

Dear Future Trine Graduate,

Welcome to the Trine University family, where we are putting you into motion to revolutionize the 21st century. We have taught generations of successful learners and plan to do so for years to come. With an educational heritage spanning 127 years, we will hold you to the same rigorous academic standards we have set for those who came before you.

Our expectations for academic excellence will serve you well, even before you graduate, as many of you will find jobs and internships with companies who know our reputation. After graduation you will find that having Trine University on your resume will carry immense clout with employers. Our job-placement numbers speak for themselves. In 2012, 92 percent of our graduates were enrolled in graduate school or found meaningful employment within six months of graduation. We expect those numbers to be even higher for our 2013 graduates, many of whom received multiple job offers before graduation at starting salaries above the national average. Several of our 2012 graduates went on to pursue doctorates at schools such as Yale, Stanford, University of Michigan and Case Western, to name a few.

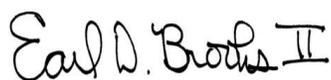
In the last decade we have experienced some of the most substantial changes than any other time in our history. The changes will continue because of the vision of our administration, faculty, staff, trustees, community and – most importantly – **you**. We are focusing on your future. You are our most valuable asset and, quite frankly, the reason we're here.

Your professors will expect active participation, collaboration, theoretical study and creativity. Not only will you learn how to do, you'll learn what to do. We are giving you the tools – quality teaching, labs, resources, technology, support – to be successful in your college career. It's up to you to use them. We believe in you and look forward to the day we receive word that you got your dream job or were accepted to graduate school.

That's why we're here – to send you out into the 21st century, help you reach your goals and impact the world.

Please feel free to stop by my office anytime. My door is always open.

Sincerely,

A handwritten signature in black ink that reads "Earl D. Brooks II". The signature is written in a cursive, slightly slanted style.

Earl D. Brooks II, Ph.D.
President, Trine University

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TRINE UNIVERSITY PROFILE

DESCRIPTION

Trine University is a private, comprehensive, career-oriented, degree granting institution. It offers degrees in over 35 academic programs through six schools—Allen School of Engineering & Technology, Franks School of Education, Jannen School of Arts & Sciences, Ketner School of Business, School of Health Sciences, and the School of Professional Studies. The University is governed by a self-perpetuating Board of Trustees.

MISSION STATEMENT

Trine University promotes intellectual and personal development through professionally-focused and formative learning opportunities, preparing students to succeed, lead, and serve.

To achieve this mission, Trine University undergraduate and graduate students receive personal attention through small classes and excellent teaching. We focus on your future by providing career-oriented higher education that emphasizes:

1. active participation in classes, with a focus on teaming and collaboration
2. the useful and practical, to complement rigorous theoretical study
3. intentional co-curricular experiences to cultivate holistic student development
4. learning how to do, while learning what to do

VISION

Trine University will be the very best mid-sized private university, contributing to local and regional economic and cultural development. We will be characterized as engaged, dynamic, growing, and adding value.

VALUES

Trine University's mission and vision for the future rest on five core values that define our foundational beliefs and guide all that we aspire to accomplish.

1. Personal and professional growth with a focus on creative endeavors and lifelong learning
2. Quality teaching, learning, and scholarship
3. A highly responsive, dynamic environment
4. A trustworthy, secure, and caring community that embraces diversity
5. The highest ethical standards in all activities

GOALS (Specific, Measurable, Attainable, Realistic, and Timely=SMART)

To realize our mission and achieve our vision, the following operational goals have been established to guide our day-to-day activities:

- Provide a responsive and effective environment for student learning, living, student living, and personal achievement through exceptional programs and services
- Continue to enhance its processes, tools, and to complement the quality of academic programs; optimally utilizing information, technology, or both
- Build a community which exemplifies and celebrates diversity
- Develop and strengthen corporate and community partnerships
- Consistently and passionately engage all stakeholders in the mission and life of the University

- Support systematic planning, developmental, and assessment processes to assure on-going improvement of the University and its programs

Adopted on May 7, 1999 and revised April 30, 2004, September 2006, and October 2010 by the Board of Trustees

ACCREDITATION

Trine University is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools, www.ncahlc.org. Telephone 312.263.0456. Trine University's programs in chemical engineering, civil engineering, computer engineering, electrical engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET. ABET's national office is located at 111 Market Place, Suite 1050, Baltimore, Maryland, 21202-4012, USA, Telephone 410.347.7700. All teacher preparation programs are accredited by the Council for the Accreditation of Educator Preparation (www.caepnet.org) and the Department of Education/Office of Educator Licensing and Development (DOE/OELD) (www.doe.in.gov/licensing). The Ketner School of Business, Bachelor of Science in Business Administration Program is accredited by the Accreditation Council for Business Schools and Programs (ACBSP), www.acbsp.org. Accredited majors include: accounting, business administration, entrepreneurship, finance, golf management, management, marketing, and sport management. Associate degree programs in accounting and business administration are also accredited.

DISCLAIMER

The information contained in this catalog is subject to change. It is the responsibility of the student to ensure that information, particularly in regard to fees, is current. Up-to-date information is available through academic advisors or on the Trine University Web site at trine.edu.

HISTORY

The University was founded in 1884 by 12 private citizens. It was and is a product of the normal school movement of that time, a fact that was reflected in its original name, Tri-State Normal College.

As a result, the mission and focus differed radically from the prevailing concepts of higher education in that day. The first schools of higher education in this country were essentially in the British mold, with emphasis on the liberal arts and training for the learned professions, particularly the clergy. By contrast, normal schools provided higher education for students in the "normal occupations" of life, such as teaching, engineering, telegraphy, domestic science and other practical arts.

Although they provided an unpretentious type of education, normal schools were generally bold and innovative. They simply took students in and encouraged them to do as much as they could through self-development. They also encouraged active student participation in classes, as opposed to the prevailing lecture format. For the convenience of their students, the schools operated on a year-round basis. Coeducation was another striking feature of the normal school movement.

But it was the emphasis on the useful and practical, rather than the traditional, that enabled normal schools to flourish. By 1888, 30 normal schools had been founded in Indiana, including Ball State Teacher's College, Valparaiso and, of course, Tri-State Normal College, located on six

acres of land in the tiny village of Angola. Within 30 years, however, Tri-State was the only school to survive as an independent; all of the other schools had perished or had become state-or church-sponsored.

One reason that Trine University succeeded while the other schools failed was because of its early leader, Littleton M. Sniff. His fierce sense of independence and total devotion to this school is documented in hundreds of letters he wrote to prospective students, assuring them they could start college regardless of their academic background and that they could earn degrees in the shortest time possible at a cost they could afford. Most of these letters concluded with the simple command and exhortation of “Come.”

Sniff, the institution’s second president, presided over the school’s first commencement ceremonies in 1888. By May 1922, Tri-State College—renamed in 1906—had more than 200 graduates, representing nearly every state in the Union and 30 countries. Sniff died on September 14, 1922, in his 36th year as president, the longest tenure in school history. The strength of his character and the power of his convictions were part of his legacy to Trine University.

The original curricula featured teaching, bookkeeping, science, commercial law, penmanship and some courses in the classics and music. Under Sniff’s guidance, the institution kept pace with the needs of the new scientific era by adding or dropping courses of study according to demand, financial feasibility and the needs of the marketplace. In 1927, the University reorganized to focus solely on its strengths in engineering and business. All other programs were discontinued, including teacher preparation, fine arts, music and the School of Law. The School of Pharmacy opened in 1902 and closed in 1922.

The School of Engineering, which was established in 1902 by George Neihous (who had come to the college at the request of President Sniff), offered accelerated bachelor of science degree programs in civil, mechanical, electrical, and chemical engineering. There was also a new engineering need to be met in the expanding world of transportation: aviation. Ever flexible and alert, Tri-State College listed aeronautical engineering as a degree program in 1929, two years after Charles Lindbergh crossed the Atlantic. During this time, the school’s flying clubs—the Stick and Wing Club and the Glider Club (later renamed the Thunderbirds)—were formed. In 1934, the University celebrated its 50th anniversary at the 1934 World’s Fair in Chicago with daily demonstrations of its miniature wind tunnel.

The School of Commerce, built around the objectives of the American private enterprise system, offered accelerated Bachelor of Science degree programs in business administration and accounting.

World War II could not have ended too soon for Tri-State College. By 1945 its enrollment sank to 170, putting its future in jeopardy. Several administrators had gone two years without pay. But the war ended and more than 1,300 students—mostly GIs—swelled the campus in the fall of 1946. War surplus buildings were secured from the Federal Public Housing Agency to provide additional classroom buildings and student housing for an over-crowded campus. In 1947, due to the volume of students completing their coursework early, a mid-year commencement was instituted. With its future secure, the stockholders agreed to reorganize the 60-year-old school into a nonprofit educational corporation, marking the first time the College was granted exemption from federal tax.

Dr. Richard M. Bateman began his 15-year tenure on campus in 1960. His era would prove to be of great significance. The campus underwent one of its largest expansions in history, adding Ford Library (1962), Stewart Hall (1965), Best Hall of Sciences (1967), Hershey Hall (1970) and Zollner Golf Course (1971). Five new dormitories were constructed in 1968 as student enrollment hit a record: 2,022 students.

In 1964, as a first step in gaining accreditation with the North Central Association of Colleges and Secondary Schools (NCA), the University discontinued its accelerated 27-month programs and began enrolling students in standard 36-month programs. While many had serious misgivings about ending the accelerated programs, most realized the importance of gaining accreditation. NCA accreditation was achieved in 1966.

In 1968, the Division of Arts and Sciences was formed to offer two-year transfer programs to students who planned to earn Bachelor of Science degrees in the liberal arts at other schools. The new programs proved popular, and in 1970, the division was upgraded to a school with four-year degree programs. Teacher preparation returned to the curriculum in the 1970s. With three schools—Engineering, Business, Arts & Sciences—the institution had become more than a college. Shortly after Bateman's departure in 1975, Tri-State College was officially renamed Tri-State University.

During the 10 years leading up to its Centennial Celebration in 1984, the University continued to innovate and excel. The first Grand Prix go-kart race was held in 1971. The first International Students Association dinner was served in 1974. The first WEAX (student radio station) broadcast was heard in 1978. A free film series was inaugurated in 1980. The Trojans, known as the Engineers until 1967, had great success in golf, track and field, and particularly basketball, which collected 11 consecutive Mid-Central Conference titles and earned two appearances in the NAIA national tournament.

Tri-State University celebrated its 100th anniversary with the publishing of *From Carriage to Computer: The First 100 Years of Tri-State University*, written by Elizabeth Brown Orlosky.

In the early 1990s, the University received approval from NCA to offer adult degree programs outside of Angola. Between 1994 and 1998, the University opened four locations across northern Indiana—Angola, Fort Wayne, Merrillville and South Bend. In 2002 the Masters of Science in Engineering Technology was approved as the first of five graduate programs currently offered.

Hershey Hall was the site of the 1996 and 1997 NAIA Division II Women's Basketball Championship. The Tri-State University Thunder advanced to the Elite Eight in 1996. The women's golf team captured the University's first national championship in 1997. The men's volleyball team won the school's second national championship in 1998, the same year Thunder football rolled to an 11-3 record and a semi-final appearance in the national playoffs.

More than 120 years after its founding, TSU, now Trine University, continues on a successful path. Since 2001, significant renovations have given the campus new life. The Keith E. Busse Athletic and Recreation Center with 200-meter indoor track and practice areas for tennis, volleyball, baseball and softball, opened 'Fall 2009'. In Fall 2010, the new Fred Zollner Athletic Stadium will serve 5,000 fans of football, lacrosse, soccer and field hockey. The renovated Sniff Building now houses the school's executive offices once again, under the name C.W. Sponsel Administration Center. The school's newest and most modern building opened on Homecoming weekend in October, 2007. The University Center and the Center for Technology and Online

Resources houses the new Library and Information Resources, 320-seat Fabiani Theatre, Trine Bookstore, Student Life and Student Success and Retention offices, a post office, IT help desk and department, Hornbacher Fitness Center and Hornbacher Studios, the new home for WEAX 88.3-FM, Trine University's radio station.

Students moved into new apartments near the University Center and on Kinney and Moss streets in fall 2007. The apartments feature a central living area with private bedrooms and baths and kitchen area with microwave. The buildings include a central lounge with big screen TV, fireplace and small bistro area.

Trine University has completed a \$2 million technology upgrade, creating a campus-wide wireless environment. The Center for Digital Excellence, a technology classroom for group learning, is housed in the new University Center. SMART classrooms, new classrooms equipped with access to modern computers, projector systems, connectivity for laptops and additional resources for electronic instruction such as DVD players, have also been installed on the campus. The University provides more than 200 computers dedicated to student access in labs across campus. Students can also access the Internet at their convenience because every room in each apartment enjoys connectivity.

Academics remain strong in all six schools: Allen School of Engineering & Technology, Franks School of Education, Jannen School of Arts & Sciences, Ketner School of Business, School of Health Sciences, and School of Professional Studies. Master's degree programs in criminal justice, leadership, and engineering (majors in civil, biomedical and mechanical).

CORPORATE STATUS

Trine University is an educational corporation organized and existing under the laws of the state of Indiana. The correct corporate name of the institution is Trine University, Incorporated. The University was founded in 1884 as Tri-State Normal College. The governing body of the University is the Board of Trustees, which has an authorized membership of 30 trustees, each of whom serves without compensation and none of whom may be employed by the University in any administrative or teaching capacity. Two of the trustees are authorized to be elected by the alumni. Consistent with this form of organization and non-profit operation, Trine University has been granted exemption from federal income tax by the Commissioner of Internal Revenue, Treasury Department under Section 501 (c) (3) of the Internal Revenue Code. Contributions to the University are deductible to the extent provided by law; bequests, legacies, devises or transfers to the University are deductible in arriving at the value of the net estate of a decedent for estate tax purposes in the manner and to the extent provided by law; gifts of property are deductible in computing net gift for gift tax purposes in the manner and to the extent provided by the Internal Revenue Code.

FINANCIAL INFORMATION

Selected financial data are available from the institution's annual report. That report may be obtained from the office of the President or of the Vice President for Finance.

CAMPUS SECURITY

A copy of the annual campus security report is available by September 1 of each year on the Trine University Web site (*trine.edu*). It contains statistics, policies, and a description of programs that promote campus safety as well as drug prevention program information.

LOCATIONS

MAIN CAMPUS

Nestled in the heart of Steuben County, Trine University's 400-acre main Angola campus serves as the hub of Trine University's various locations. Besides being home to 101 of Indiana's natural lakes, Steuben County is one of the fastest growing areas in the state. In recent years, it has been touted as one of 50 boom towns in the U.S. in Money magazine. All though the town has a population of only 9,000 residents, 750,000 visitors flock to Steuben County's scenic gem, Pokagon State Park annually. Due to the abundance of water and natural beauty, fishing, camping, skiing and boating are all popular pastimes. Angola's location at the major highway intersection of Interstate 80/90 and Interstate 69, makes it easily accessible from any of the major cities in the area. It also has a healthy economy, with 300 businesses and industries, many of which partner with Trine University to offer enhanced educational opportunities. Restaurant and shopping chains, in addition to an outlet mall in Fremont, also provide quick access to many convenient retail businesses. Additionally, a variety of family-centered activities are nearby, like putt-putt, a roller skating rink, and movie theaters. Virtually every necessity, including healthcare at Cameron Memorial Community Hospital or Urgent Care, is met on or near campus.

The Aerospace Engineering Building is slated for remodeling as the **Bock Center for Biomedical Engineering** to serve a new Master of bio-medical engineering degree.

Named in honor of John G. Best, a distinguished alumnus and former member of the Board of Trustees, the **John G. Best Hall of Science** contains classrooms and science laboratories. The building houses the **Jannen School of Arts & Sciences**, which was named in honor of Trine University alumnus and trustee Dr. Robert L. Jannen and his wife, Dolores.

Best Hall also houses the **Fairfield Lecture Room**; the Department of Mathematics & Informatics; the Department of Science; the science laboratories; the Department of Criminal Justice, Psychology & Social Sciences; and the study abroad program.

Forman Hall, named after trustee emeritus Leamen Forman, trustee emeritus which includes the **Trine Welcome Center**, named to honor trustees Ralph and Sheri Trine, and the **Radcliffe Conference Room**. Dedicated in April 2001, it houses the Office of Admission, Office of Financial Aid, Office of the Registrar, Business Office, and Centennial Station Cafe.

The **Thomas L. Fawick Hall of Engineering** was named in honor of Thomas L. Fawick, an inventor, industrialist and friend of the University. Renovation on the interior of the building and the updating of all laboratories, classrooms, offices and the **Kitsuda Seminar Room** were completed in 1997. The building, which houses a scanning electron microscope, is home to the University's **Allen School of Engineering & Technology**, named for alumni Jerry and Jorja Allen. Fawick Hall also houses the **McKetta Department of Chemical & Bioprocess Engineering**, the **Wade Department of Mechanical & Aerospace Engineering**, the **Reiners Department of Civil & Environmental Engineering**, the Department of Electrical & Computer Engineering and the Department of Technology.

The chemical engineering laboratories and offices are housed in the **Howard P. Conrad Chemical Engineering Wing** of Fawick Hall, named in honor of Howard P. Conrad, distinguished industrialist and friend of the University.

The central entrance of Fawick Hall is known as the **Clifford W. Sponsel Tower** and is named to honor of Dr. Clifford W. Sponsel, an emeritus member of Trine University's Board of Trustees and a 1931 civil engineering graduate of Tri-State College.

Honoring a former chair of the Board of Trustees, the **Perry T. Ford Memorial Building** is a three-level building that houses the **Ketner School of Business**, which includes the Department of Business Administration and the Department of Sport Management & Public Relations.

The **General Lewis B. Hershey Hall** athletic complex was named in honor of General Lewis B. Hershey, a distinguished alumnus, member of the Board of Trustees, and 29-year director of the U.S. Selective Service System. Hershey Hall contains offices, classrooms, the **Ketner Sports Center**, the **Gettig Fitness Center**, the **John Behee Conference Room**, racquetball courts, an indoor track and a main arena for basketball and volleyball with a seating capacity of 4,000. Hershey Hall was renovated before serving as the site of the 1996 and 1997 NAIA women's national basketball tournament.

Platt Hall, Conrad Hall, Fabiani Hall, Cameron Hall and **Alwood Hall** house students at the main campus. Parking is available behind and in front of the residence halls, and additional street parking is available. In 1995 and 1996, the original Alwood, Cameron and Platt residence halls were demolished. They had been named in honor of three former trustees: Ray Alwood, an accomplished Angola businessman and former vice chair of the Board of Trustees; Dr. Don Cameron, a 1905 graduate and founder of Angola's Cameron Hospital; and Dr. Henry Platt Jr., a business and industry leader in the Chicago area. On April 5, 2000, the residence halls were renamed in the trustees' honor. On May 4, 2000, Conrad Hall was dedicated to honor the memory of Mr. Howard P. and Dr. Martha Conrad, both past presidents of Northern Indiana Fuel & Light Co. Dr. Martha Conrad was also a former member of the Board of Trustees. Fabiani Hall was named in honor of Dr. Dante C. Fabiani, a 1938 graduate and former chair of the Board of Trustees. His son, James P. Fabiani, is currently a member of the Board of Trustees.

Named in honor of Jack F. Ealy, a 1927 electrical engineering graduate, the **Ealy International Center** was dedicated in the summer of 1996. It is located on the lower level of Conrad Hall and houses lounges for students and visitors and a kitchen and dining room for international students.

From 1905 to 1970, **William D. Shambaugh Hall** was known first as the Engineering Building and later as the Recitation Building, which housed the classrooms for basic subjects. The building was renovated in 1988-89 and was named in honor of William D. Shambaugh, a distinguished alumnus. It now houses the **Franks School of Education**, the namesake of long-standing trustee Lawrence Franks. The **Mary Mogish Kostyshak Educational Media Resource Center** is also located in the Building. The center offers a juvenile literature and school curriculum collection, kits and audio-visual resource materials as well as workspace and materials to support education students. Named in honor of Paul and Mary Mogish Kostyshak, Paul Kostyshak was a 1949 Tri-State College civil engineering graduate. Shambaugh Hall also houses the Angola Adult Education Center of School of Professional Studies, People Services, Career Services, and Trine Middle College.

Built in 1887, the **Littleton M. Sniff Administration Building** is the second- oldest building on campus. It was named in honor of the second president of Tri-State College, Littleton M. Sniff. In 2004, a multi-year, \$2 million renovation began, which included renaming the building the **C.W.**

Sponsel Administration Center. The addition of a carillon in the bell tower of the building was a gift from current trustee and alumnus William Gettig. The bell chimes on the quarter hour and plays, among other tunes, the University alma mater.

The oldest building on campus was completed in 1884 and received a complete renovation in 1992. It was named in honor of 1936 mechanical engineering graduate Dr. Charles Taylor, a Trine University Trustee since 1992, and his wife, Nancy. The **Charles and Nancy Taylor Hall of Humanities** houses the Department of Humanities & Communication as well as classrooms, the **Wells Gallery**, the Humanities Institute, the Fine Arts Library, and the **Wells Theater**, the home of the University's drama club.

The 18-hole **Zollner Golf Course** offers scenic recreation with its renovated bunkers and many challenging holes. The golf course is named in honor of Fred Zollner, a prominent industrialist and former chair of the University Board of Trustees. In 1999, the **Witmer Clubhouse** was named for Wilber E. Witmer, a 1947 business administration graduate and golf course benefactor.

SCHOOL OF PROFESSIONAL STUDIES

The School of Professional Studies is designed to provide quality, continuous higher education learning opportunities for adults who want to advance in their careers and keep pace with the growing complexities of today's career environment. Nearly one-fourth of all students attending Trine University are School of Professional Studies' students.

SCHOOL OF PROFESSIONAL STUDIES**Angola Education Center**

322 Shambaugh Hall
One University Ave.
Angola, IN 46703; 260.665.4623
E-mail: trinenorth@trine.edu

Columbus Education Center

2222 Poshard Drive
Columbus, IN 47203; 812.350.6387
E-mail: Columbus@trine.edu

Fort Wayne Regional Campus

9910 DuPont Circle Drive East
Fort Wayne, IN 46825; 260.483.4949
E-mail: trinefw@trine.edu

Indianapolis Regional Educational Center

7508 Beechwood Centre Road
Avon, IN 46123; 317.775.8410
E-mail: trineavon@trine.edu

Logansport Educational Center

2815 E. Market St.
Logansport, IN 46947; 574.516.1218
E-mail: Logansport@trine.edu

Schererville Educational Center

746 E U.S. Hwy. 30
Schererville, IN 46410; 219.440.7180
E-mail: trinem@trine.edu

South Bend Regional Campus

4101 Edison Lakes Parkway, Suite 250
Mishawaka, IN 45545; 574.243.0500
E-mail: trinesb@trine.edu

Sturgis Educational Center

107 W. West Street
Sturgis, MI 49091; 269.651.2115
E-mail: Sturgis@trine.edu

Trine Virtual Campus

9910 DuPont Circle Drive East
Fort Wayne, IN 46825; 260.439.4949
E-mail: virtualcampus@trine.edu

Warsaw Educational Center

907 Wooster Road
Winona Lake, IN 46590; 574.377.9278
E-mail: warsaw@trine.edu

TRINE UNIVERSITY ADDITIONAL LOCATIONS**Carew Education Center**

1819 Carew St.
Ft. Wayne, IN 260-203-2914
E-mail: DPT@trine.edu

Peoria, Arizona

14100 N. 83rd Ave.
Peoria, Arizona 480.209.3549
E-mail: www.trine.edu/peoria

UNDERGRADUATE ADMISSION

Trine University admits applicants on the basis of scholastic achievement and academic potential; selection is made without regard to race, religion, color, gender, sexual orientation, or age. Admission into Trine University is not an entitlement; attendance at Trine University is a privilege. Prospective students are encouraged to visit the campus. An admission counselor will make arrangements for a visitor to meet faculty, students, coaches, and financial aid personnel. Prospective students may visit classes and have a guided tour of campus facilities. Students who wish to arrange a campus visit should call or e-mail the Trine University Office of Admission at 260.665.4100 or admit@trine.edu.

Trine University accepts an online application only. It can be accessed via the Internet at trine.edu. Online applications may be sent by following the directions given on our Web site. No application fee is required.

RECOMMENDED HIGH SCHOOL PREPARATION

All prospective students should have satisfactorily completed a minimum of the following high school courses: four years of English and three years each of science, social studies, and mathematics.

ENGINEERING, MATHEMATICS, FORENSIC SCIENCE, AND COMPUTER SCIENCE APPLICANTS

In addition to the above, all prospective engineering, mathematics, forensic science, and computer science majors should at a minimum have completed two years of algebra, one year of geometry, and a semester of trigonometry.

ENGINEERING APPLICANTS

Prospective engineering majors should have completed one year each of chemistry and physics.

PREPARATORY COURSES

Every Trine University academic program has a mathematics component. Faculty advisors recommend a beginning mathematics course based upon a student's SAT and/or ACT exam results and high school GPA. If adequate information regarding a student's math skills is not available, a student may be required to take a mathematics placement exam. A student may be assigned to non-credit, preparatory courses in mathematics.

GENERAL APPLICATION PROCEDURES AND REQUIREMENTS

In addition to a completed application form, applicants must provide the following items: evidence of graduation from an accredited high school or an acceptable score on the General Education Development (GED) examination.

Official high school transcripts must be sent from the originating high schools or official documentation from GED provided directly to the Office of Admission.

Transfer students must request that all of the post-secondary schools they have attended send official transcripts directly to the Office of Admission.

Results from the American College Aptitude Test (ACT) or the Scholastic Aptitude Test (SAT) are required unless the applicant has been out of high school for five years or more.

A person may apply as a non-degree student without showing evidence of a high school diploma or an acceptable score on the GED test. Non-degree students who later apply for degree status must meet the degree requirements of the program to which they seek admittance.

NON-DEGREE SENIOR CITIZENS

Trine University offers free tuition for persons 60 years of age or older who are served by the Steuben County Council on Aging and who reside in Steuben County to take undergraduate courses for credit and/or non-credit. Enrollment is granted on a space-availability basis.

HOUSING INFORMATION

University residence room contracts are available online. Students must complete and submit their housing contracts and non-refundable enrollment deposits to the Office of Admission by the National Candidate Reply Date of May 1 for full-time admission. Request for an extension must be made in writing. For more information on housing requirements, see the "Student Life" section of the catalog, or review the "Student Life" section on the web at www.trine.edu.

AWARDING OF CREDIT BY EXAMINATION

ADVANCED PLACEMENT (AP) EXAMINATION

An applicant for freshman standing who achieves a score of 3, 4, or 5 on the College Entrance Examination Board's Advanced Placement (AP) Examination may be granted credit. Results of the examination should be sent to the Office of the Registrar. Students who score 5 on an exam should contact the appropriate department chair for consideration of additional credit:

AP EXAMINATION

TRINE UNIVERSITY CREDIT

Art

History	3 sem. hrs. Humanities electives
Studio	3 sem. hrs. Humanities electives
Drawing	3 sem. hrs. Humanities electives

Biology

Biology	BIO 114
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Chemistry

Chemistry	CH 104
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Computer Science

Computer Science	3 sem. hrs. Informatics electives
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Economics

Macroeconomics	ECO 223
Microeconomics	ECO 213

English

Language & Composition	ENG 103, 113
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Literature & Composition	ENG 103, 153
French	
Language	3 sem. hrs. Humanities electives
Literature	3 sem. hrs. Humanities electives
German	
German	3 sem. hrs. Humanities electives
Government & Politics	
Government & Politics	GOV 113
History	
American	HIS 103, 113
European	HIS 203, 213
Latin	
Virgil	3 sem. hrs. Humanities electives
Catullus-Horace	3 sem. hrs. Humanities electives
Mathematics	
Calculus AB	MA 134
Calculus BC	If a student has a score of 4 or 5, credit will be given in MA 134 and MA 164. A score lower than 4 on the BC Exam may earn credit in MA 134 depending upon the AB subscore.
Statistics	MA 253
Music	
Music	3 sem. hrs. Humanities electives
Physics	
Physics B	PH 104
Physics C	PH 224
Psychology	
Psychology	PSY 113
Spanish	
Language	SPN 113, 123
Literature	SPN 113, 123

CLEP AND DANTES TESTING

Trine University awards credits based upon the College Level Examination Program's (CLEP) general and subject-matter examinations as well as all DANTES examinations. Trine University is not a testing site for either examination program. For information regarding CLEP or DANTES credits, contact the Office of the Registrar.

Trine University accepts the American Council on Education's recommended passing score in effect at the time of the administration of the examination. Upon achieving a score considered

“passing” by Trine University, CLEP or DANTES credit will be listed on the student’s transcript for the number of semester hours recommended in the official CLEP or DANTES publications. The student’s department chair will determine whether the CLEP or DANTES credit received will apply toward a portion of the requirements in the University’s general education requirements, school requirements, major requirements or electives.

PROJECT LEAD THE WAY TUITION SCHOLARSHIPS

- Value: \$500 annually (\$250 per semester) and may be renewed for up to three years for a total value of \$2,000 over four years. This scholarship may be stacked on top of two Trine University merit-based awards, but not to exceed tuition.
- Renewal Criteria: must continue to pursue a Trine University engineering or technology degree and make satisfactory progress towards completing the degree.
- Eligibility: must have completed minimum of (2) PLTW high school courses with grade of “B” or better in each course and provide a transcript documenting these courses from a PLTW certified high school.

TRINE UNIVERSITY/PROJECT LEAD THE WAY CREDIT

Course Equivalency:

- PLTW Introduction to Engineering Design equivalent to Trine University Basic Technical Drawing (ETD 103)
- PLTW Computer Integrated Manufacturing equivalent to Trine University Manufacturing Materials & Processes (ETD 123)
- PLTW Engineering Design & Development equivalent to Trine University Middle College designation (GE 113 or substitution/free elective for an introductory course to individual engineering degree programs)

NONCOLLEGIATE SPONSORED INSTRUCTION

Trine University awards credit for college-level courses offered by business and professional organizations as recommended by the American Council on Education in its National Guide to Educational Credit. Credit is awarded for course work offered by the military as recommended by the American Council on Education in its Guide to the Evaluation of Educational Experiences in the Armed Services. Credits are awarded subject to the approval of the student’s department chair.

UNIVERSITY CREDIT BY EXAM

A student may earn credit by taking an examination for approved courses administered by the appropriate academic department. A list of courses for credit by examination is available in departmental offices. A fee is assessed, and application forms are available in the Office of the Registrar.

MIDDLE COLLEGE (Dual Credit Program for High School Students)

Through the Middle College, Trine University provides an opportunity for high school students to earn dual credit (college and high school credit simultaneously). Courses are offered in the following ways: on Trine University campuses and online (blended with Trine University students),

and on the campuses of participating high schools (strictly for high school students through the concurrent enrollment program).

To qualify for Middle College, students must meet the following requirements: submit an official Middle College application and a current high school transcript, be in good academic standing in high school (GPA of B or higher or by recommendation of the high school guidance counselor), successfully completed the sophomore year of high school, and be currently enrolled in a public, private, or home school.

Courses on campus and online are offered throughout the calendar year, and students may register for any courses in which they meet the prerequisites. Courses on high school campuses are offered during the school year, and high schools only offer specific courses. Tuition is set at a significantly reduced rate. Students taking courses on the campuses of Trine University or online must provide the books specified by the course syllabus; students enrolled in the concurrent enrollment program generally rent books through their regular high school book rental program (this is decided by the participating high school).

All Middle College students must sign enrollment forms which cover the policies and procedures related to Middle College participation. Middle College students are registered students with the university and must abide by policies stated in the Trine University Student Handbook.

Trine University Middle College is a member of the National Alliance of Concurrent Enrollment Partnerships (NACEP).

More information is available at www.trine.edu/middlecollege or by calling the Middle College office at 260.665.4648.

TRANSFER STUDENT ADMISSION

A transfer student follows Trine University's general application admission procedures. Students are eligible for admission only from approved schools of higher learning, and cannot be on academic probation from the previous institution(s).

A student who does not meet Trine University's academic standards for freshman admission may apply as a transfer applicant once he/she has completed a minimum of 18 semester credit hours/or 27 quarter credit hours within a two semester/or three quarter period at a community or junior college or other 4-year institution. These 18 semester/or 27 quarter credits must include English Composition I, a mathematics course, and a social science or humanities elective. Developmental or preparatory classes are not to be included in this total. The student must earn a grade of "C" or better in each of these required courses and have a minimum grade point average of 2.0.

Transfer students applying to the School of Engineering must have a cumulative grade point average of 2.5 and a grade of "C" or better in Calculus I, Chemistry I, and English Composition I.

Trine University encourages applications from community college graduates. Transfer relationships facilitate the application process and offer special benefits with the following two and four-year institutions:

Bethel College, Mishawaka, IN
Genessee Community College, Batavia, NY
Glen Oaks Community College, Centreville, MI
Ivy Tech Community College, IN
Jackson Community College, Jackson, MI
Joliet Junior College, Joliet, IL
Kellogg Community College, Battle Creek and Coldwater, MI
Lansing Community College, Lansing, MI
Lorain Community College, Elyria, OH
Northwest State Community College, Archbold, OH
Owens Community College, Toledo, OH
Southwestern Michigan College, Dowagiac, MI
Vincennes University, Terre Haute, IN

Graduates of two-year programs in applied science should anticipate a minimum of six semesters to complete a bachelor's degree in engineering. Trine University offers a number of "two-plus-two" degree program options, including design engineering technology and selected business programs.

Trine University offers transfer scholarships to qualified full-time, main campus applicants.

TRANSFER CREDIT

Credits earned at an approved institution with grades of "C" or better may be transferred to Trine University. Credits acceptable toward a Trine University degree shall be determined by the department in which the student is enrolled. An evaluation of transfer credit shall be made when the University receives an official transcript of the completed course work. To facilitate the evaluation, the applicant should provide the Office of Admission with a catalog or guide which contains descriptions of the courses completed elsewhere.

INTERNATIONAL STUDENT ADMISSION

International students who wish to study full time on the main campus may apply for admission as freshmen or as transfer students. The application deadline for fall admission is June 1 and for spring admission November 1. By following these deadlines, the prospective student will have ample time for long distance correspondence, obtaining a US visa, and making travel arrangements. An international applicant to Trine University is required to submit the following materials:

APPLICATION FORM

A completed Trine University International online application must be submitted to the Office of Admission. Prospective students may apply online at *trine.edu*. (No application fee required.)

FINANCIAL GUARANTEE

US Department of Homeland Security regulations require that students demonstrate their ability to finance the first year of education before receiving the I-20 AB form. A financial guarantee (bank statement) must be submitted before the I-20 AB form is issued.

ACADEMIC RECORDS

The student must send complete, official academic records, in English, to: Trine University Office of Admission, and should include courses taken, grades received and degrees or certificates earned. An explanation of the coding system used to evaluate the student's work should accompany the records. Transfer students should have official transcripts sent from each institution of higher education attended, in English, as described above. Course descriptions and/or syllabi from those institutions must also be included. If the transfer student is presently residing in the United States, a photocopy of the current I-20 must be enclosed.

INSURANCE

All International students will be required to carry Trine University's student health insurance unless they are government sponsored and can provide proof of insurance through their sponsor.

TEST SCORES

Students must demonstrate proficiency in English by providing a TOEFL score (code is 1811), ACT (code is 1250), or SAT (code is 1811). A minimum TOEFL score of 530 is required on the paper test, or 71 on the iBT, or a 6.0 overall score IELTS.

Awarding of transfer credit is contingent upon demonstration of knowledge on placement examinations to be given upon arrival on campus.

ENGLISH AS A SECOND LANGUAGE PROGRAM (ESL)

Students who do not meet the English language proficiency requirement for admission directly into a University degree program may apply for admission to the English as a Second Language program with "conditional admission" to a University degree program.

The intensive ESL program strives to prepare non-native English speaking students with the academic, cultural, and social language skills needed for success in an American university setting and in everyday life in the United States. It offers a variety of classes to non-native English speakers who need to improve their English language skills before entering their academic field of study. Students who score below minimum requirements on the IELTS or TOEFL and those who do not have a TOEFL or IELTS score are placed in the appropriate level of English Language proficiency based on the results of an ESL placement test taken upon their arrival to the university.

The English as a Second Language Program at Trine University offers non-credit intensive English language courses to highly motivated international students whose native language is not English. The ESL program is designed to help equip students with the skills necessary to read, write, speak, and understand American English, so they can successfully complete college-level courses. Students will be tested at the end of the first semester of the ESL program and may need to continue taking intensive English preparation courses either full-time or part-time in combination with regular college courses as recommended by the Director of the ESL program. Students may begin their full-time degree program after successful completion of the ESL program.

READMISSION

A student whose enrollment is interrupted for any reason for more than one semester, not including the summer semester, is considered to have withdrawn and must be readmitted. Candidates for readmission must make application through the Registrar's Office.

For students not on academic probation who need some time away from campus and who do not wish to have their enrollment interrupted, Trine University has a Planned Academic Leave program (PAL). This program provides the student with on-campus benefits during the period of the leave. Application materials are available in the Registrar's Office.

TUITION AND FEES

PAYMENT OF EDUCATION COSTS

Payment of tuition, fees, and room and board is due at the Business Office on the date indicated on the student's bill. Any financial aid awarded will be deducted from the student's charges each semester. Each student is responsible for purchasing books using funds from personal and/or financial aid sources. Any student with outstanding financial obligations to the University will not be permitted to register for any subsequent semester, or receive a transcript or diploma until the obligation is fulfilled. Students maintaining a balance owed to the University will be assessed late fees and will be responsible for collection and/or attorney costs if such efforts should become necessary.

AUDITING FEE

A fee is charged per credit hour for auditing courses. To learn the amount of this fee, call the Business Office.

COURSE FEES

Additional fees may be incurred for online courses and other specialized courses.

CREDIT BY EXAMINATION

A fee per credit hour must be paid in advance to the Business Office for a school or department-administered examination for credit. To learn the amount of this fee, call the Business Office.

ENGINEERING AND SCIENCE FEE

A fee is charged for all engineering and science majors.

ENROLLMENT DEPOSIT

All admitted domestic applicants must confirm their intention to enroll by paying a \$300 Enrollment Deposit. A portion of the fee (\$150) will be used as a housing deposit. The \$300 Enrollment Deposit is not refundable and must be submitted no later than May 1. Request for an extension must be made in writing.

FLAT RATE TUITION

A flat rate tuition charge is assessed to each main campus student registered for the full-time load of 12–18 credit hours per semester. Individual credit hour charges are applied to overloads and loads less than full time.

INTERNATIONAL FEE

All entering international students are assessed a one-time non-refundable fee of \$500 upon enrollment for an orientation program and specialized programs and services.

TRANSCRIPT FEE

A per copy fee is assessed for issuance of official Trine University transcripts. A transcript will not be issued to a student with an outstanding financial obligation to the University.

OTHER COSTS**BOOKS AND SUPPLIES**

Book and supply expenses vary depending on the number of courses taken and the major and are the personal obligation of each student.

MISCELLANEOUS FEES

A student is responsible for any additional fees such as long distance telephone charges, library fines, parking tickets, and lab breakage.

ROOM AND BOARD

A 19-meal per week plan or a 10-meal per week plan is required for all students residing in the units or apartments. Villa students are required to have a 50-meal per semester plan; however, they have the option of increasing to the other plans. When the University is in session, three meals are available daily Monday through Friday. Brunch and evening meals are available Saturdays and Sundays. Commuter students may purchase any of the meal plans.

PERSONAL EXPENSES

Expenditures for personal items such as laundry, dry cleaning, travel, membership fees and similar expenses should be included when prospective students are estimating total costs of their university experience.

PERSONAL INSURANCE

Trine University is not responsible for the damage and/or loss of a student's personal property of any type. This includes, but is not limited to, computers, printers, stereo equipment, microwaves, refrigerators, etc. All damage or loss incurred to a student's personal property is solely the responsibility of the student. This damage and/or loss can be caused by, but is not limited to, theft, power outages, power surges, etc. It is recommended that all students verify that their personal property is covered by their parents' homeowners insurance. If this is not the case, it is

recommended that students acquire renter's insurance, which can be obtained through parents' homeowners insurance company and/or agent.

TELEPHONE SERVICE

Students living in University units, apartments or villas will be provided local telephone service and voice mail capabilities free of charge. On request, students may have long distance service enabled.

STUDENT HEALTH INSURANCE

All full-time students are required to demonstrate that they have adequate health insurance coverage; therefore, the insurance premium is automatically placed on your student account. If you determine that your current coverage is adequate and want to waive the Trine Student Accident and Sickness Insurance Plan, you will need to complete an on-line insurance waiver by the published deadline. The waiver must be completed each academic year. Information regarding the insurance and waiver process is available in the Business Office.

ATHLETES: If an athlete is granted a waiver, the athlete or his/her family's health insurance company will be responsible for the first \$5,000 of any sports-related injury. Athletes who are enrolled in the Trine Student Accident and Sickness Insurance Plan will be covered for intercollegiate sports injuries at 100% up to \$5,000. Trine University provides additional excess insurance coverage for students who are injured while participating in intercollegiate athletics at no additional cost to the student.

INTERNATIONAL STUDENTS: All International students will be required to carry Trine University's student health insurance unless they are government sponsored and can provide proof of insurance through their sponsor.

REFUNDS

Refunds of tuition and room and board follow the schedule below. The international fee and enrollment fee are not refundable.

Tuition:

Week One—100%;

Weeks Two & Three—50%;

Week Four—0%

Room and Board:

Week One—Prorated at \$50/day;

Weeks Two & Three—50%;

Week Four—0%

A \$50 administration fee will be assessed for "exception" drops (per occurrence).

Please note: If a student receiving financial aid withdraws during the semester, that aid is subject to the federal refund calculation.

Any student who is dismissed or suspended for misconduct shall not be entitled to any refund. No refund is provided at any time on fees, books and supplies, or personal expenses.

WITHDRAWAL

If a student decides to drop or withdraw after registering for classes:

- The student is responsible for completing the proper paperwork and filing it with the Office of the Registrar. By failing to do so, the student accepts financial responsibility for all charges incurred on their account.
- The Student may be eligible for a full or partial refund of tuition and room and board, depending on when the official withdrawal takes place.
- It may result in a change in the total amount due for the semester.
- It may result in a loss of financial aid from a federal, state or institutional source.
- Failure to attend classes does not constitute a drop/withdrawal.

MONTHLY PAYMENT PLAN

A monthly payment plan service is available through a national organization specializing in education financing. Parents desiring information concerning the monthly payment plan may request a pamphlet from the business office, or on the Trine University Web site (*trine.edu*).

FINANCIAL AID

PURPOSE

The Office of Financial Aid provides assistance to students and their families to make a college career at Trine University affordable. It is important to reward students for exceptional academic accomplishments. To provide such assistance allows students to attend who might not otherwise have the opportunity.

Most scholarships are merit-based. They are based on academic achievement. However, other grants and loans are awarded based upon financial need as determined by the federal and state governments after completion of the Free Application for Federal Student Aid (FAFSA).

The Office of Financial Aid provides a convenient location and several options of access for students and/or their families. The office offers walk-in counseling, telephone counseling, and can be contacted via electronic mail.

The Office of Financial Aid is located in Forman Hall, and has a street address of Office of Financial Aid, 1 University Avenue, Angola, Indiana, 46703.

Normal hours of operation are Monday through Friday, 8 a.m. to 5 p.m. The Office of Financial Aid can be reached by phone at 1.800.347.4878, option 2, by email at finaid@trine.edu, and accepts faxed documents at 260.665.4511.

APPLICATION PROCEDURES

All students applying for financial aid must complete the Trine University Online Application for Admission to be accepted into a degree-seeking program and complete a FAFSA at www.fafsa.gov with school code 001839.

The FAFSA (Free Application for Federal Student Aid) for new applicants or returning applicants is the primary application for assistance. This can be filed on line at www.fafsa.gov. It is used to determine eligibility for all Federal Title IV aid programs, such as Federal Pell Grant, Supplemental Educational Opportunity Grant, Federal Work Study Program, and Federal Direct Education Loan Programs. It is also the application for undergraduate Indiana residents to apply for tuition assistance programs from the State of Indiana.

The priority application filing deadline is March 1 of each academic year for fall/spring/summer enrollment; however, aid is awarded throughout the school year. Current students need only complete the FAFSA once each academic year before March 1 to reapply for all aid. The Trine University FAFSA filing priority deadline is March 1 to be eligible for all types of institutional aid.

The U.S. Department of Education's Central Processing System (CPS) reviews and analyzes the information provided on the FAFSA. The CPS uses this information to calculate an Expected Family Contribution (EFC) and the EFC is the index of the family's financial strength and not necessarily

the amount a family will have to pay towards college. Once Trine University receives this information, it will be used to create an electronic award notification.

AWARDING

Each year Trine University awards over \$20 million of institutional funds in the form of scholarships and grants.

Awards are processed by the Office of Financial Aid in accordance with University policy and the regulations governing the various aid programs. The University policy is established by the financial aid committee, and the Director of Financial Aid is responsible for determining financial aid eligibility based on the results the Department of Education submits to Trine University after a FAFSA is processed. An award notification detailing the type and amount of each award is posted on line at MyTrineFA with a postcard or an email being sent to the student as soon as the FAFSA is received.

Assistance derived from Trine University may only be used for the costs of tuition, fees and room and board in University owned facilities during the academic year that it is issued. Additional descriptions of aid programs and satisfactory academic progress standards are included in the Trine University Student Handbook and on the University website.

MERIT-BASED SCHOLARSHIPS

Merit-based scholarships are institutional awards available to full-time, main campus degree seeking students who have demonstrated outstanding academic achievement. Unless otherwise specified, academic awards are renewable for each year a recipient is enrolled (up to 4 year) while maintaining satisfactory academic progress. At the end of every semester hours earned (Pace) and cumulative GPA's are checked to verify eligibility.

If a student moves off campus, his/her need based grant/scholarships might be adjusted. Other aid can be affected as well. Starting August 2009, students are required to live in campus housing throughout their college career.

ACADEMIC SCHOLARSHIPS

Scholarship grants to full-time, main campus degree seeking students are based on test scores, either SAT or ACT, and cumulative grade point averages (GPA). The ranges of awards are from \$500 up to full tuition for the academic year. Awards are renewable each year that a recipient is enrolled at Trine University as a full-time student (up to 4 years) and maintains a satisfactory GPA. Additional details can be found on the Financial Aid website. Awards are available to incoming freshmen and transfer students, both commuters and residents.

LEGACY AWARDS

Awards of \$2,000 per year are available for full-time, main campus students who are children, grandchildren or siblings of Trine University alumni. This award may be placed on top of no more than two additional scholarships and cannot exceed tuition.

NEED-BASED ASSISTANCE

Need-based assistance is available to qualified main campus students who file the Free Application for Federal Student Aid (FAFSA) by the Trine University priority filing deadline of March 1. State of Indiana information is taken from the FAFSA— no separate form is required.

FEDERAL GRANTS

Federal Pell Grants - \$605 to \$5645

Federal Supplemental Educational Opportunity Grants (FSEOG) - \$200 to \$4000

(Amounts vary depending upon federal funding.)

Note: The amount of *Federal Pell Grant* funds you may receive over your lifetime is limited by a new federal law to be the equivalent of six years of Pell Grant funding. Since the maximum amount of Pell Grant funding you can receive each year is equal to 100%, the six-year equivalent is 600%.

STATE GRANTS

Freedom of Choice (FOC) - \$200-\$7410

Twenty-First Century Scholarship - Up to \$7528

Note: Students first entering college in the 2013-2014 academic year will be required to meet certain completion requirements to renew state financial aid awards in 2014-2015. Students receiving the Higher Education Award, the Freedom of Choice Award, or the 21st Century Scholars Award must complete at least 30 credit hours during their first year of college to remain eligible for the maximum financial aid award. A student who completes at least 24 credit hours during his first year will remain eligible for financial aid, but will receive an amount that is less than a student who completes 30 credit hours. More information about these requirements is available at www.in.gov/ssaci.

INSTITUTIONAL

Additional awards may be available to a student with extreme economic need, after his/her FAFSA has been received by the March 1 priority deadline. Eligibility requirements and responsibilities for need-based assistance are as follows:

Student must be a U.S. citizen or an “eligible non-citizen.”

Student must be accepted for admission to Trine University.

Student must complete and submit the FAFSA by March 1.

Student must submit documentation to complete his/her financial aid file by May 1.

Student must be accepted as a regular student in an eligible program that leads to a degree or certificate.

Student must be enrolled in the minimum number of credit hours needed to fulfill specific program requirements.

Student must not be in default on any Title IV loan (Perkins, NDSL, Federal Stafford, GSL, and FSL) or owe a repayment on any Title IV grant (Federal Pell Grant or FSEOG) received for attendance at any institution.

Student must be registered with the U.S. Selective Service System, if required by law.

FEDERAL DIRECT LOAN PROGRAM STAFFORD LOANS

Students apply for a Stafford loan by first completing the FAFSA. When the financial aid office reviews the FAFSA, the student's eligibility for the Federal Direct Loan is then determined. Upon acceptance of the Direct Loan, a master promissory note (MPN) and an entrance interview form need to be completed.

A Stafford loan can either be subsidized or unsubsidized. A student must be enrolled half-time (6 credit hours) to be eligible and the maximum amount a student can borrow is based upon grade level status.

A subsidized loan is awarded on the basis of financial need. A student must be enrolled half-time to be eligible. The student is not charged interest until repayment begins because the federal government "subsidizes" the interest. These loans have a 10-year payoff and a six-month grace period beginning after the student leaves college, either by graduation or withdrawal from the University. For Direct subsidized student loans borrowed on or after July 1, 2012 and before July 1, 2014, the interest subsidy will not be available during the six-month grace period. This means that interest WILL be charged during the grace period for subsidized loans borrowed during this time period.

If you are a first-time borrower on or after July 1, 2013, there is a limit on the maximum period of time (measured in academic years) that you can receive Direct Subsidized Loans. You may not receive Direct Subsidized Loans for more than 150 percent of the published length of your program. This is called your "maximum eligibility period." Your maximum eligibility period is based on the published length of your current program. You can find the published length of any program of study in the course catalog.

An unsubsidized loan is not awarded on the basis of need. A student must be enrolled half-time to be eligible. The student is charged interest from the time the loan is fully disbursed until it is paid in full. A student can choose to pay the interest while enrolled in school or defer those payments until repayment. These loans also have a 10-year payoff and a six-month grace period beginning after the student leaves college, either by graduation or withdrawal from the University.

PARENT LOANS

The Direct Parent Loan for Undergraduate Students (PLUS) is designed to help parents assist their dependent children with their educational expenses. Parents will need to go through a pre-approval process, which is based on specific credit criteria. There is no grace period with a PLUS loan. The interest rate is fixed at 6.41%. Interest is charged from the date of the first disbursement until the loan is paid in full. The repayment period for a Direct PLUS Loan begins at the time the PLUS loan is fully disbursed, and the first payment is due within 60 days after the final disbursement. Parents must begin paying both principal and interest while the student is still in school. However, for Direct PLUS Loans with a first disbursement date on or after July 1, 2008, the parent may defer repayment either when the student on whose behalf the parent borrowed the loan is enrolled on at least a half-time basis or for an additional six months after the student ceases to be enrolled at least half-time.

ENROLLMENT STATUS

Each type of aid requires main campus, day program students to enroll for a certain number of credit hours per semester. Most federal aid requires at least half-time status (six credit hours); state, institutional and private aid requires fulltime enrollment (a minimum of 12 credit hours). All Trine University Institutional Awards are created for 12-18 credit hours. Schedule overloads, or 19 or more credit hours and additional course fees, are the responsibility of the student.

MAINTAINING ELIGIBILITY

Currently enrolled students are required to maintain the appropriate grade point average for the award. Students must maintain satisfactory academic progress by completing the required number of credit hours each academic year (see the Trine University Student Handbook) and reapply for aid in the spring for the next academic year.

DISBURSEMENT

All aid is disbursed equally between semesters. (Aid is generally not available during the summer.) Aid is credited to students' accounts in the Business Office. Student loans are credited only after they are disbursed to the student's account. Students who work on campus will receive paychecks every two weeks. (For more information, see the Trine University Student Handbook or www.trine.edu.)

APPEALS

Appeals to financial aid decisions can be filed with the Director of Financial Aid, who will present them to the financial review committee. Appeals must be filed in a timely manner.

REFUNDS AND REPAYMENTS

Students, who withdraw from the University or drop classes during the first 60 percent of a term, may be required to repay some or all of their financial aid. Refund and repayment amounts are calculated based upon a required federal formula to determine how much is to be refunded to the student or refunded back to various federal, state, and institutional programs. (See the Fees section for information about the Tuition Refund Schedule and Residence Refund Schedule.)

Return of Title IV federal regulations require the Office of Financial Aid to review the aid packages of students who officially withdraw or unofficially withdraw from Trine University if they receive any type of federal aid, including federal grants and loans.

Examples of these calculations can be seen in the Office of Financial Aid.

STUDENT RIGHTS AND RESPONSIBILITIES

Trine University is committed to working with each student to provide the best financial aid package possible. At the same time, each student has the responsibility to apply for the aid and to meet and maintain eligibility requirements. Following is a list of basic rights and responsibilities of the students in regard to financial aid:

- Students must apply for financial aid.
- Financial aid information and counseling will be available.
- Students will be considered for financial aid on a first-come, first-served basis.

- Students will be notified electronically or via postcard of their eligibility for financial aid.
- Students will be informed of the specific type of financial aid, the amount of each type of aid and the conditions to renew each type.
- Students will have the opportunity to review with the Office of Financial Aid the process by which awarded aid was determined.
- Students may request an additional review of their aid package with the director of the Office of Financial Aid.
- All students who receive financial aid are required to abide by the policies and regulations of Trine University.
- All Trine University financial aid policies and fund rules are either published on our website or available in our office. Aid recipients are required to be familiar with these policies. Information that is unclear should be brought to the attention of a financial aid staff member.
- The Office of Financial Aid will process financial aid requests without regard to race, religious affiliation, gender, age, or disability. All funds are subject to individual student need as well as the availability of funds.
- General information is communicated to students through their student e-mail account and financial aid information is communicated through their MyTrineFa account. It is recommended that students review their accounts daily. **For new students we use the email that was entered in on the FAFSA but after they receive their student email account we begin to communicate using that one.
- The student has the right to know what types of aid are available. That information is available on both our website and in our offices.
- Students are obligated to advise the Office of Financial Aid of any name, address, or phone number changes. Updating this information through the MyPortal will not update your financial aid records.
- Financial aid recipients are required to notify the Office of Financial Aid of any scholarships, loans, book allowances, employer assistance or other forms of assistance extended to them from sources outside the college. Adjustments of aid may occur as a result.
- The Office of Financial Aid reserves the right, on behalf of the Institution, to review and cancel any award at any time because of changes in a student's financial or academic status, state program rules, federal program rules or any other significant change. Students will be notified of any changes to their aid via an email communication to their Trine email account (refer to ** in #3 for new students). The email will include instructions on how to access MyTrineFA and review the changes. This will only show the changes made to your award notification and not your bill. If you want to know how this change will affect your bill you will need to log into your MyPortal account for that information.
- Financial aid is awarded to a student contingent upon maintaining standards set forth by the institution's Title IV Satisfactory Academic Progress (SAP) policies which complies with required Federal standards. Please refer to our website and/or student handbook for policy details.
- Disbursement of a student's financial aid award(s) (with the exception of CWS- College Work Study) will be in the form of a direct payment to the student's account in the Business Office. Work-study earnings are paid directly to the student on a bi-weekly basis via direct deposit after a job is secured and hours are worked.
- Financial aid will be awarded and disbursed based on full-time enrollment. Should the student register for less than a full-time course load or drop classes that adjusts enrollment, costs and

- aid will be adjusted and an acknowledgement will be sent to the student via email communication. In some cases, students may be required to repay funds to the University.
- It is the student's responsibility to ensure that their tuition is paid in full by the due date either by financial aid, payment plan, cash or whatever resource they plan to use. Students can check their account status on My Portal.
 - The student must complete all application forms accurately and submit them on time to the appropriate location.
 - The student must provide correct information. The intentional misreporting of information on financial aid application forms is a violation of the law and is considered a criminal offense which could result in indictment under the U.S. Criminal Code.
 - The student must return all additional documentation, verification, corrections, and/or new information requested by the Financial Aid Office in a timely manner. Any delay can affect eligibility for certain types of aid.
 - A student receiving federal financial aid earns their aid based on the number of days that they attend class. A recipient who fully withdraws from Trine University before 60% of the term is completed will be subject to an aid recalculation based on the number of days attended. The unearned aid will be refunded to the appropriate federal financial aid program by the institution and the student will repay the institution.
 - A student receiving state financial aid earns those funds based on their enrollment at the end of the 28th class day. Therefore state aid will be affected should the student drop all of their coursework or below full time before that date.
 - A student receiving a Federal Pell Grant earns those funds based on their enrollment as a first time bachelor degree seeking student. A student needs to begin enrollment in all of their coursework before Pell Grants will disburse to their student account. Therefore Pell Grants will be affected if you do not begin your enrollment in all of your coursework and/or drop some or all of the coursework for which you enrolled in.
 - A student may be awarded employment under the CWS – Federal Work Study Program. The amount of CWS aid shown on the award letter is the maximum amount of money the student can expect to earn during the academic year as a result of work performed. The student will only be paid for hours worked and obtaining work is contingent on finding CWS approved employment.
 - Financial aid awards are made for one academic year only. One half of the award will be applied each semester. It is always the student's responsibility to apply annually for aid; applications submitted by March 1st will receive priority consideration. Renewal of aid depends upon the student maintaining Title IV Satisfactory Academic Progress, continued need for financial aid assistance and the availability of funds.
 - Students planning to attend summer semester and wishing to receive financial aid must complete a Request for Summer Aid Form in addition to the FAFSA. Applications are available on-line and in the Office of Financial Aid following spring break.
 - Students who are incarcerated in a state or federal correctional institution are required by Federal law to inform the aid office of their incarceration.
 - The student is responsible for reading and understanding all forms that he/she is asked to sign and for keeping copies of the forms.
 - The student must accept responsibility for all agreements that he/she signs.
 - The student must be aware of and comply with the deadlines for application or reapplication for aid.

- The student should be aware of the school's refund policy
- Students receiving financial aid must inform the Office of Financial Aid about additional awards
- Students must maintain satisfactory academic progress toward academic goals.
- Students must maintain good social standing.
- Students must reapply for financial aid between January 1 and March 1.
- Students must report to the Office of Financial Aid when transferring to another school.
- If applicable, students must participate in the Federal Stafford Loan entrance and exit interviews.

STUDENT SERVICES

In addition to the information regarding student life provided below, the Student Handbook provides a wide range of information for students.

HOUSING

A housing survey and residential room and board contract are available though MyPortal, and will not be processed until after a formal offer of admission has been extended by the Office of Admission and the Enrollment Deposit has been paid. Former students may submit housing applications upon readmission.

HOUSING REQUIREMENTS

Trine University students enrolled prior to fall 2009: All students are obligated to live on campus until he/she has completed 48 hours and has lived on campus for four semesters. Students who are married, responsible for a dependent child, living at home with a parent or legal guardian (within 40 miles of Angola), or are 21 years of age on or before the first day of fall classes may be waived from the housing requirements.

Trine University students, beginning with students entering in the fall of 2009, are required to live on campus. Students who are married, responsible for a dependent child, living at home with a parent or legal guardian (within 40 miles of Angola), or 21 years of age on or before the first day of fall classes may be waived from this requirement. Students with a cumulative GPA of a 2.0 or higher and have completed 48 credit hours and lived on campus for four semesters may be approved to move into a University recognized Sorority / Fraternity House or Christian Campus House.

Students are required to be enrolled full-time (12 credit hours per semester) to reside in university housing. Students must have the written approval from the Dean of Student Life prior to moving off campus. Failure to receive approval or providing false information may lead to expulsion from Trine University.

All residential students: A signed Residential Room and Board Contract, Housing Information Form, and Housing Deposit are required before arriving on campus. The Residential Room and Board Contract is binding for the entire academic year. If the Residential Room and Board Contract is broken or if permission from the Dean of Students has not been given to be released from the contract, the Housing Deposit is forfeited and a contract release fee will be assessed.

Additionally, any student leaving on-campus housing without a contract release may be subject to billing for the entire contract period. Falsification of housing arrangements may lead to expulsion from the University. For those students with an on-campus portion of the Trine University Merit Scholarship it will be withdrawn once the student is no longer an on-campus residential student. The academic merit portion will remain. The student is eligible for other types of financial assistance, and as always it is recommended that the student continue to complete the FAFSA by the March 10th institutional deadline.

RESIDENTIAL FACILITIES

Residential facilities at Trine University include men only traditional residence halls, women only traditional residence halls, and co-ed apartment buildings. Villas are available for juniors and

seniors, and are assigned based on combined academics and social standing. Honors students are eligible to be housed in Moyer Apartments on the golf course.

Applications are processed in the spring for the next academic year.

Whitney Commons dining facility in the University Center serves all residential students. A commuter meal plan is available for students not living on campus. The campus Mail Center and student mailboxes are also located in the University Center and serve all of the residential facilities.

PERSONAL PROPERTY INSURANCE

Trine University will not reimburse students for damage to personal items as a result of theft, fire, flood, and other disasters. Personal items must be covered by personal insurance.

COUNSELING SERVICES

The purpose of Counseling Services is to provide students with short-term counseling that will enable them to overcome a variety of personal and interpersonal difficulties that may interfere with their pursuit of academic and career goals. Clinical counseling services, as well as prevention, outreach, and consultation, are provided free on the residential Angola campus.

DISCIPLINARY STRUCTURE

Learning to live as productive members of a university community is a developmental process that starts as a freshman and continues throughout the college experience. The primary goals of educational discipline are to educate students in the understanding of community and to help them assume and demonstrate responsibility as a member of a civilized society. The primary principle upon which the disciplinary program is based is that actions have consequences. Educational discipline is different from law enforcement. The goal is education and restoration. For that reason, the Office of Student Services operates within a different realm and makes decisions differently than those agencies that enforce public law.

Attending Trine University is an optional and voluntary action. Institutional acceptance for attendance extends an invitation to students to join an academic and social community and to remain a member of that community as long as academic, community and residential standards are met. The standards and procedures of Trine University have been established to ensure the educational purpose of the university will be met and an atmosphere of intellectual growth exists. Any person may file a complaint, with the Campus Safety or the Office of Student Services, against another student, a member of the University community, or a student organization for the violation of community or residential standards as outlined in this Student Handbook. Students are expected to abide by the standards set forth in this Student Handbook. Failure to do so may result in disciplinary sanctions.

PROCESS:

The disciplinary system at Trine University consists of a Judicial Review Committee, Judicial Review Board, Dean of Students, and the University Disciplinary Review Board. Disciplinary issues may be handled by one or more of the above groups depending on the severity of the offense. The Judicial Review Committee shall determine which group will hear the individual case(s). The University Disciplinary Review Board will hear cases involving potential dismissal or expulsion. In addition, for serious offenses, acts, or crimes against other people or the university

are grounds for immediate dismissal or expulsion by the Dean of Students.

The Judicial System at Trine University is operating under a standardized point system. Points are assigned depending on the severity of the violation. Points are accumulated for the duration of time spent at Trine University.

WARNING

Disciplinary Warning is an official sanction notifying the student or organization that certain behavior was unacceptable. Further misconduct may result in additional disciplinary sanctions.

INTERVENTION: 1 – 74 judicial points

Disciplinary Intervention is an official sanction indicating to a student or organization that their behavior was unacceptable. Disciplinary sanctions will be imposed.

PROBATION: 75 judicial points

When on Disciplinary Probation, a student or organization will meet with the Dean of Students and a disciplinary action plan will be developed. Probation is an official sanction notifying the student or organization that any additional inappropriate behavior may result in a referral to the University Disciplinary Review Board with a recommendation of possible dismissal from Trine University.

FINAL NOTICE – REVIEW BOARD REFERRAL: 80 judicial points

Final Notice is an official sanction notifying the student that his or her inappropriate behavior has resulted in a referral to the University Disciplinary Review Board and a recommendation of possible dismissal or expulsion from Trine University.

Disciplinary Dismissal is an official determination canceling the student's registration at the university. In the instance of dismissal, all academic grades will revert to "F's" and monetary reimbursements may not be made for tuition, room and board, or any other university fees. Students who wish to return to the university at a later date must submit a written request to return to the Registrar and Dean of Students. Notification will be sent to appropriate university offices when a student is dismissed. The student's parents or guardians will also be notified.

Disciplinary Expulsion is an official determination made by the Dean of Students that permanently prohibits the student from attending Trine University. In the instance of expulsion, all academic grades will revert to "F's" and monetary reimbursements may not be made for tuition, room and board, or any other university fees. Notification will be sent to appropriate university offices when a student is expelled. The student's parents or guardians will also be notified of the decision.

DISCIPLINARY SANCTIONS

Sanctions for misconduct may include, but not limited to fines, loss of privilege or participation in any university activities, sports, academic organizations, or trips for a set period of time, restitution, university service hours, educational/service activities, dismissal, and/or expulsion.

JUDICIAL REVIEW MEETING

During the judicial review meeting, the Judicial Review Committee will meet with the student to

review the charge(s). During this review, the case will be presented to the student and a decision regarding actions and sanctions will be determined. If the student chooses to accept, responsibility for the violation(s), appropriate sanction(s) will be issued. If the student chooses to deny responsibility, the student will then meet with a Judicial Review Board. During a disciplinary review meeting, students will:

- a) Have the opportunity to state his/her side of the case and provide any additional information that might be helpful in resolving the case.
- b) Receive written notification of the results of the judicial review meeting at the conclusion of the meeting.

APPEAL PROCESS:

The Dean of Students will address appeals of decisions made by the Judicial Review Board. These appeals must be submitted in writing, via email, within three working days of the notification. Appeals will only be accepted for the following reasons:

1. Insufficient evidence to support decision
2. Harshness of sanction
3. Procedural irregularity
4. New evidence

The reason of a student's appeal must be included in the written appeal. It is up to the Dean of Students to determine whether the appeal statement clearly identifies and explains one or more of the above reasons for the appeal. In the absence of such demonstration, the appeal will be denied and the sanctions stand. The appeal is not an opportunity to argue that the initial decision was wrong. If the Dean of Students determines that there is an acceptable reason(s) for an appeal, based on those indicated above, he/she will refer the case back to the Judicial Review Board for further evaluation and possible adjustment of sanctions.

UNIVERSITY DISCIPLINARY REVIEW BOARD PROCESS:

When a violation of university community or residential standards requires the convening of a University Disciplinary Review Board, the following procedure will be initiated by the Office of Student Services:

1. The University Disciplinary Review Board will be established consisting of the following five members: one administrator (who will serve as the chair of the board), one faculty member, one representative from the Athletic Department, a student resident director, and the President of Student Senate. Meeting minutes will be recorded.
2. The student accused of the violation will meet with the Dean of Students and charges and recommendations as a result of the violation(s) will be issued and explained.
3. A date and time of the hearing will be set.
4. The student is allowed to have two people present during the hearing.
5. The Dean of Students or Judicial Review Committee representative will introduce information about the disciplinary history of the accused and other relevant information. The Dean of Students or Judicial Review Committee will recommend a plan of action. The student will have the opportunity to provide his or her account of event(s). The Board will determine if the recommended sanctions will be imposed.
6. The accused student will receive written notice within 24 hours of the hearing.

The decision of the University Disciplinary Review Board is final with no avenue of appeal.

ADDITIONAL STUDENT SERVICES INFORMATION

For information on the following, please see the current Student Handbook available at:

http://www.trine.edu/campus_life/student_handbook/

- Student Organizations
- Professional Societies & Fraternities
- Honor Societies & Fraternities
- Greek Life
- Special Interest Groups
- Athletics
- Intramural Sports

CAREER SERVICES

Career Services offers programs and services to assist students and alumni to make career decisions and pursue the skill development necessary to compete in a rapidly changing, competency-based, global workplace. Career planning is an on-going process that begins when the student is a freshman and continues throughout the student's senior year. The office of Career Services works collaboratively with academic departments, faculty members, student services, employers and other relevant constituents to enhance students' career development and participation in internships and other experiential education programs. Career Services accumulates and makes accessible information and resources pertaining to career exploration, workforce trends, the job search, employment opportunities, current salary trends, and graduate employment statistics. The resources of Career Services are available throughout the student's academic preparation and when the student becomes an alumnus.

EMPLOYMENT ASSISTANCE

Students are offered advice and coaching for procuring major-related internships, cooperative education assignments, and full-time employment. Career Services facilitates communication between job seekers and employers, which includes hosting career fairs, networking events, guest speakers, and arranging student interviews for representatives of business, industry, and educational institutions who visit campus to recruit prospective employees. Career Services also reaches out to relevant individuals, campus offices, alumni, and external agencies to establish and maintain effective relations, disseminate information about programs and services, and increase experiential learning and employment opportunities for the benefit of Trine University students.

INTERNSHIPS

Career Services advertises internship requests throughout the academic year on www.trinecareers.org and refers students to other internship resources that meet their individual needs. These major-related work experiences, which usually are limited to a three-month time period, build credentials that are essential to a graduate's job search. Internships for credit are also available for students who meet specific requirements within the student's discipline or major field of study.

COOPERATIVE EDUCATION PROGRAM

The Cooperative Education Program (co-op) is a course that promotes professional learning and enhances traditional university course and lab work. The Cooperative Education Program is designed to allow students to alternate full-time work with an employer and campus sessions. This experience not only better prepares the student for entry into his/her chosen field, it allows students the opportunity to network with professionals and make industry contacts. Another advantage is that co-op students can earn a salary while on work assignments, enabling them to finance a portion of their education. Students eligible for the Cooperative Education Program must have completed a minimum of 30 semester hours with a 2.4 cumulative grade point average and must meet criteria established by the prospective employer.

A student is considered a cooperative education student after having accepted employment with a cooperative education employer, after the cooperative education director and department chair have approved the student's program, and after the student has registered for the course CO 050

Co-op Employment. Work experience prior to acceptance into the Cooperative Education Program cannot be applied to the program.

A cooperative education student must complete a minimum of three semesters of work assignments. Approval of any changes in the alternating employment/class schedule must be obtained in writing from the cooperative education company, the cooperative education director, and the respective department chair. This approval should be obtained by mid-term of the semester before the proposed change. Consecutive work periods require separate registration.

A cooperative education student may have a second cooperative education employer only if a co-op position is terminated by the original employer or, in the extreme case, that no major-related experience or progression of responsibilities is occurring. Verification of major-related experience and progression must be made in writing by the cooperative education student and confirmed by both the cooperative education director and the respective department chair.

During or upon completion of the final work assignment, the student must enroll in CO 453 Co-op Work Experience. Through this course, the student will prepare and submit a comprehensive report on his/her work experience. Upon approval of the finished report, three (3) hours of academic credit will be awarded.

Upon satisfactory completion of both academic and co-op work experience requirements, the cooperative education student will be granted a baccalaureate degree with the inscription "Cooperative Education Program," as well as a designation on his/her transcript noting cooperative education participation.

WORK STUDY EMPLOYMENT

The Office of Financial Aid manages the work study program. All on-campus work study positions are posted on www.trinecareers.org.

ACADEMIC INFORMATION

PLANNING

ACADEMIC ADVISING

Each student is assigned a faculty advisor who assists the student in planning a program to meet graduation requirements and career goals. It is, however, the student's responsibility for meeting the academic program requirements presented in the catalog.

PREPARATORY COURSES

Every Trine University academic program has a mathematics component. Faculty advisors recommend a beginning mathematics course based upon student's SAT and/or ACT exam results and high school GPA. If adequate information regarding a student's math skills is not available, a student may be required to take a mathematics placement exam. A student may be assigned to non-credit, preparatory courses in mathematics or English.

ONLINE COURSES FOR MAIN CAMPUS STUDENTS

- A student must be in good academic standing to be eligible to register for an online course.
- Students may take a single online course per semester with the approval of their academic advisors during the regular academic year (fall and spring semester).
- Students may take two online courses per six-week session with the approval of their academic advisors during the summer term.

CHANGING A MAJOR

To change a major, students must get the approval of both their current department chair and the chair of the new department.

Change-of-major forms are available in the *Office of the Registrar*. Admission requirements for each major are available in the departmental office.

A student who changes a major is subject to the program requirements in effect at the time of the major change.

When a student changes his or her major, all transcripts, including the Trine University transcript, are evaluated by the new chair. If the change of major is from one school to another (This includes students in the Allen School of Engineering & Technology who change from an engineering major to Design Engineering Technology.), from a four-year to a two-year program, or from a two-year to a four-year program, courses with less than a "C" grade may be dropped from the student's cumulative totals, if the courses are not required in the new major and if the student is not currently enrolled in those courses. Dropped courses may not be repeated in the new major.

In cases where a student is readmitted to a school in which he or she was previously enrolled, all grades earned during enrollment in that school must be included in the cumulative grade point average.

Students wishing to change from non-degree status to a degree program should process the change through the Office of Admission.

FULL-TIME STUDENT

A full-time student at the main campus is one who is carrying a minimum of 12 academic credit hours. If a student wishes to register for more than 18 credit hours, he or she must have written permission as follows: 19–20 credits requires permission from the department chair; 21–23 credits also requires permission from the school dean; and 24 or more credits also requires permission from the vice president for academic affairs.

CLASSIFICATION OF STUDENTS

For purposes of registration and determination of eligibility for certain student activities, the registrar uses the following guidelines:

CLASS	CREDITS
Freshman	0–28
Sophomore*	29–59
Junior	60–89
Senior	90+

*Students enrolled in associate degree programs remain sophomores when they have 60 or more credits.

NON-DEGREE STUDENT

An applicant may be admitted to Trine University as a non-degree student in certain programs. The non-degree student is limited to a maximum of 30 semester credit hours attempted. To continue taking courses after 30 credit hours are earned, the non-degree student must apply for and be accepted to degree status. A change from non-degree to degree status is processed by the Office of Admission.

GENERAL EDUCATION PHILOSOPHY

The purpose of the general education curriculum components is to provide the Trine University graduate with skills necessary to think critically and to communicate clearly with persons in all professions. The General Education requirements are designed to ensure breadth of knowledge and to promote intellectual inquiry and critical thinking.

GENERAL EDUCATION OUTCOMES

After completion of the general education curriculum, the student will be able to:

- present written thoughts in an effective manner using correct grammar, punctuation, and organization of ideas,
- communicate thoughts orally in an effective manner,
- demonstrate critical thinking skills utilizing information and thought processes by various perspectives listed in the philosophy, and
- demonstrate use of quantitative problem solving and reasoning skills.

The General Education Requirements consist of courses in two categories: skills and perspectives. Skills courses include written and oral communication courses as identified by individual degree programs.

Perspective courses are required for all degrees, with specific information identified in the General Education Requirement section of the catalog. Perspective courses are divided into the following areas:

Sciences – to learn to use analytical tools and applications in the study of that which is material.

Mathematics – to learn to connect mathematical ideas and applications in the study of that which is material.

Humanities – to learn to appreciate the achievements which humanity has accomplished.

Social Sciences – to gain insight into the effects of human behavior on the individual, society, and the world through history as well as in current times.

GENERAL EDUCATION REQUIREMENTS FOR ALL BACHELOR DEGREES

Area	# of semester hours
Written Communication (must include ENG 103 or ENG 104 and either ENG 113 or ENG 133)	6
Oral Communication (SP 203 or COM 163)	3
Social Sciences & Humanities (*take at least two courses from Social Sciences and at least two courses from Humanities. See table that follows.)	12
Mathematics & Science (must include at least 1 course in mathematics and 1 course in science)	10
Other (additional hours to be taken from the above categories*)	11
TOTAL	42

*EXS 102 – Lifetime Wellness may be used to satisfy two (2) of the eleven (11) “Other” hours. HNR 121 – Introduction to Honors Seminar may be used to satisfy one (1) hour of the eleven (11) “Other” hours. Any approved computer literacy course may be used to satisfy three (3) of the eleven (11) “Other” hours under General Education requirements.

Cultural Events requirement: students must attend eight university-approved cultural events over the course of four years, with no limitations on the number of events per semester. Attendance at off-campus cultural events may be possible if first approved by the university.

The cultural events requirement relates to the university’s mission in that cultural events are co-curricular experiences that cultivate the holistic development of students.

Examples of cultural events include the following:

- Multicultural events
- International events
- Musical performances, recitals, and concerts
- Dance performances
- Theater productions
- Art exhibits
- Readings in prose or poetry
- Humanities & Communication Department sponsored events
- Lectures, seminars, and symposia on a range of culturally-related themes
- University approved exhibits at cultural institutions

BACHELOR DEGREES

Humanities		Social Sciences	
ARC 293	FRN 113	ECO 213	HIS 213
ART 253	FRN 123	ECO 223	HIS 251
CHN 113	GER 104	ECO/SOC 243	HIS 423
CHN 123	GER 114	ECO 323	HIS 433
COM 123	GER 203	ECO 363	HNR X2X
COM 203	GER 213	ECO 383	PSY 113
COM 233	HIS 253	ECO/HIS 393	PSY 313
COM 363	HNR X1X	GEO 213	PSY 323
ENG 153	MUS 123	GEO 303	PSY 333
ENG 204	MUS 223	GEO 313	PSY/SOC 343
ENG 233	MUS 272	GEO 323	PSY 353
ENG 214	MUS 273**	GEO/GOV 353	PSY 383
ENG 253	PHL 203	GOV 113	PSY 393
ENG 263	PHL 251	GOV 313	PSY 403
ENG 273	PHL 313	GOV 333	PSY 413
ENG 323	PHL 323	GOV /HIS 323	SOC 103
ENG 333	PHL 333	GOV/HIS 343	SOC 313
ENG 363	PHL 343	GOV/HIS 363	SOC 323
ENG 403	SP 103	GOV/PSY 373	SOC 333
ENG 423	SPN 103	GOV/HIS 403	WS 103
ENG 433	SPN 113	HIS 103	
ENG 443	SPN 123	HIS 113	
FLM 203	SPN 203	HIS 203	
	SPN 213		

**School of Professional Study course only

GENERAL EDUCATION REQUIREMENTS FOR ALL ASSOCIATE DEGREES*

Area	# of semester hours
Written Communication (must include ENG 103 or ENG 104 and either ENG 113 or ENG 133)	6
*Social Sciences & Humanities	6
*Mathematics & Science	7
Other	3
TOTAL	22

*The above choices must include at least one course from the following perspective areas: Social Sciences, Humanities, Mathematics, and Sciences.

ASSOCIATE DEGREES

Humanities		Social Sciences	
ARC 293	FRN 113	ECO 213	HIS 213
ART 253	FRN 123	ECO 223	HIS 251
CHN 113	GER 104	ECO/SOC 243	HIS 423
CHN 123	GER 114	ECO 323	HIS 433
COM 123	GER 203	ECO 363	HNR X2X
COM 203	GER 213	ECO 383	PSY 113
COM 233	HIS 253	ECO/HIS 393	PSY 313
COM 363	HNR X1X	GEO 213	PSY 323
ENG 153	MUS 123	GEO 303	PSY 333
ENG 204	MUS 223	GEO 313	PSY/SOC 343
ENG 233	MUS 272	GEO 323	PSY 353
ENG 214	MUS 273**	GEO/GOV 353	PSY 383
ENG 253	PHL 203	GOV 113	PSY 393
ENG 263	PHL 251	GOV 313	PSY 403
ENG 273	PHL 313	GOV 333	PSY 413
ENG 323	PHL 323	GOV /HIS 323	SOC 103
ENG 333	PHL 333	GOV/HIS 343	SOC 313
ENG 363	PHL 343	GOV/HIS 363	SOC 323
ENG 403	SP 103	GOV/PSY 373	SOC 333
ENG 423	SPN 103	GOV/HIS 403	WS 103
ENG 433	SPN 113	HIS 103	
ENG 443	SPN 123	HIS 113	
FLM 203	SPN 203	HIS 203	
	SPN 213		

**School of Professional Studies course only

GRADUATION REQUIREMENTS

1. Specific degree requirements: Students must complete the degree requirements specific to their programs. Once in a program, if the requirements change, students have the option of graduating under the new requirements. Students who re-enter the University after an absence of more than one academic year are subject to the degree requirements in effect at the time of re-entry.
2. General Education Requirements: All Trine University students receiving a baccalaureate or associate degree must meet the General Education requirements. Details regarding the General Education philosophy and requirements are presented immediately before this section in the catalog.
3. A cumulative grade point average of not less than 2.0 must be achieved for all Trine University courses.
4. All required courses or approved substitutions must be completed as described in the respective degree programs.
5. Candidates for graduation must file with the registrar intent to graduate no later than one semester before the final semester of attendance in which degree requirements shall be completed.
6. Cultural Events requirement: students must attend eight university-approved cultural events over the course of four years, with no limitations on the number of events per semester. Transfer students are required to attend a prorated number of events, dependent upon the number of semesters they are enrolled, at one per semester. Attendance at off campus cultural events may be possible if first approved by the university. *(Implementation date Fall 2011)*

COMMENCEMENT PARTICIPATION FOR UNDERGRADUATE STUDENTS

All spring semester and summer semester prospective graduates are eligible to participate in the annual spring commencement ceremony. Fall semester graduates are eligible to participate in the spring commencement ceremony prior to completing their degrees only if, by the end of the spring semester, they have 18 or fewer credit hours to complete to earn their degrees. If a fall graduate has more than 18 credit hours to complete, the student is invited to attend the commencement ceremony the following spring.

COURSE SUBSTITUTIONS

An alternate course may be substituted for one required in a student's major if the student cannot schedule the required course without undue hardship. The substitution must be requested by the student's department chair. Proper notation must be made in the student's record and approval granted prior to the substitution. The substitution cannot be made simply on the request of the student to take a different course from the one required.

ACADEMIC RESIDENCY REQUIREMENT

To be eligible for a baccalaureate degree, a student must earn a minimum of 30 credits at Trine University. To be eligible for an associate degree, a student must earn a minimum of 16 credits at Trine University. The last 30 credits of a four-year degree program or the last 16 credits of a two-year degree program must be taken at Trine University unless a waiver is granted by the academic dean upon the recommendation of the department chair.

THE SECOND DEGREE

A candidate for a second Trine University baccalaureate degree is required to complete a minimum of 30 credit hours in residence above the total credit requirements for the first baccalaureate degree. In addition, the candidate must complete all other requirements for the second degree. A candidate for a second Trine University associate degree is required to complete a minimum of 16 credit hours in residence above the total credit requirements for the first associate degree as well as meet all course requirements. A candidate for a Trine University baccalaureate degree who has already earned an associate degree from Trine University must complete a minimum of 46 Trine University credit hours.

Two baccalaureate degrees may be received at the same time provided all requirements for both degrees have been met, and the student has earned a minimum of 30 credit hours more than the degree with the lower minimum hour requirement. Two associate degrees may be received at the same time provided all requirements for both degrees have been met, and the student has earned a minimum of 16 credit hours more than the degree with the lower minimum hour requirement.

ACADEMIC MINOR OR SECOND MAJOR

A candidate for a minor must file a minor declaration form with the registrar. Second majors must also be declared and are possible with certain degree programs. Students should check with their academic department, if interested. Students are subject to the program (major/minor) requirements in effect at the time the major or minor is declared.

SCHOLASTIC AWARDS AT GRADUATION

GOLD KEYS: Gold Keys are awarded to bachelor degree students enrolled at the main campus that have earned GPAs of 3.750 or better while carrying at least 15 credit hours in each of four consecutive semesters. In the event that a student qualifies for the equivalent of a second Gold Key, the name of that person is placed upon a scholastic plaque. The exception to this policy is when a main campus student meets all requirements of the second gold key with the exception of the requirement of registering for 15 credits in the final term. The student's name will be placed on the scholastic plaque provided the student has registered for a minimum of 12 credit hours, which are the final credits required for graduation.

SILVER KEYS: Silver Keys are awarded to associate degree main campus students who earn 3.750 grade point averages or better while carrying at least 15 credit hours in each of two consecutive semesters.

GRADUATION WITH HONORS: An undergraduate candidate for graduation will have his or her diploma inscribed as graduating cum laude if he or she achieves a cumulative grade point average of 3.500 to 3.749, magna cum laude if he or she achieves a cumulative grade point average of 3.750 to 3.949, or summa cum laude for a cumulative GPA of 3.950 or higher. The grade point average will be computed on the basis of all courses taken while at Trine University. To qualify for the award, a candidate for a bachelor's degree must earn a minimum of 40 semester hours at Trine University, and a candidate for an associate degree must earn a minimum of 20 semester hours.

HONORS DAY: For the purpose of Latin honors recognition at Honors Day, the grade point average requirement will be based upon the student's cumulative GPA before spring grades are posted. For such recognition, a minimum of 40 Trine University credits must be completed by the end of the spring term for a bachelor's degree or a minimum of 20 Trine University credits for an associate degree. Latin honors will be listed on the diploma and transcript based upon the student's cumulative GPA after the final term's grades are posted and the student has met all degree requirements.

GRADING SYSTEM

The grading system is as follows:

A	Excellent	4.0
B+	Very Good	3.5
B	Good	3.0
C+	Above Average	2.5
C	Average	2.0
D+	Below Average	1.5
D	Poor (lowest passing grade)	1.0
F	Failure	0.0
FI	Failure (original grade of I)	0.0
S	Satisfactory	not figured into GPA
U	Unsatisfactory	not figured into GPA
I	Incomplete	not figured into GPA
IP	In progress (grade deferred)	not figured into GPA
W	Withdrawal before completion of 80% of the semester	
WP	Withdrawal after completion of 80% of the semester with passing work at the time of withdrawal	

(issued only under special circumstances)

GRADE OF INCOMPLETE Incomplete (“I”) is a temporary grade used by the instructor in cases where a student is unable to complete course requirements because of circumstances beyond the student’s control such as illness, family emergency or other similar circumstances. It is assigned only if the student has satisfactorily completed the major portion of the course requirements and has convinced the instructor of his or her ability to complete the remaining work without registering for the course again. An instructor who assigns a grade of “I” submits to the department chair a formal statement of requirements that must be satisfied for removal of the incomplete grade. A copy of the statement of requirements, including deadlines for their completion, shall be made available to the student.

It is the student’s responsibility to contact the instructor to make arrangements for completing the remaining work. The required work should be completed and a grade reported by the end of the student’s next semester in residence, but in no case later than one calendar year following the receipt of the “I” grade. An “I” grade not removed within one year from the end of the semester in which the “I” grade was issued will be converted to an “FI” grade by the registrar. An “I” grade may not be removed by registering again for the course.

If the instructor giving the “I” grade is no longer a member of the faculty, the student should contact the department chair who will act on behalf of the former instructor. In the case of a graduating senior, if an “I” or “IP” grade is not removed until after the start of the next semester, the graduation date will reflect the new semester.

GRADE OF “IN PROGRESS” The “IP” (In Progress) grade is to be given only in courses so designated by the respective schools. The “IP” grade is designed for courses which require more than one semester for completion. An “IP” grade not removed within one year from the end of the semester in which the “IP” grade was issued will be converted to an “FI” by the registrar. An “IP” grade may not be removed by registering again for the course.

COURSE REPEAT

Course repeat means that a student may retake a course at Trine University for a better grade. When a student has repeated a course, the honor points for the higher grade are substituted.

The student’s record will not show additional hours attempted for the repeated course. Additional earned hours are given if a student passes a class where an “F” or “U” grade was originally received. Courses which are repeated remain on the student’s permanent record (transcript).

FAILING GRADES

Credit for a course failed at Trine University may not be obtained by examination.

GRADE APPEALS

The awarding of grades is the prerogative of the classroom instructor in accordance with policies posted in the Trine University Catalog. Faculty members are responsible for informing students of their grading policy. Grades become official when they are reported to the Registrar. If a faculty member discovers incorrectly reported grades due to miscalculation or clerical error, the error should be reported to the Registrar immediately on the prescribed form. The appropriate program chair/director must approve any adjustment of grades.

A student who disagrees with an assigned grade will take the following steps:

- Approach the professor and explain the problem.
- If the professor and student do not come to an agreement, the student should write a letter to the program director/chair.
- If the program director/chair's mediation does not resolve the issue, the student should file a written appeal to the Dean.

If these steps do not resolve the problem, or if impractical, the student may petition the Grade Review Board in writing for a hearing of the issue. Information regarding this may be obtained from the Vice President for Academic Affairs. The petition shall set forth in detail the basis for the review. This should be done by the midterm of the first regular term following the assignment of the grade. The Board may grant an extension of this time limit. If the Board agrees to hear the case, it will so inform the student by the end of that term. In grade review cases, the student is responsible for presenting evidence to support his/her position.

At the Grade Review Hearing, the student shall present his/her argument followed by the professor's response. The Board shall promptly prepare a written recommendation and forward copies to all parties involved, including the Chairperson and Vice President for Academic Affairs. The report shall include dissenting opinions on the Board, if any. Recommendations of the Board are advisory. In cases involving death, incapacity, or prolonged inaccessibility of the professor, or in similar unusual circumstances, the professor's immediate supervisor is responsible for assigning the grade. Records of each case heard by the Board shall be maintained in the office of the Vice President for Academic Affairs. If the student or professor involved wishes to appeal the decision on procedural grounds, he/she should file an appeal within two working days for the decision with the Vice President for Academic Affairs. If any procedural irregularities are discovered, he/she will notify the student and the Board within ten working days after the appeal.

The Vice President for Academic Affairs shall appoint the faculty members who will serve on the Board. He shall choose one regular member and one alternate (who will be from a different department, if possible) from each school. In addition, the Student Senate shall elect two student members and their alternates. Student members must have junior or senior standing. The faculty members shall serve three-year, staggered terms, and faculty members serving their third year will chair the committee. Student members shall serve one-year terms.

WITHDRAWAL FROM CLASS

A student may withdraw from class through 80 percent of the semester, provided the student obtains the proper form from the registrar and obtains academic advisor approval. International

students must also have the approval of the registrar if they will be dropping below 12 credit hours.

All students dropping below full-time status must have the approval of the director of financial aid. The completed form shall be submitted to the registrar before 80 percent of the semester is completed.

No classes shall be dropped after the completion of 80 percent of the semester except for circumstances beyond the control of the student, such as illness, family emergency, or other similar circumstances. Permission to withdraw after the completion of 80 percent of the semester must be obtained from the chair of the student's department, dean, and VPAA. If permission is granted, a grade of "WP" will be issued if the student was passing at the time of withdrawal.

A grade of "F" will be issued if the student was failing and will count toward the student's cumulative and semester grade point averages. Any deviation from the policy will be considered an unofficial withdrawal, and a grade of "F" will be issued.

COURSE AUDIT

To audit is to take a course for no credit. A course may be audited only if space is available in the course. The approval of the student's academic advisor is required. A change to credit status is permissible if completed during the normal add period. Auditors shall receive a grade of "AU." At the discretion of the instructor, an auditor may participate in class discussion and take examinations.

SCHOLASTIC AWARDS AT THE END OF EACH SEMESTER

THE PRESIDENT'S LIST: A main campus student whose semester grade point average is 3.750 or better, while carrying at least 15 credit hours, will be placed on the President's List.

THE DEAN'S LIST: A main campus student whose semester grade point average is between 3.500 and 3.749, while carrying at least 15 hours, will be placed on the Dean's List.

CLASS ATTENDANCE AND EXCUSED ABSENCES

Students are expected to attend all class and laboratory sessions. Absences may be permitted for reasonable causes such as illness, disabling injury, death or serious illness in the immediate family, or in the case of a court order. Participation in University-sponsored activities shall also constitute a reasonable cause for absence from class. Written documentation of the reason for absence may be required and, in the case of University-sponsored events, such documentation will be provided by the University sponsor.

It is the student's responsibility to discuss pending absences (field trips, athletic competitions, etc.) with his/her professor prior to the missed class period. The faculty member may require the student to complete any work due prior to the absence. Class or team lists distributed via e-mail do not excuse a student from class or laboratory sessions, but rather provide confirmation to the faculty member that the activity is indeed University-sponsored.

It is the instructor's responsibility to present a class attendance policy to each class at the beginning of the semester. Decisions regarding submittal of assignments will be at the instructor's discretion, but students may not be penalized for absences due to reasonable cause.

ACADEMIC MISCONDUCT

The University prohibits all forms of academic misconduct. Academic misconduct refers to, but is not limited to, the following activities:

- Copying another person's work and claiming it as your own, or submitting the same paper in two different courses without knowledge and consent of the instructor (plagiarism);
- Using the work of a group of students when the assignment requires individual work;
- Looking at or attempting to look at an examination before it is administered;
- Using materials during an examination that are not permitted;
- Allowing another student to take your examination for you;
- Intentionally impeding the academic work of others;
- Using any electronic device to transmit portions of questions or answers on an examination to other students;
- Using any electronic device to improperly store information for an exam;
- Knowingly furnishing false information to the University;
- Assisting other students in any of the acts listed above.

Moreover, a student is expected to submit his/her own work and to identify any portion of work that has been borrowed from others in any form. An ignorant act of plagiarism on final versions and minor projects, such as attributing or citing inadequately, will be considered a failure to master an essential course skill and is considered Academic Misconduct. A deliberate act of plagiarism, such as having someone else do your work or submitting someone else's work as your own (e.g., from the Internet, fraternity file, etc., including homework and in-class exercises), is also Academic Misconduct and will result in more serious penalties.

In situations of Academic Misconduct, instructors have the authority to award a failing grade on the assignment in question or a failing grade for the course. Upon approval by the appropriate Dean, Academic Misconduct may also result in expulsion from the University.

ACADEMIC PROBATION

The academic performance of every student is monitored by the registrar and the academic departments to determine satisfactory progress. Students with GPAs below 2.0 will receive a letter warning them that they have fallen below the standard required for graduation. (See chart on page 51 for further explanation of required GPA.)

Students are placed on probation in the following situations:

- Degree seeking students who have attempted 59 or fewer semester hours at Trine University and are more than six cumulative honor points below the 2.0 graduation standard. (See chart on page 51 for further explanation of required GPA.)
- Degree seeking students who have attempted 60 or more semester hours of course work and have a cumulative grade point average lower than 2.0. Transfer hours are added to Trine University hours attempted for purposes of determining the 60 hours attempted.

A student on academic probation will have one semester to reach minimum standards or be dismissed. Students on probation who achieve at least a 2.0 GPA in summer courses will not be dismissed. Students on probation who raise their cumulative GPA to acceptable academic graduation standards will be removed from probationary status.

After a period of not less than one semester (not including summer school), a dismissed student may apply for readmission to the program from which he or she was dismissed. A dismissed student may be readmitted without a waiting period in any other degree program to which the student can gain acceptance by the readmit committee.

Financial aid is not automatically reinstated when a dismissed student is readmitted.

Students on academic probation will have the following restrictions placed on their attendance:

- They will be required to attend a meeting explaining a student success plan.
- They may not register for more than 15 credit hours. If they wish to take more, they must petition the Readmission/Probation Committee for permission.
- They may not participate in the “rush” system for any fraternity or sorority.
- They are not eligible to participate in any athletic competition. They may practice with the team only if their coach approves. They will not be permitted to travel with the team without approval of the athletic director.

For information concerning eligibility for the University’s extra-curricular activities, consult the Student Handbook.

FULL-TIME STUDENT

A full-time student at the main campus is one who is carrying a minimum of 12 academic credit hours. If a student wishes to register for more than 18 credit hours, he or she must have written permission as follows: 19–20 credits requires permission from the department chair; 21–23 credits also requires permission from the school dean; and 24 or more credits also requires permission from the vice president for academic affairs.

The chart lists the grade point average (GPA) required to be removed from probation. The required GPA is based on the number of GPA hours attempted at Trine University.

GPA Hours Attempted	GPA	GPA Hours Attempted	GPA
1	0.000	31	1.806
2	0.000	32	1.813
3	0.000	33	1.818
4	0.500	34	1.824
5	0.800	35	1.829
6	1.000	36	1.833
7	1.143	37	1.838
8	1.250	38	1.842
9	1.333	39	1.846
10	1.400	40	1.850
11	1.455	41	1.854
12	1.500	42	1.857
13	1.538	43	1.860
14	1.571	44	1.864
15	1.600	45	1.867
16	1.625	46	1.870
17	1.647	47	1.872
18	1.667	48	1.875
19	1.684	49	1.878
20	1.700	50	1.880
21	1.714	51	1.882
22	1.727	52	1.885

23	1.739	53	1.887
24	1.750	54	1.889
25	1.760	55	1.891
26	1.769	56	1.893
27	1.778	57	1.895
28	1.786	58	1.897
29	1.793	59	1.898
30	1.800	60	2.000

When a student has attempted a total of 60 credit hours, INCLUDING transfer credits, a 2.0 GPA is required to be in academic good standing.

WITHDRAWAL FROM THE UNIVERSITY

VOLUNTARY

A student wishing to withdraw from the University during a term may obtain a withdrawal form from the registrar. A student living in a residence hall should consult the housing officer in Student Life about the room and board refund policy.

A student who plans to return to Trine University within one calendar year may apply for a Planned Academic Leave (PAL). Details and application forms are available in the Office of the Registrar.

UNAUTHORIZED

A student leaving the University during a term without officially withdrawing will receive "F" grades in all courses and will not receive refunds of any kind, including fees and deposits.

The withdrawal procedure will not take place automatically for a student who leaves campus because of illness or family emergency. If official notification of withdrawal cannot be made in person, the student should contact the registrar in writing.

DISCIPLINARY

Students dismissed for disciplinary reasons during a term may be given "F" grades and monetary reimbursement will not be made for tuition, housing, or any other university fees.

THE ACADEMIC RECORD

A report of the student's grades earned in all courses taken during a semester is posted online at the end of each term. Grade reports for first year students are mailed to permanent addresses for domestic students and to local addresses for international students.

In cases of unsatisfactory work, a student may be warned, placed on probation or dismissed from the University.

A permanent record of all the student's courses, credits and grades earned is kept in the Office of the Registrar. The student should maintain a record of courses, credits and grades each term and check from time to time to see that this record agrees with the University version. The official record may also help the student determine eligibility for any activity that requires meeting specific scholastic standards. Copies of the transcript are available to the student upon written request and advance payment, as determined per copy.

RELEASE OF INFORMATION FROM STUDENT ACADEMIC RECORDS

To ensure compliance with the federal government's Family Education Rights and Privacy Act (FERPA), the following general principles and procedures govern the release of information from student academic records.

A written request signed by the student whose name appears on the transcript and that contains information such as date of birth and/or the Trine University student identification number, is required before a University transcript or other information from the student's academic record may be released. Trine University will not release copies of transcripts from another institution. Exceptions to the above statements are outlined in the next paragraph:

- The Office of the Registrar may release transcripts or information from academic records including reports of academic standing to administrative and faculty members of Trine University whose responsibilities require this information.
- Public directory information from student records may be released at any time unless restricted by the student. This includes the student's name, local and permanent addresses and telephone numbers, e-mail address, date and place of birth, major field of study, class year, participation in officially recognized activities and sports, weight and height of athletic team members, dates of attendance, degrees, awards received, and photographs.
- Information pertaining to graduation and honors achieved may be released for publication unless otherwise restricted by the student.

Upon proper identification, a student will be shown the following:

- His or her Trine University permanent academic record, including the student's file and transcript
- His or her transcripts from another institution.

A hold may be applied to the release of a transcript or other information requested from an academic record for a student who has an overdue indebtedness to the University.

A current student may obtain a maximum of five unofficial (personal) copies of his or her Trine University transcript at no charge while attending the University. All official transcripts which bear the registrar's signature and school seal are \$3 per copy. Additional unofficial transcripts are also \$3 per copy.

ACADEMIC OPPORTUNITIES

ESL, Honors Program, Middle College, and ROTC

ESL PROGRAM –(ENGLISH AS A SECOND LANGUAGE)

In concert with the mission of Trine University, the mission of the ESL program is to provide Non-Native English Speaking Students with all the skills necessary to be successful in U.S. institutions of higher learning, to lead enriched lives during their time in the United States, and to share their cultures with their local communities.

To achieve this mission, the Trine University ESL program emphasizes:

- expecting and requiring the highest ethical standards from its students, faculty and support staff
- modeling and clearly explaining the rules of classroom etiquette
- respecting each student's culture while modeling and clearly explaining U.S. culture and traditions
- defining and promoting ethical study and test-taking practices
- providing daily opportunities for individual meetings with faculty
- requiring active classroom participation
- systematically teaching the four areas of language skills: reading, writing, understanding, and speaking
- promoting active participation in the local community
- providing opportunities to share students' cultures with the local community

Trine University's ESL Program envisions seven core values. They are:

1. Providing a secure environment that embraces diversity
2. Breaking down language and cultural barriers through education
3. Focusing on the needs of the students
4. Maintaining and teaching the highest ethical standards in all activities
5. Providing quality instruction and individualized help as needed
6. Promoting professional growth
7. Recognizing each student as an individual with potential greatness

The Trine University ESL program is comprised of four levels:

1. In level 1, students practice the basics of English Communication.
2. In level 2, students improve on basic communication tasks while gaining exposure to academic English.
3. Level 3 students have a good command of English for communicative purposes and concentrate more on academic skills.
4. In level 4, students focus on the academic skills they will need for matriculation into their degree program.

In order to matriculate into a degree program, students must attain an overall average of C+ in all their level 4 courses.

Undergraduate students may also enter into a degree program by officially submitting a score of 71 on the TOEFL iBT (530 PBT) or 6.0 on the IELTS test before the last day to drop/add courses. Graduate students need a TOEFL iBT of 79 (550 PBT) or 6.5 on the IELTS.

HONORS PROGRAM

The mission of the Trine University Honors Program is to provide support, resources, and academic experiences to high achieving and highly motivated students, thus allowing them to grow intellectually and become active independent learners. A student in the Honors Program would be exposed to a breadth of teaching methods and topics and, through this exposure, will have a more fulfilling and varied educational experience.

ADMISSION REQUIREMENTS

First-year students accepted to any Trine University program with a minimum SAT of 1220/ACT 27 and a High School GPA of 3.750 or higher may be invited into the Honors Program. The Honors Program Director will review qualifications of incoming freshmen and will make recommendations for admittance, which will then go before the Honors Program Advisory Board for final approval. Current Trine University freshmen or sophomores may also apply for admission into the Honors Program. These students must notify the Honors Program Director of their intentions, have a current Trine University GPA of 3.500 or higher, and must submit a letter of recommendation from a Trine University faculty member. Decisions regarding admission will be made on a case-by-case basis as space allows.

PROGRAM REQUIREMENTS

Students accepted into the Honors Program will need to earn 22 Honors Program Points and satisfy the basic requirements for each category listed below. In addition, students also must maintain a 3.500 GPA to successfully earn an Honors Degree.

Introduction to Honors Seminar—HNR 121 (1 pt)

Honors students are required to take this course their first semester in the Honors Program. This course provides an introduction to the Honors Program and is also a forum to read about and discuss various current topics. Writing, critical thinking, and classroom discussion are emphasized. This is a one credit hour course and can be applied toward a student's social sciences general education requirements.

Honors Courses/Contract Courses (13 - 16 pts)

Honors students are required to compile at least 13 points with any combination of dedicated HNR courses, honors sections of regularly offered courses, or contract courses in their departments. For HNR courses and honors sections of courses, the credits for each course will directly correlate to the number of points earned. Contract course points will vary depending on the degree of extra work involved. Students must take courses in at least two of the three categories listed above.

Enrichment Experiences (4 -6 pts)

Honors students are required to participate in extracurricular activities that enrich classroom learning. These activities are varied in scope and will center on the students' interests. Students are required to earn at least one enrichment experience point per year to total a minimum of four points before graduation.

Honors Project (4 pts)

Honors students are required to complete an Honors Project during their senior year. Activities that qualify for an Honors Project include an original Honors Thesis, a semester of study abroad, or elaboration of a capstone project to include Honors Program requirements. Honors Projects will culminate in a written paper as well as a presentation at the Honors Symposium held at the end of the spring semester.

ACADEMIC PERFORMANCE

To participate in the Honors Program, a student must maintain a 3.500 cumulative grade point average at the end of each academic year. A student whose GPA falls below 3.500 will be placed on probation in the Honors Program and will have one semester to raise his/her GPA. A student may only be placed on probation once. If the GPA would fall below 3.500 a second time, the student would be removed from the Honors Program.

MIDDLE COLLEGE (Dual Credit Program for High School Students)

Through the Middle College, Trine University provides an opportunity for high school students to earn dual credit (college and high school credit simultaneously). Courses are offered in the following ways: on Trine University campuses and online (blended with Trine University students), and on the campuses of participating high schools (strictly for high school students through the concurrent enrollment program).

To qualify for Middle College, students must meet the following requirements: submit an official Middle College application and a current high school transcript, be in good academic standing in high school (GPA of B or higher or by recommendation of the high school guidance counselor), successfully completed the sophomore year of high school, and be currently enrolled in a public, private, or home school.

Courses on campus and online are offered throughout the calendar year, and students may register for any courses in which they meet the prerequisites. Courses on high school campuses are offered during the school year, and high schools only offer specific courses. Tuition is set at a significantly reduced rate. Students taking courses on the campuses of Trine University or online must provide the books specified by the course syllabus; students enrolled in the concurrent enrollment program generally rent books through their regular high school book rental program (this is decided by the participating high school).

All Middle College students must sign enrollment forms which cover the policies and procedures related to Middle College participation. Middle College students are registered students with the university and must abide by policies stated in the Trine University Student Handbook.

Trine University Middle College is a member of the National Alliance of Concurrent Enrollment Partnerships (NACEP).

More information is available at www.trine.edu/middlecollege or by calling the Middle College office at 260.665.4307.

ROTC – AIR FORCE RESERVES OFFICER TRAINING CORPS

The Air Force Reserves Officer Training Corps (ROTC) is an educational program designed to give men and women the opportunity to become Air Force officers while completing their degrees. The Air Force ROTC Program develops leadership and management skills students need to become leaders in the 21st Century. In return for challenging and rewarding work, ROTC offers the opportunity for advancement, education and training, and the sense of pride that comes from serving your country. Upon completion of the Air Force ROTC program, students are commissioned as second lieutenants in the United States Air Force. Following commissioning, there are excellent opportunities for postgraduate study in a wide variety of academic fields. In accordance with the Crosstown Agreement with Detachment 225 at the University of Notre Dame, Trine University students may participate in ROTC by travelling to South Bend one afternoon and evening per week for coursework. For more information contact Shawn P. Braue, Lt Colonel, USAF; 574.631.4675.

STUDY ABROAD PROGRAM

Do you plan to take on the world? We'll put you in it. Learning is about doing and seeing at Trine. Imagine combining your studies with firsthand experiences—studying foreign cultures, or learning new languages.

To truly excel, you'll need a broad perspective, the kind you get from immersing yourself in experiences and exploration. As a student traveling abroad, you'll learn what it means to be a global citizen. You'll prepare to work with international companies, diverse people, and a global economy.

Pick your program

Trine offers three separate study abroad programs. You can enroll in semester, yearlong, or summer programs through our partner providers: International Studies Abroad (ISA) and GlobalLinks Learning Aboard or with our partner universities. Most students opt for one semester (typically second semester of sophomore year or first semester of junior year) or a summer session (typically the summer between sophomore and junior years or between junior and senior years).

It is critical that you begin planning early in your academic career particularly if your major has a fairly rigid list of courses offered in a certain sequence. Talk with your academic advisor and visit with the Trine Study Abroad office to discuss your options.

TRINE UNIVERSITY GRADUATE PROGRAMS

DOCTORATE OF PHYSICAL THERAPY**

MASTER OF ENGINEERING

- **BIOMEDICAL MAJOR ***
- **CIVIL ENGINEERING MAJOR ***
- **MECHANICAL ENGINEERING MAJOR ***

MASTER OF SCIENCE WITH A MAJOR IN CRIMINAL JUSTICE *

MASTER OF SCIENCE IN LEADERSHIP *

* For more information including graduate course descriptions refer to the SPS Catalog at:
http://www.trine.edu/adult_students/resources/catalog.cfm

**Trine University is seeking accreditation of a new physical therapist education program from the Higher Learning Commission of the North Central Association of Colleges and Schools, *www.ncahlc.org*, and CAPTE. The program will submit an Application for Candidacy, which is the formal application required in the pre-accreditation stage. Submission of this document does not assure that the program will be granted Candidate for Accreditation status. Achievement of Candidate for Accreditation status is required prior to implementation of the professional phase of the program; therefore, no students may be enrolled in professional courses until Candidate for Accreditation status has been achieved. Further, though achievement of Candidate for Accreditation status signifies satisfactory progress toward accreditation, it does not assure that the program will be granted accreditation.

GRADUATE POLICIES

CULTURE OF GRADUATE LEARNING

Graduate learning, teaching and scholarship differ from the undergraduate educational experience through the intensity of learning and the role of applicable research. All graduate experiences should reflect an in-depth study of a particular curricular field and should lead students to independent thinking, learning and knowledge acquisition.

AFFIRMATIVE ACTION STATEMENT

Trine University is committed to the equitable treatment of students, faculty and staff; therefore, all who work, live, study and teach in the Trine Community will be valued on the basis of scholastic achievement and academic potential without regard to race, religion, color, gender, sexual orientation, or age.

ADMISSION REQUIREMENTS

Students seeking to enroll in graduate studies must have:

1. A bachelor's degree from a regionally-accredited institution in an appropriate academic field, *or*
2. a bachelor's degree from a regionally accredited institution in a related field and significant major-specific professional experience, *or*
3. a bachelor's degree from a non-regionally accredited institution in an appropriate or related field and GRE test scores of 475 verbal and 600 quantitative or higher. (A GMAT score of 570 or higher may substitute for the GRE at the discretion of the department chair, program director, or dean.)

Applicants whose native language is not English must provide evidence of a minimum score of 550 on the paper-based or 79 on the internet-based Test of English as a Foreign Language (TOEFL). Additional program-specific admission requirements may exist. Some graduate programs may have additional admission requirements. Admittance to any graduate program is valid for one year from the time of admission to enrollment.

STUDENT CLASSIFICATIONS

1. Dual Undergraduate/Graduate

Dual undergraduate/graduate enrollment status is granted to those students who have completed the first 3 years of the 3+3 Doctor of Physical (DPT) degree program. These students will be granted graduate status after completing the requirements for the bachelor's degree while remaining in good standing in the DPT program. Students who do not meet this standard will not be given graduate status. Students will be awarded each degree upon completion of its respective degree requirements.

2. Graduate

Prospective graduate students are required to submit a completed Graduate Application, official academic transcripts from each previous undergraduate and graduate institution attended (except Trine University), and supplemental admission materials as required by the department or program in order to be considered for admission into graduate programs.

Transcripts from prospective students will be evaluated by the program chair/director in consultation with the school dean to determine if additional undergraduate coursework is required to adequately prepare for the rigors of graduate coursework.

One of the following conditions must be met to enroll in graduate coursework:

1. An undergraduate grade point average of 3.0 or greater *or*
2. Permission for admission as a conditional graduate student as approved by the program chair/director and dean as follows:

Conditional Admission

In order to be considered as a candidate for conditional graduate admission, students who have not earned a cumulative GPA of 3.0 in an undergraduate degree program must submit the following materials to the program chair/director in addition to required application materials:

- A 1-page narrative describing the challenges or extenuating circumstances that led to the student earning less than 3.0 GPA in undergraduate work. Students must include a description of specific strategies they will use to ensure academic progress within the graduate degree program.
- An additional letter of recommendation from a professional colleague who can address the applicant's situation and potential for success.
- The applicant's resume or vita indicating positions held that demonstrate task commitment, knowledge and skill relevant to the applicable course of study.

Upon receipt of all the materials, the application will be reviewed by the department chair/program director and a recommendation will be made to the appropriate dean for conditional admission. A student admitted conditionally will become a graduate student in good standing upon completion of four graduate level courses maintaining a B or better grade in each course. Conditional graduate students not garnering a grade of B or better in each of their first four courses will be dismissed.

3. Special Graduate Student

Special Graduate Student status maybe granted to those students who wish to (1) audit a course, (2) seek certification in specialized areas, or (3) enroll in certain courses but do not plan to pursue a graduate degree program.

For degree-seeking students who audit courses, a fee of ½ the normal rate is charged per credit hour. For special graduate students who are non-degree seeking, full tuition will be charged.

ACADEMIC RESIDENCY/TRANSFER CREDIT

A maximum of 6 semester hours of graduate course credit completed at other graduate schools may be counted toward completion of a graduate degree at Trine University with a grade of B or above and with the approval of the program chair/director and dean. All other courses must be taken at Trine University. Transfer credit will not include a grade and, therefore, will not impact the student's GPA. Courses used to satisfy the requirements of a bachelor's degree cannot be applied to a master's degree. This policy does not apply to the 3+3 Doctorate of Physical Therapy program.

The final 15 credits of a graduate degree must be taken at Trine University unless a waiver is granted by the academic dean upon recommendation of the program chair/director.

For the five-year graduate programs, students holding senior class standing may take up to 6 credit hours in the graduate program with the approval of the program director, and providing: (1) these credits were not applied to the undergraduate degree, (2) the credits were earned in designated graduate courses, and (3) a grade of B or better was earned in the course.

GRADUATION REQUIREMENTS

Students must have a 3.0 cumulative GPA, complete all necessary program requirements, and carry a grade of C or better in all courses to qualify for graduation.

GRADUATE STUDENT COMMENCEMENT PARTICIPATION

Graduate students are eligible to attend the spring commencement ceremony following their degree completion. No graduation honors or honor cords are used for graduate degrees.

CREDIT BY EXAMINATION

There is no credit by examination in the Trine graduate programs.

GRADING SYSTEM

The grading system is as follows:

A	Excellent	4.0
B+	Very Good	3.5
B	Good	3.0
C+	Above Average	2.5
C	Average (lowest passing grade)	2.0
F	Failure	0.0
I	Incomplete	not figured into GPA
IP	In progress (grade deferred)	not figured into GPA
W	Withdrawal before completion of 80% of the semester	
WP	Withdrawal after completion of 80% of the semester with (passing work at the time of withdrawal) issued only under special circumstances and with the approval of the department chair/program director.	

INCOMPLETE GRADE POLICY

Incomplete (I) is a temporary grade used by the instructor in cases where a student is unable to complete course requirements because of circumstances beyond the student's control such as illness, family emergency or other similar circumstances. Incomplete grades are rarely assigned

and only if the student has satisfactorily completed the vast majority of the course requirements and has convinced the instructor of his or her ability to complete the remaining work without registering for the course again. An instructor who assigns a grade of "I" submits to the program chair/director a formal statement of requirements that must be satisfied for removal of the incomplete grade. A copy of the statement of requirements, including deadlines for their completion, shall be made available to the student.

It is the student's responsibility to contact the instructor to make arrangements for completing the remaining work. The required work should be completed and a grade reported by the end of the student's next semester in residence, but in no case later than one calendar year following the receipt of the "I" grade. An "I" grade not removed within one semester in which the "I" grade was issued will be converted to an "FI" grade by the registrar. An "I" grade may not be removed by registering again for the course.

If the instructor giving the "I" grade is no longer a member of the faculty, the student should contact the program chair/director who will act on behalf of the former instructor. In the case of a graduating senior, if an "I" or "IP" grade is not removed until after the start of the next semester, the graduation date will reflect the new semester.

IN PROGRESS GRADE POLICY

The "IP" (In Progress) grade is to be given only in courses so designated by the respective schools. The "IP" grade is designed for courses which require more than one semester for completion. An "IP" grade not removed within one year from the end of the semester in which the "IP" grade was issued will be converted to an "F" by the registrar. An "IP" grade may not be removed by registering again for the course.

COURSE REPEAT

A student may retake a course at Trine University; however, no more than two courses may be retaken during the student's course of study. The number of repeated courses may be further limited by individual departments, and scheduling constraints may impact the length of the program.

Whenever a course is repeated on a credit basis, the higher grade and credits earned completely replace the previous grade in the satisfaction of requirements and computation of cumulative grade-point average. All entries remain a part of the student's permanent academic record.

WITHDRAWAL FROM CLASS

A student may withdraw from class through 80 percent of the semester, provided the student obtains the proper form from the registrar and obtains academic advisor approval. International students must also have the approval of the registrar if they will be dropping below 9 credit hours.

All students dropping below full-time status must have the approval of the director of financial aid. The completed form shall be submitted to the registrar before 80 percent of the semester is completed.

No classes shall be dropped after the completion of 80 percent of the semester except for circumstances beyond the control of the student, such as illness, family emergency, or other similar circumstances. Permission to withdraw after the completion of 80 percent of the semester must be obtained from the program chair/director of the student's department. If permission is granted, a grade of "WP" will be issued if the student was passing at the time of withdrawal.

A grade of "F" will be issued if the student was failing after completing 80 percent of the semester, and whereby no "WP" was awarded.

Any deviation from the policy will be considered an unofficial withdrawal, and a grade of "F" will be issued.

ACADEMIC STANDING

Students whose cumulative GPA drops below a 3.0 will be dismissed from Trine University. A student who is dismissed may apply for readmission immediately by contacting the program director and completing the re-admit form, providing a 3-4 paragraph written statement explaining why he/she was not meeting academic standards and outlining a plan for his/her future success. The re-admit form requires students to submit a plan for raising their cumulative GPA back to 3.00.

The Graduate Council will determine the outcome of the re-admit request.

GRADE APPEALS

The awarding of grades is the prerogative of the classroom instructor in accordance with policies posted in the Trine University Catalog. Faculty members are responsible for informing students of their grading policy. Grades become official when they are reported to the Registrar. If a faculty member discovers incorrectly reported grades due to miscalculation or clerical error, the error should be reported to the Registrar immediately on the prescribed form. The appropriate program chair/director must approve any adjustment of grades.

A student who disagrees with an assigned grade will take the following steps:

- Approach the professor and explain the problem.
- If the professor and student do not come to an agreement, the student should write a letter to the program director/chair.
- If the program director/chair's mediation does not resolve the issue, the student should file a written appeal to the Dean.

If these steps do not resolve the problem, or if impractical, the student may petition the Grade Review Board in writing for a hearing of the issue. Information regarding this may be obtained from the Vice President for Academic Affairs. The petition shall set forth in detail the basis for the review. This should be done by the midterm of the first regular term following the assignment of the grade. The Board may grant an extension of this time limit. If the Board agrees to hear the case, it will so inform the student by the end of that term. In grade review cases, the student is responsible for presenting evidence to support his/her position.

At the Grade Review Hearing, the student shall present his/her argument followed by the professor's response. The Board shall promptly prepare a written recommendation and forward copies to all parties involved, including the Chairperson and Vice President for Academic Affairs. The report shall include dissenting opinions on the Board, if any. Recommendations of the Board are advisory. In cases involving death, incapacity, or prolonged inaccessibility of the professor, or in similar unusual circumstances, the professor's immediate supervisor is responsible for assigning the grade. Records of each case heard by the Board shall be maintained in the office of the Vice President for Academic Affairs. If the student or professor involved wishes to appeal the decision on procedural grounds, he/she should file an appeal within two working days for the decision with the Vice President for Academic Affairs. If any procedural irregularities are discovered, he/she will notify the student and the Board within ten working days after the appeal.

The Vice President for Academic Affairs shall appoint the faculty members who will serve on the Board. He shall choose one regular member and one alternate (who will be from a different department, if possible) from each school. In addition, the Student Senate shall elect two student members and their alternates. Student members must have junior or senior standing. The faculty members shall serve three-year, staggered terms, and faculty members serving their third year will chair the committee. Student members shall serve one-year terms.

ASSESSMENT

The academic assessment process at Trine University is designed to measure the abilities and knowledge of students graduating from all degree programs. It also measures student satisfaction with the program. Sometimes students will be asked to reply to surveys or questionnaires that rate the quality of instruction, the level of satisfaction with career preparation, and the overall satisfaction of the Trine experience. Occasionally, anonymous samples of student course work will be used in an assessment process.

Trine University is committed to providing quality educational experiences for our students. The information gathered through the assessment process provides information for continual improvement of our programs.

PAYMENT OF EDUCATIONAL COSTS

Payment of tuition and fees is due at the Business Office on the date indicated on the student's bill. Any student with outstanding financial obligations to the University will not be permitted to register for any subsequent semester or receive a transcript or diploma until the obligation is fulfilled. Students maintaining a balance owed to the University will be assessed late fees and will be responsible for collection and/or attorney costs if such efforts should become necessary.

ACADEMIC MISCONDUCT

The University prohibits all forms of academic misconduct. Academic misconduct refers to, but is not limited to, the following activities:

- Copying another person's work and claiming it as your own, or submitting the same paper in two different courses without knowledge and consent of the instructor (plagiarism);
- Using the work of a group of students when the assignment requires individual work;
- Looking at or attempting to look at an examination before it is administered;
- Using materials during an examination that are not permitted;

- Allowing another student to take your examination for you;
- Intentionally impeding the academic work of others;
- Using any electronic device to transmit portions of questions or answers on an examination to other students;
- Using any electronic device to improperly store information for an exam;
- Knowingly furnishing false information to the University;
- Assisting other students in any of the acts listed above.

Moreover, a student is expected to submit his/her own work and to identify any portion of work that has been borrowed from others in any form. An ignorant act of plagiarism on final versions and minor projects, such as attributing or citing inadequately, will be considered a failure to master an essential course skill and is considered Academic Misconduct. A deliberate act of plagiarism, such as having someone else do your work or submitting someone else's work as your own (e.g., from the Internet, fraternity file, etc., including homework and in-class exercises), is also Academic Misconduct and will result in more serious penalties.

In situations of Academic Misconduct, instructors have the authority to award a failing grade on the assignment in question or a failing grade for the course. Upon approval by the appropriate Dean, Academic Misconduct may also result in expulsion from the University.

DEGREES

An "Intent to Graduate" form obtained through the Registrar's office should be filed at the beginning of the master's program. This form will include an expected graduation date and other information pertinent to graduation. All degree requirements must be completed within five years.

TRANSCRIPTS

A hold may be applied to the release of a transcript or other information requested from an academic record for a student who has an overdue indebtedness to the University.

A current student may obtain unofficial (personal) copies of his or her Trine University transcript at no charge while attending the University. All official transcripts which bear the registrar's signature and school seal are available at an additional cost.

RELEASE OF STUDENT INFORMATION

To ensure compliance with the federal government's Family Education Rights and Privacy Act (FERPA), the following general principles and procedures govern the release of information from student academic records.

A written request signed by the student whose name appears on the transcript and that contains information such as date of birth and/or the Trine University student identification number, is required before a University transcript or other information from the student's academic record may be released. Trine University will not release copies of transcripts from another institution. Exceptions to the above statements are outlined in the following paragraph:

- The Office of the Registrar may release transcripts or information from academic records including reports of academic standing to administrative and faculty members of Trine

University whose responsibilities require this information.

- Public directory information from student records may be released at any time unless restricted by the student. This includes the student's name, local and permanent addresses and telephone numbers, e-mail address, date and place of birth, major field of study, class year, participation in officially recognized activities and sports, weight and height of athletic team members, dates of attendance, degrees, awards received, and photographs.
- Information pertaining to graduation and honors achieved may be released for publication unless otherwise restricted by the student.

Upon proper identification, a student will be shown the following:

- His or her Trine University permanent academic record, including the student's file and transcript.
- His or her transcripts from another institution.

SEMESTER HOUR LOAD

The semester course load of a full-time graduate student is nine hours. The maximum load for a full-time master's degree student is 12 credits hours in any semester. Any master's degree course load greater than 12 credit hours must be approved by the program director.

DOCTORATE OF PHYSICAL THERAPY

117 HRS.

Trine University is **seeking accreditation** of a new physical therapist education program from CAPTE. The program will submit an Application for Candidacy, which is the formal application required in the pre-accreditation stage. Submission of this document does not assure that the program will be granted Candidate for Accreditation status. Achievement of Candidate for Accreditation status is required prior to implementation of the professional phase of the program; therefore, no students may be enrolled in professional courses until Candidate for Accreditation status has been achieved. Further, though achievement of Candidate for Accreditation status

signifies satisfactory progress toward accreditation, it does not assure that the program will be granted accreditation.

***See accreditation statement on previous page**

DOCTORATE OF PHYSICAL THERAPY

117 HRS.

PROGRAM REQUIREMENTS

REQUIRED HOURS

DPT	5111	CARE I	(1)
DPT	5124	Anatomy of Movement I	(4)
DPT	5134	Applied Physiology I	(4)
DPT	5143	Clinical Practice I	(3)
DPT	5152	Health Behavior Science	(2)
DPT	5162	Professional Development	(2)
DPT	5211	CARE II	(1)
DPT	5224	Anatomy of Movement II	(4)
DPT	5234	Applied Physiology II	(4)
DPT	5243	Clinical Practice II	(3)
DPT	5254	Applied Neuroscience	(4)
DPT	5311	CARE III	(1)
DPT	5352	Pharmacology	(2)
DPT	5362	Outcome Assessment	(2)
DPT	5343	Clinical Practice III	(3)
DPT	5372	Evidence Based Practice I	(2)
DPT	6111	CARE IV	(1)
DPT	6124	Musculoskeletal PT I	(4)
DPT	6134	Neuromuscular PT I	(4)
DPT	6142	Imaging and Laboratory Testing	(2)
DPT	6152	Cardiopulmonary PT	(2)
DPT	6172	Evidence Based Practice II	(2)
DPT	6191	Anatomy Seminar I	(1)
DPT	6211	CARE V	(1)
DPT	6224	Musculoskeletal PT II	(4)
DPT	6233	Neuromuscular PT II	(3)
DPT	6242	Orthotics and Prosthetics	(2)
DPT	6252	Lifespan I: Growth & Dev.	(2)
DPT	6272	Evidence-Based practice III	(2)
DPT	6282	Healthcare Delivery I	(2)
DPT	6291	Anatomy Seminar II	(1)
DPT	6312	CARE VI	(2)
DPT	6342	Primary Care Practice	(2)
DPT	6352	Lifespan 2: Geriatrics	(2)
DPT	6362	Prof. Development II	(2)
DPT	6382	Healthcare Delivery II	(2)
DPT	7118	Clinical Internship I (8 weeks)	(8)

DPT	7128	Clinical Internship I (8 weeks)	(8)
DPT	7214	Clinical Internship III	(14)
DPT	7262	Professional Development III	(2)
TOTAL			117 HRS.

MASTER OF ENGINEERING MAJORS

BIOMEDICAL ENGINEERING MAJOR 30 HRS.

PROGRAM REQUIREMENTS	REQUIRED HOURS
BIOMEDICAL ENGINEERING CORE	12 HRS.

BME	5003	Principles of Biomedical Engineering	(3)
BME	5013	Applied Anatomy & Physiology	(3)
BME	5103	Musculoskeletal Biomechanics	(3)
BME	5203	Introduction to Biomaterials	(3)

BIOMEDICAL ENGINEERING ELECTIVES 9-12 HRS.

BME	5023	Biomedical Measurements & Instrumentation
BME	5043	Finite Element Analysis
BME	5113	Kinematics of Human Motion
MAE	5583	Design of Experiments

MATHEMATICS 3 HRS.

Any 400-level mathematics course. (3)

CAPSTONE/DESIGN PROJECT 3-6 HRS.

BME 600X Capstone/Design Project

TOTAL 30 HRS.

STRUCTURAL ENGINEERING TRACK

30 HRS.

PROGRAM REQUIREMENTS

REQUIRED HOURS

STRUCTURES GRADUATE COURSES

12 - 15HRS.

CE	5503	Advanced Structural Analysis
CE	5513	Structural Dynamics
CE	5523	Finite Element Methods
CE	5533	Advanced Solid Mechanics
CE	5553	Structural Design Loads
CE	5563	Structural Systems
CE	5593	Special Topics in Structural Engineering

ELECTIVES

9 HRS.

CE 4513 Advanced Steel Design

CE	4543	Prestressed Concrete Design
CE	4553	Timber Design
CE	4563	Bridge Engineering
CE	4703	Special Topics in Geotechnical Engineering
CE	4713	Foundation Design
CE	5573	Advanced Concrete Design
MAE	5663	Materials Failure Analysis

Or other engineering course approved by advisor.

PROFESSIONAL DESIGN ELECTIVE **0 - 3 HRS.**

Any course that is consistent with the student's professional goals and approved by graduate advisor.

CAPSTONE/DESIGN PROJECT **3- 6 HRS.**

CE	590X	CE Independent CE Project I
CE	591X	CE Independent CE Project II

TOTAL **30 HRS.**

ENVIRONMENTAL ENGINEERING TRACK **30 HRS.**

ENVIRONMENTAL GRADUATE COURSES **12 - 15 HRS.**

CE	5103	Special Topics in Water and Wastewater Treatment
CE	5113	Environmental Engineering Chemistry
CE	5123	Solid Waste Management
CE	5303	Advanced Hydrologic and Hydraulic Modeling
CE	5313	Groundwater Hydrology and Contaminant Transport

ELECTIVE COURSES **9 HRS.**

CE	4113	Hazardous Waste Engineering
CE	4123	Water Treatment Principles and Design
CE	4133	Wastewater Treatment Principles and Design
CE	4303	Open Channel Hydraulics
CE	4313	Water Resources Engineering
CE	4323	Engineering Hydrology
CE	4333	Design of Water Distribution Systems and Sewers
CHE	4033	Air Dispersion Modeling
CHE	4043	Air Environmental Control
CHE	4073	Biochemical Engineering
CHE	4083	Plant Management

Or other engineering course approved by graduate advisor.

PROFESSIONAL DESIGN ELECTIVE **0 - 3 HRS.**

Any course that is consistent with the student's professional goals and approved by graduate advisor.

(3)

DESIGN PROJECT **3 - 6 HRS.**

CE	590X	CE Independent Design Project I	
CE	591X	CE Independent Design Project II	
TOTAL			30 HRS.

MECHANICAL ENGINEERING MAJOR	30 HRS.
PROGRAM REQUIREMENTS	REQUIRED HOURS

MECHANICAL ENGINEERING GRADUATE CORE	12 HRS.
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MAE	5213	Advanced Heat Transfer	(3)
MAE	5223	Introduction to Computational Fluid Mechanics	(3)
MAE	5433	Mechanism Synthesis	(3)
MAE	5543	Advanced Machine Design	(3)

MECHANICAL ENGINEERING GRADUATE ELECTIVES	6 - 9 HRS.
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MAE	5753	Computer Integrated Manufacturing
MAE	5663	Materials Failure Analysis
MAE	5473	System Dynamics and Control
MAE	5583	Design of Experiments

MATHEMATICS	3 HRS.
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Any 400 level mathematics course.	(3)
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BUSINESS	3 HRS.
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One 500 level course selected from the Ketner School of Business with approval of the graduate advisor.	(3)
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CAPSTONE/DESIGN PROJECT	3- 6 HRS.
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MAE	600X	Mechanical Engineering Graduate Project
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TOTAL	30 HRS.
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**MASTER OF SCIENCE WITH A MAJOR IN CRIMINAL JUSTICE
WITH A CONCENTRATION IN PUBLIC ADMINISTRATION 36 HRS.
PROGRAM REQUIREMENTS REQUIRED HOURS**

CRIMINAL JUSTICE CORE (21 HRS.)

CRJ	503	Seminar in Law and Social Control	(3)
CRJ	513	Criminology	(3)
CRJ	523	The American System of Justice	(3)
CRJ	533	Criminal Justice Policy Formation and Analysis	(3)
CRJ	553	Applied Statistics for Criminal Justice	(3)
CRJ	563	Planning, & Program Evaluation	(3)
CRJ	593	Demonstration Project Capstone	(3)

Select one of the following concentrations:

LAW CONCENTRATION (15 HRS.)

LAW	603	Advanced Employment Law	(3)
LAW	613	Advance Criminal Procedure: Investigation & Adjudication	(3)
LAW	623	Children and the Law	(3)
LAW	643	Law and Public Policy	(3)
LAW	693	Law Concentration Demonstration Capstone	(3)

EMERGENCY MANAGEMENT CONCENTRATION (15 HRS.)

EM	503	Advanced Principles of Emergency Management	(3)
EM	513	Seminar in Hazard Mitigation	(3)
EM	623	Comprehensive Risk Assessment & Vulnerability	(3)
EM	653	Managing Disaster Relief and Recovery Operations	(3)
CRJ	693	Public Administration Demonstration Project	(3)

FORENSIC PSYCHOLOGY CONCENTRATION (15 HRS.)

FPY	603	Theory & Practice of Forensic Psychology	(3)
FPY	613	Psychopathology	(3)
FPY	623	Evaluation & Treatment of Specialized Populations	(3)
FPY	643	Victimology	(3)
FPY	693	Forensic Psychology Demonstration Project	(3)

PUBLIC ADMINISTRATION CONCENTRATION (15 HRS.)

CRJ	603	Theory and Practice of Public Administration	(3)
CRJ	613	Public Organizational Behavioral & Human Resource Mang.	(3)
CRJ	623	Governmental Accounting Finance & Budgeting	(3)

CRJ	643	Law and Public Policy	(3)
CRJ	693	Public Administration Demonstration Project	(3)
TOTAL			36 HRS.

<u>MASTER OF SCIENCE IN LEADERSHIP</u>	36 HRS.
PROGRAM REQUIREMENTS	REQUIRED HOURS

LEADERSHIP CORE			(21 HRS.)
LDR	5003	Leadership Philosophy	(3)
LDR	5023	Strategic Leadership	(3)
LDR	5043	Organizational Systems and Cultures	(3)
LDR	5063	Organizational Development and Change	(3)
LDR	5083	Conflict Resolution for Leaders	(3)
LDR	5203	Leadership Ethics, Culture, and Politics	(3)
LDR	5223	Organizational Communications for Leaders	(3)

Select one of the following concentrations:

ATHLETIC ADMINISTRATION CONCENTRATION			(15 HRS.)
LDR	6703	Foundations of Athletic Administration	(3)
LDR	6723	Legal and Ethical Issues in Athletic Administration	(3)
LDR	6743	Athletic Facility and Event Management	(3)
LDR	6766	Athletic Administration Capstone Course	(6)

BIOMEDICAL REGULATORY AFFAIRS CONCENTRATION			(15 HRS.)
LDR	6103	Introduction to Biomedical Regulatory Affairs	(3)
LDR	6123	Product Development and Manufacturing Systems	(3)
LDR	6143	Product Testing, Evaluation, Clinical Trials, and Post-Market Issues	(3)
LDR	6166	Biomedical Regulatory Affairs Capstone	(6)

HEALTHCARE SYSTEMS STUDIES CONCENTRATION			(15 HRS.)
LDR	6803	Leadership and Management of Healthcare Systems	(3)
LDR	6823	Legal and Ethical Issues in Healthcare Leadership	(3)
LDR	6843	Organization and Economics of Healthcare Delivery Systems	(3)
LDR	6866	Healthcare Leadership Capstone	(6)

INSTRUCTIONAL LEADERSHIP – HIGHER EDUCATION CONCENTRATION			(15 HRS.)
LDR	6513	Students and Stake holders in the Higher Education Environment	(3)
LDR	6533	Teaching and Learning in Higher Education	(3)
LDR	6553	Principles and Practices of Academic Advising	(3)
LDR	6576	Instructional Leadership Capstone Course – Higher Education	(6)

INSTRUCTIONAL LEADERSHIP – K-12 CONCENTRATION (15 HRS.)

LDR	6503	Foundations of Instructional Leadership	(3)
LDR	6523	Designing, Managing, and Monitoring Standards-driven Curriculum	(3)
LDR	6543	Systematic Improvement of Instructional Practices	(3)
LDR	6566	Instructional Leadership Capstone K-12	(6)

INTERNATIONAL STUDIES CONCENTRATION (15 HRS.)

LDR	6003	Fundamentals of Global Business Leadership	(3)
LDR	6023	International Marketing and Economics for Leaders	(3)
LDR	6043	Global Logistics and Supply Chain Management for Leaders	(3)
LDR	6066	International Studies Capstone (6)	(6)

NONPROFIT ORGANIZATIONAL STUDIES CONCENTRATION (15 HRS.)

LDR	6203	Nonprofit Sector Foundations	(3)
LDR	6223	Economic Sustainability of Nonprofit Organizations	(3)
LDR	6243	Quantitative Methods for Nonprofit Organization Planning and Evaluation	(3)
LDR	6266	Nonprofit Organization Studies Capstone	(6)

POLITICAL LEADERSHIP & CIVIC ENGAGEMENT CONCENTRATION (15 HRS.)

LDR	6303	Political Marketing and Management	(3)
LDR	6323	Leading Community Engagement	(3)
LDR	6343	Public Governance and Servant Leadership	(3)
LDR	6366	Political Leadership & Civic Engagement Capstone	(6)

STRATEGIC FORESIGHT & ENTREPRENEURSHIP CONCENTRATION (15 HRS.)

LDR	6403	Fundamentals of Foresight and Entrepreneurship	(3)
LDR	6423	Feasibility Analysis for New Ventures	(3)
LDR	6443	Business and Marketing Plans for New Ventures	(3)
LDR	6466	Global Entrepreneurship Capstone	(6)

SUSTAINABLE BUSINESS ADMINISTRATION CONCENTRATION (15 HRS.)

LDR	6603	Leading the Sustainable Business	(3)
LDR	6623	Business Management and Environmental Leadership	(3)
LDR	6643	Sustainability and Business Opportunity	(3)
LDR	6666	Sustainable Business Administration Capstone	(6)

TOTAL 36 HRS.

TRINE UNIVERSITY MINORS

- ACCOUNTING
- AERONAUTICAL ENGINEERING
- ATHLETIC TRAINING
- BIOLOGY
- BIOMEDICAL
- BIOPROCESS ENGINEERING
- BUSINESS
- CHEMISTRY
- COMMUNICATION
- CRIMINAL JUSTICE
- ECONOMICS
- ENERGY ENGINEERING MINOR
- ENTREPRENEURSHIP
- ENVIRONMENTAL ENGINEERING
- FINANCE
- GOLF MANAGEMENT
- HISTORY
- HUMANITIES
- INTERNATIONAL STUDIES
- LEADERSHIP
- MANAGEMENT
- MARKETING
- MATHEMATICS
- METALLURGICAL ENGINEERING
- MUSIC
- PSYCHOLOGY
- PLASTICS
- ROBOTICS
- SOFTWARE ENGINEERING MINOR
- STRUCTURAL ENGINEERING MINOR

ACCOUNTING MINOR			24 HRS.
AC	303	Cost Accounting	(3)
AC	323	Intermediate Accounting I	(3)
AC	333	Intermediate Accounting II	(3)
AC	373	Accounting Information Systems	(3)
AC	423	Income Tax	(3)
FIN	343	International Finance	(3)
FIN	353	Personal Finance	(3)
FIN	413	Corporate Finance	(3)
TOTAL IN MINOR PROGRAM			24 HRS.

AERONAUTICAL ENGINEERING MINOR **27 HRS.**

The curriculum is designed to prepare students for professional engineering careers in the aerospace industry or for graduate studies in the aeronautical engineering field. A grade of C or better is required for all courses in the minor.

REQUIRED ENGINEERING SCIENCE COURSES **6 HRS.**

ES	253	Electrical Science	(3)
ES	343	Heat Transfer	(3)

REQUIRED MATHEMATICS COURSE **3 HRS.**

MA	313	Linear Algebra	(3)
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REQUIRED MECHANICAL ENGINEERING COURSES **18 HRS.**

MAE	3033	Fluid Dynamics for Mechanical Engineering	(3)
MAE	473	Applied Aerodynamics	(3)
MAE	483	Vehicle Structures	(3)
MAE	493	Aerodynamics Laboratory	(3)
MAE	4173	Gas Turbines	(3)
MAE	4183	Aircraft Stability and Control	(3)
TOTAL IN MINOR PROGRAM			27 HRS.

ATHLETIC TRAINING MINOR**26 HRS.**

This minor enables students to gain experiences in athletic training and prepares them for potential certification as a trainer. The student desiring certification must meet the requirements of the NATA, which entails additional course work and training. Trine University does not certify athletic trainers.

EXS	243	Athletic Training	(3)
EXS	332	Drug Education	(2)
EXS	393	Advanced Athletic Training	(3)
EXS	403	Remedial Exercise & Rehabilitation	(3)
EXS	423	Evaluation of Athletic Injuries	(3)
EXS	443	Therapeutic Modalities	(3)
EXS	483	Internship in Sports Medicine	(3)
SM	393	Sport Psychology	(3)
SM	413	Organization & Administration of Athletics	(3)

TOTAL IN MINOR PROGRAM:**26 HRS.****BIOLOGY MINOR****24 HRS.**

(FOR A NON-EDUCATION STUDENT WITH ANOTHER MAJOR)

12 HRS.

BIO	114	Principles of Biology I	(4)
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BIO	124	Principles of Biology II	(4)
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CH	104	General Chemistry I	
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or

CH	104H	Honors General Chemistry I	(4)
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One of the following physiology classes:

3-4 HRS.

BIO	283	Marine Biology	
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BIO	304	Plant Biology	
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BIO	354	Animal Physiology	
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BIO	344	Cell Biology	
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BIO	404	Embryology	
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One of the following ecology classes:

4 HRS.

BIO	211	Conservation lab	
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and

BIO	213	Conservation	
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or

BIO	274	General Ecology	
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or

BIO	334	Environmental Biology	
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One of the following organism classes:

3-4 HRS.

BIO	283	Marine Biology	
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BIO	304	Plant Biology	
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BIO	314	Animal Biology	
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BIO	324	Microbiology	
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Additional BIO courses to bring the total to 24 credit hours.

0-3 HRS.**TOTAL IN MINOR PROGRAM:****24 HRS.**

BIOMEDICAL ENGINEERING MINOR**27 HRS.****REQUIRED BIOMEDICAL COURSES****18 HRS.**

BME	114	Intro to Biomedical Engineering	(4)
BIO	254	Human Anatomy	(4)
BIO	354	Human Physiology	(4)
BME	4103	Intro to Biomechanics	(3)
BME	4203	Intro to Biomaterials	(3)

REQUIRED ENGINEERING SCIENCE COURSES**9 HRS.**

ES	223	Dynamics	(3)
ES	233	Engineering Materials	(3)
Choose one of the following two (2) options			
ES	243	Solid Mechanics	
Or one of:			
ES	253	Electrical Science	
ECE	213	Circuit Analysis	(3)

TOTAL IN MINOR PROGRAM:**27 HRS.****BIOPROCESS ENGINEERING MINOR****24-25 HRS.**

There has been an increased focus on biological engineering techniques utilized by industries that include, but are not limited to, pharmaceuticals, food processing, consumer products, agricultural and biotechnology firms. This increased focus from an industrial standpoint has resulted in increased demand for prospective employees that have a strong background in both engineering and life sciences. The curriculum is designed to provide students with a foundation to pursue a career in these industries.

REQUIRED SCIENCE COURSES**12 HRS.**

CH	203	Organic Chemistry I	(3)
CH	211	Organic Chemistry I Laboratory	(1)
BIO	324	Microbiology	(4)
BIO	434	Biochemistry	(4)

REQUIRED ENGINEERING COURSES**9 HRS.**

CHE	303	ChE Fluid Dynamics	
or			
ES	323	Fluid Mechanics	(3)
CHE	4073	Biochemical Engineering	(3)
CHE	4173	Bio-Separations Processes	(3)

ADVANCED BIO-ELECTIVE (DEPARTMENTAL APPROVAL NEEDED) 3-4 HRS.**TOTAL IN MINOR PROGRAM:****24-25 HRS.**

BUSINESS MINOR**24 HRS.**

The business minor is designed for students in a degree program outside of the Ketner School of Business. Prerequisites as shown in the Course Descriptions section of this catalog must be carefully observed.

AC	203	Accounting I	(3)
AC	213	Accounting II	(3)
BA	123	Business Concepts	(3)
FIN	303	Managerial Finance	(3)
LAW	203	Business Law I	(3)
MGT	363	Organizational Behavior	(3)
MK	303	Marketing	(3)
ELECTIVES			(3)
TOTAL IN MINOR PROGRAM:			24 HRS.

CHEMISTRY MINOR**24 HRS.**

(FOR NON-EDUCATION STUDENTS WITH ANOTHER MAJOR)

CH	104	General Chemistry I	
or			
*CH	104H	Honors General Chemistry I	(4)
CH	114	General Chemistry II	
or			
CH	114H	Honors General Chemistry II	(4)
CH	232	Quantitative Analysis	(2)
Chemistry electives			(14)
TOTAL IN MINOR PROGRAM:			24 HRS.

COMMUNICATION MINOR**24 HRS.**

(FOR A STUDENT WITH ANOTHER MAJOR)

*COM	153	Principles of Public Relations	(3)
*COM	163	Interpersonal Communication	(3)
*SP	203	Effective Speaking	(3)
Electives in COM, FLM, SP courses, or ENG 133, and MK 323 or MK 463, with at least 6 hours of COM prefix courses at the 300-level or above.			(15)
TOTAL IN MINOR PROGRAM:			24 HRS.

CRIMINAL JUSTICE MINOR 27 HRS.

(FOR A STUDENT WITH ANOTHER MAJOR)

LE	103	Introduction to Criminal Justice	(3)
LE	253	Probation, Parole & Community Corrections	(3)
LE	263	Introduction to Criminal Law and Justice	(3)
LE	273	Criminal Procedures and Evidence	(3)
LE	343	Criminalistics and Crime Scene Investigations I	(3)
PSY	383	Forensic Psychology	(3)
Law enforcement and/or psychology electives			(9)
TOTAL IN MINOR PROGRAM:			27 HRS.

ECONOMICS MINOR**27 HRS.**

ECO	213	Microeconomics	(3)
ECO	223	Macroeconomics	(3)
ECO	323	Money and Banking	(3)
ECO	363	Comparative Economic Systems	(3)
ECO	383	International Economics	(3)
Economics and/or finance electives			(12)
TOTAL IN MINOR PROGRAM:			27 HRS.

ENERGY ENGINEERING MINOR**27 HRS.**

The minor curriculum is designed to prepare students for professional engineering careers in both the traditional and renewable branches of the electrical energy industry or for graduate studies in the energy field. A grade of C or better is required for all courses in the minor.

REQUIRED ENGINEERING SCIENCE COURSES (12)

ES	213	Statics	(3)
ES	223	Dynamics	(3)
ES	233	Engineering Materials	(3)
ES	313	Thermodynamics	(3)

REQUIRED MECHANICAL ENGINEERING COURSES (3)

MAE	4023	System Dynamics and Controls	(3)
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REQUIRED ELECTRICAL ENGINEERING COURSES (12)

ECE	213	Circuit Analysis	
OR			
ES	253	Electrical Science	(3)
ECE	303	Electrical Machines	(3)
ECE	313	Electrical Power	(3)
ECE	403	Direct Generation Techniques	(3)

TOTAL IN MINOR PROGRAM: 27 HRS.

ENTREPRENEURSHIP MINOR for Business Students 24HRS.

The entrepreneurship minor is designed for students who are interested in starting a business. Open to students from any Trine University program, the entrepreneurship minor uses collaborative, problem-based learning, assessment of learning outcomes, and collaboration among students, faculty, and business partners to deliver a dynamic program. Courses in the entrepreneurship program will help students develop an “entrepreneurial mindset,” so that they can be innovative thinkers and leaders in a startup company or an existing company.

PROGRAM REQUIREMENTS 24 HRS.

ENT	303	Entrepreneurial Leadership	(3)
MGT	463	Small Business Management	(3)
FIN	333	Venture Finance	(3)
FIN	323	Money and Banking	(3)
ENT	413	Creativity in Product/Service Development	(3)
ENT	423	Entrepreneurship & Venture Planning	(3)

Select 6 hours from list: (6)

FIN	353	Personal Finance (3)
MGT	333	Supervision (3)
MGT	313	Human Resource Management (3)
MGT	443	Managing Operations (3)
MK	473	E-Marketing (3)
MK	463	Marketing Research (3)
MK	423	Personal Selling (3)
MK	363	Buyer Behavior (3)

TOTAL IN MINOR PROGRAM: 24 HRS.

The choice of electives should reflect the student’s area of entrepreneurial interest.

ENTREPRENEURSHIP MINOR for Non-Business Students 24HRS.

The entrepreneurship minor is designed for non-business students.

PROGRAM REQUIREMENTS 24 HRS.

AC	203	Accounting I	(3)
BA	123	Business Concepts	(3)
ENT	303	Entrepreneurial Leadership	(3)
ENT	413	Creativity in Product/Service Development	(3)
ENT	423	Entrepreneurship & Venture Planning	(3)
LAW	203	Business Law I	(3)
MK	303	Marketing	(3)

Select 3 hours from list: (3)

FIN	353	Personal Finance (3)
MGT	333	Supervision (3)
MGT	313	Human Resource Management (3)
MGT	443	Managing Operations (3)
MK	473	E-Marketing (3)
MK	463	Marketing Research (3)
MK	423	Personal Selling (3)
MK	363	Buyer Behavior (3)

TOTAL IN MINOR PROGRAM: 24 HRS.

CIVIL ENGINEERING**ENVIRONMENTAL ENGINEERING MINOR****27 HRS.**

In the past, the environmental impacts of an engineering project or design were considered as an afterthought. Today, environmental concerns strongly influence almost all aspects of engineering practice. The curriculum is designed to provide students with a foundation to pursue a career in environmental engineering and an understanding of the environmental consequences of their designs.

REQUIRED SCIENCE COURSES**11 HRS.**

CH 104 General Chemistry I

or

CH 104H Honors General Chemistry I

(4)

CH 114 General Chemistry II

or

CH 114H Honors General Chemistry II

(4)

ES 323 Fluid Mechanics or equivalent

(3)

(i.e. CHE 303 ChE Fluid Dynamics)

REQUIRED ENVIRONMENTAL ENGINEERING BREADTH COURSES**7 HRS.**

CE 4103 Environmental Engineering (Non-Aqueous)

(3)

CE 3101 Environmental Engineering Lab

(1)

CE 3103 Environmental Engineering (Aqueous)

(3)

CHOOSE THREE OF THE FOLLOWING 3-CREDIT COURSES**ENVIRONMENTAL ENGINEERING DEPTH COURSES****9 HRS.**

CE 4113 Hazardous Waste Engineering

CE 4123 Water Treatment Principles and Design

CE 4133 Wastewater Treatment Principles and Design

CE 4323 Engineering Hydrology

or

CE 4313 Water Resources and Water Power Engineering

or

CE 4333 Water Distribution and Design of Sewers

or

CE 4303 Open Channel Hydraulics

CHE 4043 Air Environmental Control

CHE 453 Chemical Engineering Kinetics

CHE 4073 Biochemical Engineering

CHE 4083 Plant Management

TOTAL IN MINOR PROGRAM:**27 HRS.**

Choose courses prefixed by AC, BA, ENT, FIN, LAW, MGT, and/or MK Note: With careful planning, the majority of requirements for admission to most MBA programs may be met with this minor.

FINANCE MINOR			24 HRS.
AC	303	Cost Accounting	(3)
AC	423	Income Tax	(3)
FIN	323	Money and Banking	(3)
FIN	343	International Finance	(3)
FIN	353	Personal Finance	(3)
FIN	403	Investments	(3)
FIN	413	Corporate Finance	(3)
FIN	473	Finance Technologies	(3)
TOTAL IN MINOR PROGRAM:			24 HRS.

GOLF MANAGEMENT MINOR			24 HRS.
GM	101	Introduction to Golf Management	(1)
GM	131	Player Development I	(1)
GM	203	Golf Shop Management	(3)
GM	213	Golf Club Design, Repair and Fitting	(3)
GM	231	Player Development II	(1)
GM	233	Internship	(3)
GM	303	Teaching the Short Game	(3)
GM	323	Teaching the Golf Swing	(3)
GM	343	Golf Facility Operations	(3)
GM	411	Food and Beverage Management	(1)
GM	452	Golf Management Leadership	(2)
TOTAL IN MINOR PROGRAM:			24 HRS.

HISTORY MINOR			27 HRS.
HIS	103	American History I	(3)
HIS	113	American History II	(3)
HIS	203	World Civilization I	(3)
HIS	213	World Civilization II	(3)
History electives			(15)
TOTAL IN MINOR PROGRAM:			27 HRS.

HUMANITIES MINOR**25 HRS.****HUMANITIES CAPSTONE REQUIREMENT****1 HR.**

HUM 401 Humanities Portfolio (1)

HUMANITIES APPRECIATION COURSES**9 HRS.**

Choose nine (9) hours from: (9)

ARC 293 Architecture Appreciation

ART 253 Art Appreciation

ENG 153 Introduction to Literature

FLM 203 Film Appreciation

MUS 272 Music Appreciation

SP 103 Introduction to Theater

One (1) course in a Foreign Language (Chinese/French/Spanish)

HUMANITIES CONDITION COURSES**3 HRS.**

Choose three (3) hours from: (3)

COM 233 Intercultural Communication

ENG 433 Shakespeare

GEO 303 Human Geography

PHL 313 Ethics

WS 103 Intro to Women's Studies

FOCUS AREA**12HRS.**

Choose four (4) courses from one of the following foci. (12)

Music

MUS 113 Music Theory I

MUS 123 Music History and Literature I

MUS 213 Music Theory II

MUS 223 Music History and Literature II

Literature*

ENG 233 Mythology

ENG 253 Readings in World Literature

ENG 273 Creative Writing

ENG 363 The English Language

*Or substitute another approved 200 or above level course in literature.

Philosophy

PHL 203 Introduction to Philosophy

PHL 323 Philosophy of Religion

PHL 333 Art, Technology, and Society

PHL 343 Logic

TOTAL IN MINOR PROGRAM:**25 HRS.**

INTERNATIONAL STUDIES MINOR**24 HRS.**

COM 233 Intercultural Communication
and
1 year of foreign language at the college level

(3)

(6)

Choose five courses from the following ten courses
(must include at least one course from each group)

(15)

Geographic and Historical Perspectives

GEO 303 Human Geography

GEO 323 World Geography

GOV/GEO 353 Political Geography

HIS/GOV 323 The Contemporary World

GOV 313 Comparative Governments

Business Perspectives

BA 343 International Business

ECO/GEO 343 Economic Geography

ECO 363 Comparative Economic Systems

ECO 383 International Economics

MK 343 International Marketing

TOTAL IN MINOR PROGRAM:**24 HRS.****LEADERSHIP MINOR****27 HRS.****CORE CLASSES****18 HRS.**

PSY 113 Principles of Psychology

(3)

LDR 203 Leadership Strengths and Skills

(3)

LDR 303 Contemporary Leadership Theory & Practice

(3)

PHL 313 Ethics

(3)

LDR 403 Creativity, Innovation, and Influence

(3)

LDR 433 Leadership Practicum

(3)

LEADERSHIP ELECTIVES**9 HRS.**

Choose three courses from the following:

(9)

BA 333 Social Media for Business

COM 213 Business Communication

COM 233 Intercultural Communication

COM 363 Persuasion and Argumentation

COM 413 Corporate & Organizational Communication

ENT 303 Entrepreneurial Leadership

GOV 343 American Political Thought

GOV 373 Political Psychology

MGT 313 Human Resource Management

MGT 333 Supervision

MGT 343 Human Resource Development

MGT 363 Organizational Behavior

MGT 413 Management of Quality

MGT 443 Managing Operations

MGT 453 Strategic Management

PSY	333	Principles of Personality	
PSY	343	Social Psychology	
PSY	373	Political Psychology	
SM	313	Sport and Rec Management	
SM	393	Sport Psychology	
SM	413	Organization and Administration of Athletics	
TOTAL IN MINOR PROGRAM:			27 HRS.

MANAGEMENT MINOR			24 HRS.
BA	403	Business and Public Policy	(3)
ENT	303	Entrepreneurial Leadership	(3)
MGT	313	Human Resources Management	(3)
MGT	413	Management of Quality	(3)
MK	333	Buyer Behavior	(3)
MK	423	Personal Selling	(3)
Management electives			(6)
TOTAL IN MINOR PROGRAM:			24 HRS.

MARKETING MINOR			24 HRS.
BA	403	Business and Public Policy	(3)
ENT	303	Entrepreneurial Leadership	(3)
MK	323	Integrated Marketing Communications	(3)
MK	333	Buyer Behavior	(3)
MK	423	Personal Selling	(3)
MK	433	Marketing Management	(3)
MK	483	Senior Seminar in Marketing	(3)
Marketing electives			(3)
TOTAL IN MINOR PROGRAM:			24 HRS.

MATHEMATICS MINOR			25 HRS.
(FOR STUDENTS WITH ANOTHER MAJOR)			
MA	134	Calculus I	(4)
MA	164	Calculus II	(4)
MA	213	Calculus III	(3)
MA	233	Differential Equations	(3)
MA	313	Linear Algebra	(3)
Mathematics Electives at the 300-400 level			(8)
A grade of "C" or higher is required for each mathematics course in the minor.			
TOTAL IN MINOR PROGRAM:			25 HRS.

METALLURGICAL ENGINEERING MINOR**28 HRS.**

The curriculum is designed to prepare students for professional engineering careers that require specialized training in metallurgy or for graduate studies in the metallurgical engineering field. A grade of C or better is required for all courses in the minor.

REQUIRED SCIENCE COURSE 4 HRS.

CH 104 General Chemistry I
or

CH 104H Honors General Chemistry I (4)

REQUIRED ENGINEERING SCIENCE COURSE 3 HRS.

ES 233 Engineering Materials (3)

REQUIRED MATHEMATICS COURSE 3 HRS.

MA 393 Probability and Statistics (3)

REQUIRED MECHANICAL ENGINEERING COURSES 18 HRS.

MAE 243 Manufacturing Processes and Equipment (3)

MAE 383 Metallurgical Thermodynamics (3)

MAE 393 Metallurgical Transport (3)

MAE 443 Engineering Metallurgy (3)

MAE 4143 Physical Metallurgy (3)

MAE 4193 Metal Casting (3)

TOTAL IN MINOR PROGRAM 28 HRS.**MUSIC MINOR****24 HRS.**

MUS 111 Piano Class (1)

MUS 113 Music Theory I (3)

MUS 123 Music History I (3)

MUS 213 Music Theory II (3)

MUS 223 Music History II (3)

MUS 253 Beginning Conducting (3)

SELECT APPLIED STUDIES 4 HRS.

MUS 1011 Applied Studies (1)
(Woodwind, Brass, Percussion, String, Voice)

SELECT ENSEMBLE STUDIES 4 HRS.

Choose from:

MUS 1141 Chamber Orchestra (1)

MUS 1151 Marching Band (1)

MUS 1161 Wind Ensemble/Pep Band (1)

MUS 1171 University Choir (1)

MUS 1181 Jazz Band (1)

MUS 1191 Trine Chorale (1)

TOTAL IN MINOR PROGRAM: 24 HRS.

PLASTICS ENGINEERING MINOR**25 HRS.**

Available to all Engineering and Technology students.

REQUIRED CORE COURSES

ETD	353	Thermodynamics and Heat Transfer for Technologists	(3)
PET	223	Polymer Structure, Properties & Applications	(3)
PET	224	Plastics Processing and Testing	(4)
PET	323	Plastics Product Design	(3)
PET	333	Plastics Mold Engineering and Design	(3)

ELECTIVES (CHOOSE THREE)**(9)**

ETD	313	Design for Manufacturing Assembly
ETD	433	Computer Numerical Control
GE	413	Design of Experiments
GE	313	SPC and Lean Manufacturing
MGT	413	Management of Quality

TOTAL IN MINOR PROGRAM:**25 HRS.**

PSYCHOLOGY MINOR**27 HRS.**

PSY	113	Principles of Psychology	(3)
Any 300 level or higher psychology courses or SOC 313, SOC 323, SOC 343, LE 153, or LE 453.			(24)

TOTAL IN MINOR PROGRAM:**27 HRS.**

ROBOTICS MINOR**29 HRS.**

The field of robotics has been constantly growing for the last several decades. With industries struggling to keep costs down by implementing more automation, there is a strong desire to hire students with a background in robotics. The curriculum is designed to prepare students for professional engineering careers that require specialized training in robotics or for graduate studies in robotics. A grade of C or better is required for all courses in the minor.

REQUIRED COMPUTER SCIENCE COURSE**3 HRS.**

CS	1113	Object-Oriented Java	(3)
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REQUIRED ENGINEERING SCIENCE COURSES**12 HRS.**

ES	213	Statics	(3)
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ES	223	Dynamics	(3)
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ES	243	Solid Mechanics	(3)
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ES	253	Electrical Science	
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or

ECE	213	Circuit Analysis	(3)
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REQUIRED ELECTRICAL ENGINEERING COURSES**11 HRS.**

ECE	103	Prototyping and Projects	(3)
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ECE	263	Digital Systems	(3)
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ECE	261	Digital Systems Laboratory	(1)
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ECE	273	Microcontrollers	(3)
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ECE	271	Microcontrollers Laboratory	(1)
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REQUIRED MECHANICAL ENGINEERING COURSE**3 HRS.**

MAE	363	Mechatronics	(3)
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TOTAL IN MINOR PROGRAM**29 HRS.**

SOFTWARE ENGINEERING MINOR**24 HRS.****REQUIRED COMPUTER SCIENCE COURSE****15 HRS.**

CS	1113	Object-Oriented Java	(3)
CS	1123	C++ and Object-Oriented Design	(3)
CS	2103	Algorithm Design and Analysis	(3)
CS	2503	Software Engineering	(3)
CS	3933	Software Analysis & Design	(3)

REQUIRED BUSINESS COURSES**3 HRS.**

ENT	313	Business Concepts	(3)
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ELECTIVE COURSES FROM CS LEVEL 3000/4000**6 HRS.**

CS	3303	Net-Centric Computing	
CS	3883	Computer Security	
CS	4033	Special Topics	
CS	4103	Advanced Software Development	

TOTAL IN MINOR PROGRAM**24 HRS.**

**CIVIL ENGINEERING
STRUCTURAL ENGINEERING MINOR**

27 HRS.

Structural engineering is traditionally viewed as a branch of civil engineering dealing with the analysis and design of structures to support or resist loads. The curriculum is designed to provide students with (a) a foundation to pursue graduate studies or a career in structural engineering and (b) an understanding of the theory, behavior, and design of individual structural elements and structural systems. Please contact Reiners Department of Civil and Environmental Engineering if you are interested in this program.

REQUIRED ENGINEERING SCIENCE COURSES **6 HRS.**

ES	223	Dynamics	(3)
ES	243	Solid Mechanics	(3)

REQUIRED STRUCTURAL ENGINEERING BREADTH COURSES **12 HRS.**

CE	3201	Civil Engineering Materials Laboratory	(1)
CE	3203	Civil Engineering Materials	(3)
CE	3501	Structural Analysis Lab	(1)
CE	3503	Structural Analysis	(3)
CE	3521	Structural Design Lab	(1)
CE	3523	Introduction to Structural Design	(3)

STRUCTURAL ENGINEERING DEPTH COURSES **9 HRS.**

(Choose three of the following 3-credit courses) (9)

MAE	453	Mechanical Vibrations
CE	3513	Structural Steel Design
CE	3533	Reinforced Concrete Design
CE	4553	Timber Design
CE	4563	Bridge Engineering
CE	4713	Foundation Engineering

TOTAL IN MINOR PROGRAM

28 HRS.

ALLEN SCHOOL OF ENGINEERING & TECHNOLOGY

Trine University's Allen School of Engineering & Technology includes these Departments:

- McKetta Department of Chemical & Bioprocess Engineering
- Reiners Department of Civil & Environmental Engineering
- Department of Electrical & Computer Engineering
- Wade Department of Mechanical, Aerospace & Biomedical Engineering
- Department of Technology

Academic programs administered by the school are as follows:

- Bachelor of Science in Biomedical Engineering
- Bachelor of Science in Chemical Engineering
- Bachelor of Science in Civil Engineering
- Bachelor of Science in Computer Engineering
- Bachelor of Science in Design Engineering Technology
- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Mechanical Engineering

Minors * *SEE PAGE 76*

- Minor in Aeronautical Engineering
- Minor in Biomedical Engineering
- Minor in Bioprocess Engineering
- Minor in Energy Engineering
- Minor in Environmental Engineering
- Minor in Metallurgical Engineering
- Minor in Robotics
- Minor in Software Engineering
- Minor in Structural Engineering
- Minor in Plastics Engineering

THE SCHOOL

The Drs. Jerry and Jorja Allen School of Engineering & Technology was named in honor of Jerry Allen, a 1978 mechanical engineering graduate and member of the University's Board of Trustees, and Jorja Allen, a 1978 business administration graduate and member of the Alumni Board of Governors.

MISSION

The Allen School of Engineering & Technology promotes the application of science and technology by preparing graduates for the practice of engineering and engineering technology at the professional level.

VISION

The Allen School of Engineering & Technology will be nationally recognized for the quality of its graduates.

VALUES

To attain its mission and vision, the Allen School accepts that the School must educate engineers and technologists:

- who have a broad education;
- who see themselves as global citizens;
- who have the potential for leadership in business and public service; and
- who have a strong ethical foundation.

GOALS

The Allen School of Engineering & Technology will:

- provide quality preparation for the practice of engineering and engineering technology at the professional level;
- provide graduates with the opportunities to pursue graduate studies, lifelong learning, and to offer service to their profession; and
- provide technical and educational services to the community.

PROGRAMMATIC ACCREDITATION

Trine University's programs in chemical engineering, civil engineering, electrical engineering, computer engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET, www.abet.org, 410.347.7700.

PROGRAMS AND DEGREE REQUIREMENTS

The degree programs are listed and then described in the catalog section for each academic department. All undergraduate degrees require students to fulfill General Education requirements (discussed in detail under "[General Education Requirements](#)"), as well as specific program requirements.

GENERAL ENGINEERING

Engineering students who are undecided about their major are classified as “general engineers.” Since most courses in the first year are common to all engineering disciplines, a general engineering student will still be able to make progress toward an engineering degree, even though a major has not been selected. During this year, the student should be actively investigating the options available in engineering by talking to faculty members and practicing engineers, attending meetings of the student chapters of professional societies, and doing library research. All general engineering students are expected to transfer into one of the engineering majors by the beginning of their second year. While classified as a general engineer, a student would normally take the following courses. The student’s instructor in GE 101 Introduction to Engineering can provide additional guidance.

FIRST SEMESTER**15 HRS.**

CH	104	General Chemistry I	
or			
CH	104H	Honors General Chemistry I	(4)
ENG	103	English Composition I	(3)
GE	101	Introduction to Engineering	(1)
MA	134	Calculus I	(4)
Social Sciences & Humanities elective			(3)

SECOND SEMESTER**15–18 HRS.**

ENG	133	Technical Communication	(3)
MA	164	Calculus II	(4)
PH	224	University Physics I	(4)
Social Sciences & Humanities elective			(3)
Engineering or Science course			(1–4)

MCKETTA DEPARTMENT OF CHEMICAL & BIOPROCESS ENGINEERING

The Dr. John J. McKetta Department of Chemical & Bioprocess Engineering was named in honor of Dr. John J. McKetta, a 1937 chemical engineering graduate and member of the University's Board of Trustees. The McKetta Department of Chemical & Bioprocess Engineering offers the following degree:

- **Bachelor of Science in Chemical Engineering**

Trine University's chemical engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, 410.347.7700.

The core classes for chemical engineering are focused on the chemical sciences. The chemical sciences affect virtually every aspect of life: the food we eat, the clothes we wear, the materials for our homes and cars, our medicines and health care products, and the protection of the environment. Chemical engineers are found in every industry.

Chemical engineering is distinctive in its emphasis on chemistry. The chemistry studied by the chemical engineer may include quantitative analysis, organic chemistry, physical or biochemistry and instrumental analysis. These are the same courses that a chemist would be required to take. The chemical engineer takes these chemical principles and applies them to industrial processes.

Chemical engineering has many common elements with the other engineering disciplines. It is based upon the fundamentals of physics and mathematics. It shares the core engineering sciences of mechanics, fluid flow, heat transfer, thermodynamics, and economics. Oral and written communication skills and interpersonal skills are required for success.

Engineering design is an integral component in chemical engineering course work. Solution of open-ended problems and the design process are introduced in the department's freshman engineering course. Design of experiments is covered in the Unit Operations laboratories, and equipment and process design concepts are taught through the Unit Operations and Chemical Engineering Kinetics courses. This work culminates in the capstone courses Chemical Process Design I and Chemical Process Design II.

Chemical engineering differs from the other engineering disciplines in three main ways. First, chemical engineers work with not only pure or single component materials, but with complex mixtures or multi-component materials. A chemical engineer must characterize and predict the behavior of these complex mixtures. Second, chemical engineers are the purification and separation specialists. The processes for removing impurities or extracting a valuable product are the domain of the chemical engineer. Third, by using chemical or biochemical processes, chemical engineers create materials that did not previously exist. These new and useful components or materials improve the way we live.

Chemical engineers find themselves employed in positions of research and development, process engineering and operations, engineering design and construction, technical sales and service, and plant and corporate management. Typical industries employing chemical engineers include bulk and specialty chemical, petroleum and natural gas, consumer products, pharmaceuticals and biomedical, steel production, plastics and polymers, semiconductor and electronic materials, environmental and consulting. Chemical engineering is also an excellent preparation for those desiring to undertake graduate studies in engineering and other fields such as medicine, law or business.

MISSION

In concert with Trine University and the Allen School of Engineering & Technology mission statements, the mission of the chemical engineering program at Trine University is to provide career-oriented higher education in chemical engineering by providing a learning environment in which members of a diverse student body receive personal mentoring through small classes and excellent teaching. By emphasizing “hands-on” learning, the program prepares graduates to be productive early in their careers, to advance to leadership roles in their companies and professions, and to provide service to society.

OBJECTIVES

To meet this mission, a graduate from the McKetta Department of Chemical & Bioprocess Engineering must be able to demonstrate:

1. Technical competency;
2. Problem solving ability;
3. Communication skills; and
4. A sense of social awareness and responsibility.

OUTCOMES

As specified by the accrediting body, engineering programs assure that their students will be able to:

- A. apply knowledge of mathematics, science, and engineering;
- B. design and conduct experiments, as well as to analyze and interpret data ;
- C. design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- D. function on multidisciplinary teams;
- E. identify, formulate, and solve engineering problems ;
- F. demonstrate professional and ethical responsibility;
- G. communicate effectively;
- H. use the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- I. recognize the need for, and an ability to engage in, life-long learning;
- J. discuss contemporary issues;
- K. use the techniques, skills, and modern engineering tools, necessary for engineering practice; and
- L. recognize hazards associated with chemical, biological and physical processes and be able to recognize, evaluate, minimize and control these hazards.

THE CHEMICAL ENGINEERING CURRICULUM

The curriculum requires the completion of 132 hours of course work. The average course load is 16-17 hours per semester based on eight semesters. The core requirements may be fulfilled with the Trine courses listed below or others at the Department’s discretion.

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING 132 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 43 hours	MA 134 MA 164 MA 213 MA 233	PH 224 PH 234	<u>12 hours:</u> HUM elective HUM elective ECO 213 (or 223) SS elective	ENG 103 ENG 133 SP 203	
Additional Requirements 24 (or 21) hours		CH 104 and 114 or AH 155 CH 203 CH 211 CH Elective (12 hrs)			
Core Requirements 65 (or 68) hours	<p><u>General Engineering : 2 hours</u> GE 101 Introduction to Engineering GE 401 Professional Practice</p> <p><u>Engineering Science: 5 hours</u> ES 233 Engineering Materials ES 382 Engineering Economics</p> <p><u>Chemical Engineering Concentration: 45 hours</u> CHE 122 Introduction to Chemical & Biological Engineering CHE 203 Material Balances CHE 212 Energy Balances CHE 222 Process Measurement Lab and Sustainability CHE 252 Statistics and Computational Methods CHE 303 Chemical Engineering Fluid Dynamics CHE 313 Chemical Engineering Thermodynamics I CHE 333 Unit Operations Laboratory I CHE 372 Chemical Engineering Thermodynamics II CHE 373 Chemical Engineering Heat Transfer CHE 383 Mass Transfer CHE 393 Stagewise Separations CHE 412 Applied Numerical Methods CHE 433 Unit Operations Laboratory II CHE 453 Chemical Engineering Kinetics CHE 463 Chemical Engineering Dynamics and Control CHE 473 Chemical Engineering Design I CHE 483 Chemical Engineering Design II Chemical Engineering Concentration Electives: 6 hours Chemical Engineering Electives (6 credits)</p>				

TOTAL IN DEGREE PROGRAM:**132 HRS.**

REINERS DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

The Reiners Department of Civil and Environmental Engineering offers the following undergraduate degree:

- **Bachelor of Science in Civil Engineering**

The civil engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, 410.347.7700.

The civil engineering profession provides for our basic needs: housing, cities, commerce, transportation, education, recreation, clean air, water, environmental projects, and energy production. Civil engineers plan, design, and construct safe and purposeful civic facilities that add to the quality of life.

Today, civil engineers explore the frontiers of high technology for solutions to global needs. They deal with the techniques of modern computer-integrated design, as well as do research for new methods and materials of construction. They design and conduct experiments to study the wind effects on tall buildings and the hydrodynamic effects on offshore structures. They use computer simulations to predict hydrologic events, assess flood damage, and manage transportation systems. They employ computers to monitor treatment facilities, lasers for precision surveying, and remote sensing technologies for geodetic surveying.

Based on this vision of the future, the Reiners Department of Civil & Environmental Engineering, with the support of the Allen School of Engineering & Technology and Trine University, will excel in the education of individuals uniquely prepared for the practice of civil engineering at the professional level.

Civil engineers, individually, cannot be accomplished in all of the above areas. Therefore, they concentrate on specific areas of civil engineering, such as structures, hydraulics, geotechnics, environmental engineering, highway and transportation engineering, urban planning, or construction management. Yet, civil engineering projects require a combined knowledge of many of these areas, as well as managerial skills, which include the ability to make decisions that are based not only on sound engineering principles, but also on an understanding of the social, ethical, and economical makeup of society. Therefore, it is essential that students receive a broad foundation in the areas of mathematics, physical and engineering sciences, analytical and design methods, communication skills, and the social sciences and humanities.

Civil engineers find career opportunities with architectural and engineering firms, construction corporations, material manufacturers, material testing services, utility corporations, and the petroleum and aircraft industries. As many civil engineering entities, such as highways, bridges, dams, land reclamation and water distribution systems, belong to the public sector, a significant proportion of civil engineers work for local, state and federal governments, as well as the Army Corps of Engineers, the Air Force and the Navy. Those who pursue advanced degrees often enter teaching and research careers in universities. Presently, thirty-five percent of all civil engineers are in general management.

MISSION

The mission of the civil engineering program at Trine University is to provide graduates with quality preparation for the practice of civil engineering, to provide graduates with opportunities

to pursue graduate studies, and to provide technical and educational services to their profession and communities.

OBJECTIVES

The following educational objectives have been developed for the civil engineering program at Trine University:

1. Graduates will effectively prepare and present written and verbal proposals, design reports, drawings and other technical information to a diverse audience.
2. Graduates demonstrate the importance of teamwork and leadership in executing projects, including their role within the team and their impact on the scope, budget, and schedule of the project.
3. Graduates can effectively use state of the practice engineering tools.
4. Graduates can analyze and design a structure, system or process, taking into consideration the legal, ethical and other societal impacts of the design.
5. Graduates take an active role in professional development including achieving professional licensure and active participation in professional societies.
6. Graduates are engaged in business aspects of the profession, including marketing, budgeting, client or public interaction, and contracting.

OUTCOMES

As specified by the accrediting body, engineering programs assure that their students will be able to:

- A. apply knowledge of mathematics, science, and engineering;
- B. design and conduct experiments, as well as to analyze and interpret data ;
- C. design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- D. function on multidisciplinary teams;
- E. identify, formulate, and solve engineering problems ;
- F. demonstrate professional and ethical responsibility;
- G. communicate effectively;
- H. use the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- I. recognize the need for, and an ability to engage in, life-long learning;
- J. discuss contemporary issues;
- K. use the techniques, skills, and modern engineering tools, necessary for engineering practice; and

PURPOSES

The Reiners Department of Civil and Environmental Engineering at Trine University fulfills its Mission by providing a dedicated and enhanced learning environment featuring the following components:

- curriculum: rigorous, but carefully shaped to provide a path to success;
- faculty: committed to an excellent undergraduate learning experience;
- classrooms: sized and equipped to promote personal attention;
- laboratories: equipped to provide an excellent laboratory experience through many hands-on experiments with direct guidance from full-time faculty;
- mentoring: promoted at all levels – faculty to student and upperclassman to underclassman
- peer interaction: fostered by team assignments in classes and membership in student organizations.

CIVIL & ENVIRONMENTAL ENGINEERING CURRICULUM

To prepare the student for a professional career in civil engineering, the curriculum listed below is specified. Its flexibility allows considerable freedom to choose courses that best fit a student's interests or objectives. Additional substitutions may be allowed when warranted.

The program design experience begins with the freshman engineering program. Introduction to the design process, ethics, professionalism, economics, and communication skills are presented and explored through individual and team assignments. As the analytical problem-solving capabilities of the students develop in their sophomore and junior years, design projects become more complex and involve engineering specifications, analysis, testing, safety, and societal constraints. Finally, the program design experience is completed with a senior design project. A multi-faceted civil engineering need is identified, and a problem statement is formulated. Alternative solutions are explored, and a detailed design is documented and presented.

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

132 HRS.

All civil engineering students must sit for the Fundamentals of Engineering (FE) examination as a requirement for graduation.

	Mathematics	Science	HUM/SS	Communication	Other
General Education 44 hours	MA 134 MA 164 MA 213	CH104 PH 224 PH 234	HUM elective (3) HUM elective (3) SS elective (3) SS elective (3)	ENG 103 ENG 133 SP 203	
Additional Requirements 13 hours	MA 233 MA 393	CH 114 SCI elective			
e Program Requirements 75 hours	<p>General Engineering: 5 hours GE 101 Introduction to Engineering GE 401 Professional Practice EGR 153 Engineering Graphics</p> <p>Engineering Science: 14 hours ES 213 Statics ES 243 Solid Mechanics ES 323 Fluid Mechanics ES 382 Engineering Economics ES xx3 Engineering Science Elective</p> <p>Civil Engineering: 47 hours CE 1021 Computer Tools for Civil Engineering CE 2001 Basic Surveying Laboratory CE 2003 Basic Surveying CE 3101 Environmental Engineering Aqueous Laboratory CE 3103 Environmental Engineering Aqueous CE 3201 Civil Engineering Materials Laboratory CE 3203 Civil Engineering Materials CE 3301 Hydraulics Laboratory CE 3303 Hydraulics CE 3501 Structural Analysis Laboratory CE 3503 Structural Analysis CE 3521 Structural Design Laboratory CE 3523 Introduction to Structural Design CE 3603 Transportation Engineering CE 3701 Soil Mechanics Laboratory CE 3703 Soil Mechanics CE xxx3 Civil Engineering In-Depth Elective CE xxx3 Civil Engineering In-Depth Elective CE xxx3 Civil Engineering In-Depth Elective CE 4912 Civil Engineering Design Seminar CE 4914 Civil Engineering Design</p> <p>Other Electives: 9 hours XX XX3 Business Elective XX XX3 Professional Development Elective XX XX3 Professional Development Elective</p>				

TOTAL IN DEGREE PROGRAM:

132 HRS.

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

The Department of Electrical and Computer Engineering offers the following degrees:

- **Bachelor of Science in Electrical Engineering**
- **Bachelor of Science in Computer Engineering**

Both the Electrical Engineering program and the Computer Engineering program are accredited by the Engineering Accreditation Commission of ABET, www.abet.org, 410.347.7700.

To prepare students for the innovative work required in these areas, students are provided an undergraduate preparation with a foundation in mathematics and science, proper development in communication skills, an understanding of the relevance and impact of engineering and technology on society, and a combination of classroom study and “hands on” laboratory experience.

In addition to academic activities, engineering experience has become a major factor in acquiring a desired position upon graduation. A Cooperative Educational Program (Co-op) is available to enhance the educational experience and provide necessary industrial experience; students are encouraged to participate in this optional program, and the department and Career Services offer help to any student seeking Co-op or summer employment in the majors.

MISSION

The Mission in the Department of Electrical and Computer Engineering is to provide students with the nurturing environment of a small school accompanied by academically rigorous programs that prepare graduates for either immediate employment or entry to graduate school.

OBJECTIVES

The Electrical and Computer Engineering programs assure that graduates are prepared to:

1. devise, choose, and use diagrams or other models to design systems and to communicate engineering ideas.
2. recognize situations that demand new information, locate it, and use it in their work.
3. give oral and written reports for communication with peers and decision-makers.
4. coordinate with colleagues from their own and other disciplines.
5. recognize their ethical obligations and social responsibilities and maintain awareness of non-technical perspectives.

OUTCOMES

As specified by the accrediting body, these engineering programs assure that students will be able to:

- A. apply knowledge of mathematics, science, and engineering;
- B. design and conduct experiments, as well as to analyze and interpret data ;
- C. design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- D. function on multidisciplinary teams;
- E. identify, formulate, and solve engineering problems ;
- F. demonstrate professional and ethical responsibility;
- G. communicate effectively;
- H. use the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- I. recognize the need for, and an ability to engage in, life-long learning;
- J. discuss contemporary issues;
- K. use the techniques, skills, and modern engineering tools, necessary for engineering practice; and

PURPOSES

The Trine University Electrical and Computer Engineering Departments fulfills its Mission by providing a dedicated and enhanced learning environment featuring the following components:

- curriculum: rigorous, but carefully shaped to provide a path to success;
- faculty: committed to an excellent undergraduate learning experience;
- classrooms: sized and equipped to promote personal attention;
- laboratories: equipped to provide an excellent laboratory experience through many hands-on experiments with direct guidance from full-time faculty;
- mentoring: promoted at all levels – faculty to student and upperclassman to underclassman
- peer interaction: fostered by team assignments in classes and membership in student organization.

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

The Computer Engineering degree program requires 132 semester hours of study comprising 44 hours of University general education, 9 additional hours of mathematics beyond the general education requirement and 79 hours of program-specific requirements. The program-specific requirements include 10 hours of general engineering courses, 31 hours of required electrical and computer engineering core courses, 11 hours of computer engineering required courses, 12 hours of ECE-, CS-, or CO-prefixed elective courses, and 15 hours of open electives. Students are encouraged to use the 15 open elective hours to meet the requirements for a minor in an area of their interest.

This division of courses is planned to assure that computer engineering students complete lecture and laboratory courses in: circuits, analog electronics, digital electronics, embedded systems, software design or software engineering, an advanced computer engineering elective area, and a capstone design project. The format of laboratories and design projects is such that students will experience working as an individual, working with a same-discipline partner or small team, and finally working as part of a multi-disciplinary team. Degree requirements may be fulfilled with the Trine courses listed below or others at the Department's discretion. For curriculum-related details, see the department chair.

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING 132 HOURS

	Mathematics	Science	Hum/SS	Communication	Other
General Education 44 hours	MA 134 MA 164 MA 213	CH 104 PH 224 PH 234	HUM elective (3) HUM elective (3) SS elective (3) SS elective (3)	ENG 103 ENG 133 SP 203	
Additional Requirements 9 hours	MA 233 MA 393 MA 473				
Program Requirements 79 hours	<p>Computer Programming: 3 hours CS 1113 Object-Oriented Java Programming</p> <p>Engineering Science: 5 hours ES elective ES elective</p> <p>General Engineering: 2 hours GE 101 Introduction to Engineering GE 401 Professional Practice</p> <p>Electrical & Computer Engineering Core: 31 hours ECE 103 Prototyping & Projects ECE 211 Circuits Laboratory ECE 213 Circuit Analysis ECE 231 Discrete Electronics Laboratory ECE 233 Discrete Electronics ECE 243 Analog Signals ECE 261 Digital Systems Laboratory ECE 263 Digital Systems ECE 271 Microcontrollers Laboratory ECE 273 Microcontrollers ECE 453 Random Processes in ECE ECE 4001 Contemporary Issues ECE 4002 Project Management ECE 4003 Design Project</p> <p>Computer Engineering Concentration: 11 hours CS 1123 C++ & Object-Oriented Design ECE 361 Logic & Computer Design Laboratory ECE 363 Logic & Computer Design ECE 371 Embedded Systems Laboratory ECE 373 Embedded Systems</p> <p>Computer Engineering Concentration Electives: 12 hours Chosen from CS, ECE, or CO prefixed courses</p> <p>Open Electives – 15 hours Chosen from approved courses to bring total hours to 132</p>				

TOTAL IN DEGREE PROGRAM:**132 HRS.**

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

The Electrical Engineering degree program requires 132 semester hours of study comprising 44 hours of University general education, 9 additional hours of mathematics beyond the general education requirement and 79 hours of program-specific requirements. The program-specific requirements include 10 hours of general engineering courses, 31 hours of required electrical and computer engineering core courses, 11 hours of electrical engineering required courses, 12 hours of ECE-, CS-, or CO-prefixed elective courses, and 15 hours of open electives. Students are encouraged to use the 15 open elective hours to meet the requirements for a minor in an area of their interest.

This division of courses is planned to assure that electrical students complete lecture and laboratory courses in: circuits, analog electronics, digital electronics, signals, integrated systems, an advanced electrical engineering elective area, and a capstone design project. The format of laboratories and design projects is such that students will experience working as an individual, working with a same-discipline partner or small team, and finally working as part of a multi-disciplinary team.

The degree requirements may be fulfilled with the Trine courses listed below or others at the Department's discretion. For curriculum-related details, see the department chair.

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING 132 HOURS

	Mathematics	Science	Hum/SS	Communication	Other
General Education 44 hours	MA 134 MA 164 MA 213	CH 104 PH 224 PH 234	12 hours HUM elective HUM elective SS elective SS elective	ENG 103 ENG 133 SP 203	
Add'l 9 hours	MA 233 MA 393 MA elective (3)				
Program Requirements 79 hours	<p>Computer Programming: 3 hours CS 1113 Object-Oriented Java Programming</p> <p>Engineering Science: 5 hours ES elective ES elective</p> <p>General Engineering: 2 hours GE 101 Introduction to Engineering GE 401 Professional Practice</p> <p>Electrical & Computer Engineering Core: 31 hours ECE 103 Prototyping & Projects ECE 211 Circuits Laboratory ECE 213 Circuit Analysis ECE 231 Discrete Electronics Laboratory ECE 233 Discrete Electronics ECE 243 Analog Signals ECE 261 Digital Systems Laboratory ECE 263 Digital Systems ECE 271 Microcontrollers Laboratory ECE 273 Microcontrollers ECE 453 Random Processes in ECE ECE 4001 Contemporary Issues ECE 4002 Project Management ECE 4003 Design Project</p> <p>Electrical Engineering Concentration: 11 hours ECE 301 Electrical Machines Laboratory ECE 303 Electrical Machines ECE 323 Dynamic EM Fields ECE 481 Instrument Systems Laboratory ECE 483 Instrument Systems</p> <p>Electrical Engineering Concentration Electives:-12 hours Chosen from CS, ECE, or CO prefixed courses</p> <p>Open Electives: 15 hours Chosen from approved courses to bring total hours to 132</p>				

TOTAL IN DEGREE PROGRAM:**132 HRS.**

WADE DEPARTMENT OF MECHANICAL, AEROSPACE, AND BIOMEDICAL ENGINEERING

The Dr. Forrest V. Wade Department of Mechanical, Aerospace, and Biomedical Engineering was named in honor of Dr. Forrest V. Wade, a 1930 mechanical engineering graduate. The department offers the following undergraduate degree:

- **Bachelor of Science in Biomedical Engineering**
- **Bachelor of Science in Mechanical Engineering**

Trine University's Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, 410.347.7700.

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

The field of Biomedical Engineering combines knowledge from all of the basic science disciplines: mathematics, chemistry, physics, and biology as well as the engineering sciences. Due to this inter-disciplinary nature and rapidly advancing knowledge in the field of medicine, the curriculum for a Biomedical Engineer must also be adaptive and keep up with current advancements. To incorporate these aspects into a Biomedical Program the coursework must be grounded in the traditional sciences but also be flexible to consider both individual student interests and special topics knowledge of faculty. The Biomedical major integrates well with the mission of the University as well as vision of the Allen School of Engineering.

MISSION

The mission of the biomedical engineering program at Trine University is to enable students to become productive biomedical engineers, to advance to leadership roles in the profession, and to provide service to society.

OBJECTIVES

To satisfy the mission, the department has established the following educational objectives:

1. to provide graduates with high quality preparation for the practice of biomedical engineering and related disciplines at the professional level;
2. to offer graduates opportunities to pursue graduate studies, lifelong learning, and to offer services to their professions; and
3. to provide graduates able to supply technical expertise and engineering education services to industry and the community.

OUTCOMES

As specified for accreditation, the Biomedical Engineering Program assures the students will be able to:

- A. apply knowledge of mathematics, science, and engineering;
- B. design and conduct experiments, as well as to analyze and interpret data;
- C. design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- D. function on multidisciplinary teams;
- E. identify, formulate, and solve engineering problems;

- F. identify professional and ethical responsibility;
- G. communicate effectively;
- H. apply the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- I. recognize the need for, and an ability to engage in, life-long learning;
- J. identify contemporary issues; and
- K. use the techniques, skills, and modern engineering tools, necessary for engineering practice.

PURPOSES

The mission of the Trine University Biomedical Engineering program is fulfilled through a learning environment featuring the following components:

- curriculum: rigorous, but carefully shaped to provide a path to success;
- faculty: committed to an excellent undergraduate learning experience;
- classrooms: sized and equipped to promote personal attention;
- laboratories: equipped to provide an excellent laboratory experience through many hands-on experiments with direct guidance from full-time faculty;
- mentoring: promoted at all levels – faculty to student and upperclassman to underclassman
- peer interaction: encouraged and enhanced by team interaction in classwork and laboratories, and membership in student organizations.

THE BIOMEDICAL ENGINEERING CURRICULUM

The field of Biomedical Engineering combines knowledge from all of the basic science disciplines: mathematics, chemistry, physics, and biology, as well as the engineering sciences. Due to this inter-disciplinary nature and rapidly advancing knowledge in the field of medicine, the curriculum for a Biomedical Engineer must also be adaptive and keep up with current advancements. To incorporate these aspects into a Biomedical Program the coursework must be grounded in the traditional sciences but also be flexible enough to consider both individual student interests and special topics knowledge of faculty. The Biomedical major integrates well with the mission of the University as well as vision of the Allen School of Engineering.

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

132 HRS

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 134 MA 164	CH 155 PH 224 PH 234	<u>12 hours</u> PHL 313 HUM elective SS elective SS elective	ENG 103 ENG 133 SP 203	
Additional Requirements 21 hours	MA 213 MA 233 MA 393	CH 203 CH 211 BIO 254 BIO 354			
Core Requirements 69 hours	<p><u>General Engineering: 2 hours</u> GE 101 GE 401</p> <p><u>Unrestricted Electives: 1 hour</u></p> <p><u>Engineering Science: 14 hours</u> ES213 Statics ES223 Dynamics ES233 Engineering Materials ES382 Engineering Economics ES313 Thermodynamics <i>or</i> CHE313 Thermodynamics</p> <p><u>ELECTRICAL/COMPUTER ENGINEERING: 7 hours</u> ECE213 Circuit Analysis ECE211 Circuit Analysis Lab ECE243 Analog Signals</p> <p><u>BME CORE: 27 hours</u> BME2013 Introduction to Biomedical Engineering BME3003 Introduction to Biomechanics BME3103 Biomaterials BME4303 Biochemical Engineering BME4403 BME Measurement/Instrumentation BME4503 Tissue Engineering BME4603 BME Transport I BME4853 BME Design I BME4863 BME Design II</p>				

	Choose one (1) of the following three concentration areas
	CHEMICAL ENGINEERING CONCENTRATION: 18 hours CHE203 Material Balances CHE212 Energy Balances CHE252 Statistics and Computational Methods CHE303 ChE Fluids CH213 Organic Chemistry II CH221 Organic Chemistry II Lab BIO434 Biochemistry
	ELECTRICAL ENGINEERING CONCENTRATION: 18 hours CS1113 Object Oriented JAVA ECE263 Digital Systems ECE261 Digital Systems Lab ECE233 Discrete Electronics ECE231 Discrete Electronics Lab ECE273 Microcontrollers ECE271 Microcontrollers Lab ECE323 Electromagnetic Fields
	MECHANICAL ENGINEERING CONCENTRATION: 18 hours EGR143 Engineering Graphics MAE203 Mechanical Engineering Analysis ES243 Solid Mechanics BME4003 Advanced Biomechanics BME4613 Biomedical Transport II MAEXX3 MAE Elective

TOTAL IN DEGREE PROGRAM:

132 HRS.

Students can earn a dual degree in Biomedical and one of the following fields of concentration with the addition of the following courses.

DUAL DEGREE WITH CHEMICAL ENGINEERING

CHE 222	Process Measurement Lab & Sustainability	2
CHE 333	Units Operations Lab I	3
CHE 433	Units Operations Lab II	3
CHE 463	ChE Process Dynamics & Control	3
CHE 412	Applied Numerical Methods	2
CHE 453	ChE Kinetics	3
CH XXX	CH Electives	12
	Unrestrictive Electives	2
	Total	30

DUAL DEGREE WITH ELECTRICAL ENGINEERING

ECE 301	Electrical Machines	3
ECE 303	Electrical Machines Lab	1
ECE 483	Instrument Systems	3
ECE 481	Instrument Systems Lab	1
ECE 453	Random Processes in ECE	3
ECE 4001	Contemporary Issues	1
	EE Concentration Electives	12
	Advanced Mathematics Elective	3
	Unrestrictive Electives	3
	Total	30

DUAL DEGREE WITH MECHANICAL ENGINEERING

MA 313	Linear Algebra	3
MAE 243	Manufacturing Processes and Equipment	3
MAE 323	Thermodynamics II	3
MAE 3033	Fluids Dynamics	3
ES 343	Heat Transfer	3
MAE 353	Machine Component Design	3
MAE 373	Computer Aided Machine Design	3
MAE 413	Thermo/Fluid Component Design	3
MAE 453 or E 4073	Mechanical Vibrations or System Dynamics and Controls	3
MAE 463	Mechanical Measurements	3
	Total	30

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING 132 HRS.

Mechanical engineering is, perhaps, the most diverse and general of all the engineering fields. Mechanical engineers can be found working in almost any company. Manufacturing, transportation, health care, and insurance are some of the types of firms that employ mechanical engineers. No other field of engineering provides a better professional base for interdisciplinary activities.

Mechanical engineers design machines of all types, from paper clips to space shuttles. They plan, design, and direct the manufacture, distribution, and operation of these machines. Mechanical engineers also design the power sources needed to operate the machines and provide for the environment in which they function. In fact, mechanical engineering involves all phases of energy production and utilization: engines, power plants, electrical generation, heating, ventilating, and air conditioning.

Those mechanical engineers who choose to specialize in the aerospace area are particularly suited for employment in vehicle design. They may be involved in the design of aircraft, spacecraft, missiles, automobiles, trucks, buses, trains, or ships. Their specialized knowledge of lightweight structures and efficient, low drag design take on added importance as fuel costs increase.

Other mechanical engineers may specialize in the area of metallurgy and focus on the relationships among the structure, properties, processing and performance of metals. These engineers will be involved in product design, process development, and equipment design in addition to material specification, failure analysis, and implementing manufacturing processes.

Due to the diverse nature of the profession, the mechanical engineering education must provide a very broad base of studies. To be successful a mechanical engineer must be able to communicate knowledge and ideas to others; thus communication skills are an important part of the engineer's preparation. Studies in the social sciences and humanities develop an understanding of the relevance and impact of engineering and technology on society. Mathematics provides the engineer with the tools needed to build on the scientific foundations of chemistry and physics. The engineering sciences, common to all engineering disciplines, provide a broad foundation for the design of both thermal and mechanical systems, which are at the core of mechanical engineering.

Engineering creativity cannot be developed by theory alone; an engineer learns by doing. Thus, the laboratory courses stress hands-on work and the project design courses involve real-world problems. Multidisciplinary teams, involving students from business, technology, and/or other engineering programs in the senior design projects prepare students for the team design approach common in industry. A cooperative education program, incorporating alternating periods of full-time work and fulltime school, is available to enhance the education and provide valuable engineering experience. Students are encouraged to participate in this optional program.

MISSION

The mission of the mechanical engineering program at Trine University is to enable students to become productive mechanical engineers, to advance to leadership roles in the profession, and to provide service to society.

OBJECTIVES

To satisfy the mission the department has established the following educational objectives:

- To provide graduates with high quality preparation for the practice of mechanical engineering and related disciplines at the professional level;
- To offer graduates opportunities to pursue graduate studies, lifelong learning, and to offer services to their professions; and
- To supply technical expertise and engineering and education services to industry and the community.

OUTCOMES

As specified by ABET, accrediting body for engineering curricula, the Mechanical Engineering program assures that graduates will be able to:

- A. apply knowledge of mathematics, science, and engineering;
- B. design and conduct experiments, as well as to analyze and interpret data;
- C. design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- D. function on multidisciplinary teams;
- E. identify, formulate, and solve engineering problems;
- F. exhibit professional and ethical responsibility;
- G. communicate effectively;
- H. use the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- I. identify the need for, and an ability to engage in, life-long learning;
- J. recognize contemporary issues and their importance; and
- K. the techniques, skills, and modern engineering tools, necessary for engineering practice.

PURPOSES

The mission of the Trine University Mechanical Engineering Program is fulfilled through a learning environment comprising the following components:

- curriculum: broad yet appropriately in-depth; rigorous, with a mixture of theory and hands-on experiences;
- faculty: committed to an excellence in teaching;
- classrooms: small and personal;
- laboratories: equipped to provide excellent hands-on experiments with direct oversight of full-time faculty and a skilled laboratory technician;
- peer interaction: encouraged and enhanced by team interaction in classwork and laboratories and membership in student organizations.

THE MECHANICAL ENGINEERING CURRICULUM

The first year of the mechanical engineering program is devoted to developing knowledge and skills in communication, mathematics, and the natural sciences. Students are introduced to the mechanical engineering profession through the courses “Mechanical Engineering Analysis” and “Engineering Graphics.” In the second year the fundamental courses in the engineering sciences provide the foundation for engineering design. The design process is formalized in the junior year in the courses “Computer-Aided Machine Design” and “Thermo-Fluid Component Design.” The other courses in the third year emphasize engineering analysis and design in the areas of thermal and mechanical systems. The year-long senior design project integrates the previous studies into the design of a machine or system, most often resulting in fabrication and testing of a prototype. A professional atmosphere is developed through multidisciplinary teams and industry originated projects in the senior design sequence.

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING 132 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 44 hours	MA 134 MA 164 MA 213	CH 104 PH 224 PH 234	HUM elective (3) HUM elective (3) ECO 213 SS elective (3)	ENG 103 ENG 133 SP 203	
Additional Requirements 12 hours	MA 233 MA 313 MA 393			EGR 143	
Core Requirements 76 hours	<p><u>General Engineering: 2 hours</u> GE 101 GE 401</p> <p><u>Unrestricted Electives: 6 hours</u> Electives (6)</p> <p><u>Engineering Science: 23 hours</u> ES213 Statics ES223 Dynamics ES233 Engineering Materials ES243 Solid Mechanics ES253 Electrical Science ES313 Thermodynamics ES343 Heat Transfer ES382 Engineering Economics</p> <p><u>ME CORE 36 hours</u> MAE203 Mechanical Engineering Analysis MAE243 Manufacturing Processes and Equipment MAE303 Mechanics of Machinery MAE323 Thermodynamics II MAE3033 Fluid Dynamics for Mechanical Engineering MAE353 Machine Component Design MAE373 Computer Aided Machine Design MAE413 Thermal Fluid Component Design MAE453 Mechanical Vibrations <i>or</i> MAE 4023 System Dynamics and Controls MAE463 Measurement Lab MAE4053 Mechanical Design I MAE4063 Mechanical Design II</p> <p><u>Mechanical Electives 9 hours</u> MAE XX3 MAE XX3 MAE XX3</p>				

TOTAL IN DEGREE PROGRAM:**132 HRS.**

DEPARTMENT OF TECHNOLOGY

The Department of Technology offers the following degree:

• Bachelor of Science in Design Engineering Technology

Students are prepared for the innovative design work required in this area by providing them undergraduate preparation that includes a foundation in mathematics and science, proper development in communication skills, an understanding of the relevance and impact of engineering and technology on society through a combination of classroom study and “hands on” laboratory experiences.

In addition to academic activities, field experience can be a major factor in acquiring a desired position upon graduation. Cooperative Educational Programs (Co-op) are available to enhance the educational experience and provide necessary industrial experience. Students are encouraged to participate in these optional programs, and the department and Career Services offer help to any student seeking Co-op or summer employment in their major.

MISSION

In concert with the mission of Trine University and the Allen School of Engineering and Technology, the Department of Technology will provide an academic environment with an interactive educational climate which produces high quality graduates that are engaged, well-rounded, and technologically experienced.

OBJECTIVES

1. To produce graduates who are prepared for careers in the areas associated with the analysis, applied design, development, implementation, and oversight of design projects and processes.
2. Foster a desire for personal development to ensure a lifetime of professional advancement, success, and an appreciation for the ethical and social responsibilities of a design engineering technologist.
3. Equip students with sufficient general education studies, including liberal arts, to permit the graduate to communicate effectively and to function as a responsible citizen.

OUTCOMES

Our program assures that students attain the following outcomes:

- A. An ability to apply knowledge of mathematics, science, and engineering
- B. An ability to design and conduct experiments, as well as to analyze and interpret data
- C. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- D. An ability to function on multidisciplinary teams
- E. An ability to identify, formulate, and solve engineering problems
- F. An understanding of professional and ethical responsibility

- G. An ability to communicate effectively
- H. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- I. A recognition of the need for, and an ability to engage in, life-long learning
- J. A knowledge of contemporary issues
- K. An ability to use the techniques, skills, and modern engineering tools, necessary for engineering practice.

DESIGN ENGINEERING TECHNOLOGY CURRICULUM

The Design Engineering Technology curriculum emphasizes many of the underlying principles of component design and the skills required to communicate with other engineers, scientists, and production personnel. Elective course offerings within the academic programs provide the student with the opportunity to minor in areas such as plastics engineering, business, management, marketing, and leadership.

A strong emphasis is placed on the application of skills needed in the modern engineering department. The program provides opportunities to learn the skills and knowledge needed to advance in industry into the upper levels of supervision. Knowledge of computers, management, computer FEA analysis, solid modeling and applied engineering design, and the application of engineering specifications are integrated in this program. This program is approved, strongly supported, and guided by an advisory board of engineers from various industries.

BACHELOR OF SCIENCE IN DESIGN ENGINEERING TECHNOLOGY 121 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 MA 123 MA 134 MA 253	PH 154 PH 164	<u>12 hours</u> PSY 113 ECO 213 HUM elective HUM elective	ENG 103 ENG 133 SP 203	
Add'l hrs 10	MA 253	CH 144	ECO 233		
Core Requirements 69 hours	<p><u>Design Engineering Technology : 46 hours</u> ETD 101 Introduction to Engineering Technology ETD 103 Basic Technical Drawing ETD 113 Geometric Dimensioning & Tolerancing ETD 123 Manufacturing Materials & Processes ETD 163 Environmental Health & Safety ETD 173 Computer-Aided 3D Modeling ETD 203 Basic Mechanisms ETD 233 Engineering & Manufacturing Systems ETD 243 Statics & Strength of Materials ETD 263 Design, Analysis, & Prototyping ETD 273 Electrical Fundamentals ETD 313 Design for Manufacture and Assembly ETD 323 Product Design and Development ETD 363 Elements of Machines ETD 463 Senior Design Project I ETD 473 Senior Design Project II</p> <p><u>Additional Requirements: 15 hours</u> COM 213 Business Communication INF 103 Information Applications MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 413 Management of Quality</p> <p><u>Free Electives: 8 hours</u> Department Approved Elective (2 hrs min) 300/400 Department Approved Elective 300/400 Department Approved Elective</p>				

TOTAL IN DEGREE PROGRAM:

121 HRS.

FRANKS SCHOOL OF EDUCATION

Trine University's Franks School of Education includes this department:

- Shevenaugh Department of Elementary Education

Academic programs administered by the school are as follows:

- Bachelor of Science
Majors
 - Elementary Education
 - Health/Physical Education
 - Mathematics Education
 - Science Education
 - Social Studies Education

Information presented here is subject to change at any time, depending on actions taken by the Indiana Department of Education/Office of Educator Licensing and Development. Students are responsible for meeting any requirements for licensure that are in effect at the time they seek to be licensed. The requirements may differ from what is presented in this document. Students should remain alert to changes in requirements. Updated information is available from the Franks School of Education.

THE SCHOOL

The Franks School of Education was named in honor of Lawrence A. Franks, a 1959 mechanical engineering graduate and member of the University's Board of Trustees.

Established in 1884 by a group of Angola citizens, the University began as part of the normal school movement that spread throughout much of the United States during the last half of the nineteenth century. The initial course of study at Tri-State Normal College included teacher education and commerce. In 1921, Frances Kain Shevenaugh earned her "teaching certificate" at Tri-State by completing a twelve-week course of study. In June, 2001, the University reorganized its basic structure to make education a visible component. To renew the tradition of serving the needs of public education in the service area and beyond, the School of Education was created.

All education programs are built upon three major components that are deemed necessary for effective and productive teachers—content, communication, and caring. Each is dependent upon the other, and together they describe the knowledge, dispositions, and performances of a knowledgeable, reflective educator.

ACCREDITATION

The Trine University Franks School of Education is accredited by the Indiana Department of Education/Office of Educator Licensing and Development (DOE/OELD) and by the Council for Accreditation of Educator Preparation (CAEP).

MISSION OF THE SCHOOL

The mission of the Franks School of Education at Trine University is to provide an educational atmosphere in which each teacher candidate is challenged to become the best educator he or she can be. Faculty members of the School are committed to helping each future educator achieve his or her potential as a knowledgeable, reflective educator who is committed to and able to provide for the growth of all learners.

PROFESSIONAL COMMITMENTS AND DISPOSITIONS

The Franks School of Education at Trine University adopted the ten principles developed by the Interstate Teacher Assessment and Support Consortium (InTASC) as program objectives, and two additional objectives specific to the mission of the School.

1. The teacher candidate understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches, and can create learning experiences that make these aspects of subject matter meaningful for students.
2. The teacher candidate understands how children learn and develop, and can provide learning opportunities that support their intellectual, social, and personal development.
3. The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.
4. The teacher candidate understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.
5. The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.
6. The teacher candidate uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.
7. The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.
8. The teacher candidate understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the learner.
9. The teacher candidate is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.
10. The teacher candidate fosters relationships with school, colleagues, parents, and agencies in the larger community to support students' learning and well-being.
11. The teacher candidate organizes and implements instruction for students based on an understanding of the caring ethic.

12. The teacher candidate understands and applies interpersonal communication skills that support the caring ethic.

ADMISSION TO TEACHER EDUCATION

Two courses, EDU 111 Freshman Practicum and EDU 211 Sophomore Practicum, may be taken prior to official admission to teacher education. Other courses with EDU prefixes may be taken only after the candidate has applied to and has been accepted into teacher education. A candidate may apply for admission to teacher education (which allows her/him to pursue a teacher education degree in a selected major) after completing the following:

1. earned State of Indiana passing scores on reading, writing, and mathematics sections of Praxis I;
2. completed 12 semester hours of university credit with a cumulative GPA of 2.5 or higher;
3. submitted three positive letters of recommendation supporting the candidate's admission to teacher education;
4. submitted an expanded criminal background check; and
5. submitted appropriate application forms.

Transfer students must meet similar requirements. The Franks School of Education should be contacted for further details (260.665.4121).

APPROVED PROGRAMS

All teacher preparation programs are approved by the Indiana Department of Education/Office of Educator Licensing and Development and the National Council for Accreditation of Teacher Education.

Approved programs include the following:

- Elementary Education (K-6)*
- Health/Physical Education (P-12)*
- Mathematics Education (5 -12)*
- Science Education (5 -12)*
- Social Studies Education (5 -12)*

Science education majors must choose at least one content area from life science/biology or chemistry.

Social studies education majors must choose at least three content areas from economics, geographical perspectives, government and citizenship, historical perspectives, and/or psychology.

Applicable standards for each program are InTASC general standards, IDOE/OELD developmental standards, and IDOE/OELD content standards.

REMAINING IN TEACHER EDUCATION

Once officially admitted, retention in teacher education is contingent upon good academic standing and successful passing of Benchmark requirements. The GPA required for admission is

2.5 overall. Upon admission, if the candidate's GPA falls below 2.5, the candidate will be placed on probation. Education courses may be taken the next semester only with permission of the Teacher Education Committee. If the GPA remains below 2.5 at the completion of the probationary term, the candidate no longer is eligible to take EDU courses and may apply for readmission when a satisfactory GPA is achieved. The candidate must also successfully meet requirements at various checkpoints (Benchmark #1, #2, #3, #4).

TESTING REQUIREMENTS

To be eligible for admission to teacher education, state of Indiana passing scores on CASA basic skills exam must be submitted. To be eligible for student teaching, state of Indiana passing score(s) on required Praxis II content specialty test(s) must be submitted. Please note the name of this series of tests will be changing. The Franks School of Education should always be consulted before a test is taken to ensure most recent testing requirements are met.

STUDENT TEACHING

Student teaching is completed in an area school, generally within 40 miles of the University, as assigned by the dean of the Franks School of Education. The student teacher participates in a classroom with a cooperating teacher for 10-11 full weeks. The GPA requirement for enrollment in student teaching is 2.5 overall, as well as 2.5 in all intended areas of licensure. To be eligible for licensure, the teacher candidate must have earned an overall GPA of 2.5 or higher, a GPA of 2.5 or higher in all areas of licensure, must have successfully completed student teaching with a GPA of 2.5 or higher, and must have met all Benchmark requirements at established levels.

LICENSING ADVISOR

Trine University's licensing advisor is the dean of the Franks School of Education.

BACHELOR OF SCIENCE ELEMENTARY EDUCATION (K-6) 124 HRS.

To be eligible for licensure as an elementary teacher in grades K-6, the following program of study must be completed.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 43 hours	MA 184 MA 194	BIO 104	ENG 153 ART 253 PSY 113 HIS 103	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102 GOV 113 HIS 113 HPE 232
Additional Requirements 28 hours		PH 104 AST 203/201	MUS 272 ECO 213 <i>or</i> ECO 223 SOC 323 GEO 303 GEO 323		Gen Ed Elec (3) HPE 342 UE 101
Content Requirements 53 hours	EDU 111 Freshman Practicum EDU 211 Sophomore Practicum EDU 212 Introduction to Music Fundamentals EDU 222 Educational Psychology – Elementary EDU 301 Introduction to Teaching Practicum EDU 303 Introduction to Teaching EDU 311 Junior Practicum EDU 312 Exceptional Children in Schools EDU 323 Foundations of Education EDU 342 The Kindergarten Experience EDU 353 Children’s Literature EDU 441 Teaching of Reading Practicum EDU 445 Teaching of Reading EDU 452 Art for the Elementary Teacher EDU 454 Methods of Math/Science EDU 462 Educational Assessment EDU 463 Educational Media and Technology EDU 464 Methods of Language Arts/Social Studies EDU 470 Student Teaching EDU 471 Student Teaching Seminar				

TOTAL IN DEGREE PROGRAM:**124 HRS.**

BACHELOR OF SCIENCE HEALTH/PHYSICAL EDUCATION (P-12) 133 HRS.

To be eligible for licensure as a health and/or physical education teacher in grades P-12, the following program of study must be completed.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 <i>or</i> MA 153	BIO 104 BIO 254	ENG 153 Hum elective (3) PSY 113 SS elective (3)	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102 UE 101 HIS 103,113, 203, <i>or</i> 213 Gen Ed elec (4)
Health and Physical Education Courses 46 hours	<u>Content Requirements</u> EXS 103 Teaching Sport and Recreation Activities I EXS 123 Teaching Sport and Recreation Activities II EXS 131 First Aid (waived if valid CPR) EXS 202 Introduction to Adaptive PE EXS 212 Adaptive Physical Education EXS 243 Athletic Training EXS 273 Nutrition EXS 332 Drug Education EXS 333 Kinesiology EXS 373 Health Problems EXS 433 Developing Health Promotion Programs EXS 463 Motor Learning HPE 232 PE for the Elementary Teacher HPE 342 School and Community Health HPE 352 Family Life Education SM 223 History of PE and Sport SM 253 Risk Management SM 413 Organization and Administration of PE and Athletics				
Program Requirements 45 hours	<u>Professional Education Requirements</u> EDU 111 Freshman Practicum EDU 211 Sophomore Practicum EDU 212 Introduction to Music Fundamentals EDU 222 Educational Psychology – Elementary EDU 232 Educational Psychology – Middle/Secondary EDU 301 Introduction to Teaching Practicum EDU 303 Introduction to Teaching EDU 311 Junior Practicum EDU 312 Exceptional Children in Schools EDU 323 Foundations of Education EDU 333 Reading in the Content Area EDU 412 The Middle School EDU 422 Educational Media and Technology EDU 432 Practicum in Teaching – Secondary Teacher EDU 442 Special Methods – Secondary Teacher EDU 462 Educational Assessment EDU 463 Educational Media and Technology EDU 470 Student Teaching EDU 471 Student Teaching Seminar				

TOTAL IN DEGREE PROGRAM:**133 HRS.**

BACHELOR OF SCIENCE MATHEMATICS EDUCATION (5-12) 124 HRS.

To be eligible for licensure as a mathematics teacher in grades 5-12, the following program of study must be completed.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 312	Electives – Lab science (4) Lab science (4)	ENG 153 Hum elective (3) PSY 113 SS elective (3)	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102 INF 143 <i>or</i> CS 1113 Gen Ed Electives (6)
Add'l 1 hour					UE 101
Mathematics Content Area Courses 38 hours	<p><u>Content Requirements</u> MA 134 Calculus I MA 164 Calculus II MA 213 calculus III MA 233 Differential Equations MA 303 college Geometry MA 313 Linear Algebra MA 343 Sets and Logic MA 373 Abstract algebra MA 393 Probability and Statistics MA 403 Advanced Calculus MA 473 Discrete Mathematics MA XX3 300-400 level three credit Math course</p>				
Professional Education Courses 43 hours	<p><u>Professional Education Requirements</u> EDU 111 Freshman Practicum EDU 211 Sophomore Practicum EDU 232 Educational Psychology – Middle/Secondary EDU 301 Introduction to Teaching Practicum EDU 303 Introduction to Teaching EDU 311 Junior Practicum EDU 312 Exceptional Children in Schools EDU 323 Foundations of Education EDU 333 Reading in the Content Area EDU 432 Practicum in Teaching – Secondary Teacher EDU 442 Special Methods – Secondary Teacher EDU 462 Educational Assessment EDU 463 Educational Media and Technology EDU 412 The Middle School EDU 422 Middle School Methods EDU 472 Middle School Practicum EDU 470 Student Teaching EDU 471 Student Teaching Seminar</p>				

TOTAL IN DEGREE PROGRAM:

124 HRS.

BACHELOR OF SCIENCE - EDUCATION/LIFE SCIENCES-(BIOLOGY) (5-12)

To be eligible for licensure as a life sciences (biology) teacher in grades 5-12, the following program of study must be completed. **130 HRS.**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 MA 123 <i>or</i> MA 134	CH 104	ENG 153 Hum elective (3) PSY 113 SS elective (3)	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102 CH 114 Gen Ed elec (4-5)
Add'l 1 hour	UE 101 University Experience				
Content Requirements 44 hours	<u>Content Requirements</u> BIO 114 Principles of Biology I BIO 124 Principles of Biology II BIO 254 Human Anatomy BIO 304 Plant Biology BIO 314 Animal Biology BIO 324 Microbiology BIO 334 Environmental Biology BIO 354 Human Physiology BIO 414 Genetics PH 154 College Physics SC 412 Senior Research Seminar SC 422 Senior Research Project				
Professional Education Requirements 43 hours	<u>Professional Education Requirements</u> EDU 111 Freshman Practicum EDU 211 Sophomore Practicum EDU 232 Educational Psychology – Middle/Secondary EDU 301 Introduction to Teaching Practicum EDU 303 Introduction to Teaching EDU 311 Junior Practicum EDU 312 Exceptional Children in Schools EDU 323 Foundations of Education EDU 333 Reading in the Content Area EDU 432 Practicum in Teaching – Secondary Teacher EDU 442 Special Methods – Secondary Teacher EDU 462 Educational Assessment EDU 463 Educational Media and Technology EDU 412 The Middle School EDU 422 Middle School Methods EDU 472 Middle School Practicum EDU 470 Student Teaching EDU 471 Student Teaching Seminar				

TOTAL IN DEGREE PROGRAM:

130 HRS.

BACHELOR OF SCIENCE-SCIENCE EDUCATION/CHEMISTRY (5-12) 130 HRS.

To be eligible for licensure as a chemistry teacher in grades 5–12, the following program of study must be completed.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 43 hours	MA 134 MA 164	CH 104 CH 114 PH 224	ENG 153 Hum elective (3) PSY 113 SS elective (3)	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102
Add'l courses 1 hours					UE 101
Chemistry Content Area Courses 43 hours	Content Requirements CH 203/211 Organic Chemistry I and Lab CH 213/221 Organic Chemistry II and Lab CH 234 Quantitative Analysis CH 244 Inorganic Chemistry CH 324 Instrumental analysis CH 353/351 Physical Chemistry I and Lab CH 363/361 Physical Chemistry II and Lab CH 434 Biochemistry MA 213 Calculus III PH 234 University Physics II SC 412 Senior Research Seminar SC 422 Senior Research Project				
Professional Education Courses 43 hours	Professional Education Requirements EDU 111 Freshman Practicum EDU 211 Sophomore Practicum EDU 232 Educational Psychology – Middle/Secondary EDU 301 Introduction to Teaching Practicum EDU 303 Introduction to Teaching EDU 311 Junior Practicum EDU 312 Exceptional Children in Schools EDU 323 Foundations of Education EDU 333 Reading in the Content Area EDU 432 Practicum in Teaching – Secondary Teacher EDU 442 Special Methods – Secondary Teacher EDU 462 Educational Assessment EDU 463 Educational Media and Technology EDU 412 The Middle School EDU 422 Middle School Methods EDU 472 Middle School Practicum EDU 470 Student Teaching EDU 471 Student Teaching Seminar				

TOTAL IN DEGREE PROGRAM:

130 HRS.

BACHELOR OF SCIENCE SOCIAL STUDIES EDUCATION (5-12) 134-137 HRS.

To be eligible for licensure as a social studies teacher in grades 5-12, the following program of study must be completed.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 <i>or</i> MA 153	GEO 213 Lab Science elec (4)	ENG 153 Hum elective (3) PSY 113 HIS 103	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102 HIS 203 GOV 113 Gen Ed elective (3)
Add'l 1 hr					UE 101
Social Studies Content Area Courses 48-51 hours	<p>Content Requirements HIS 113 American History II HIS 213 World Civilization II ECO 223 Principles of Macroeconomics SOC 103 Principles of Sociology</p> <p>Three of the following concentrations:</p> <p>Economics ECO 213 Principles of Microeconomics ECO 363 Comparative Economic Systems ECO 383 International Economics ECO 393 Economic History of the United States</p> <p>Geographical Perspectives GEO 303 Human Geography GEO 313 Geography of north America GEO 323 World Geography GEO 353 Political Geography</p> <p>Government and Citizenship GOV 313 Comparative Governments BOV 333 State and Local Government GOV 373 Political psychology GOV 403 American Constitutional Development</p> <p>Historical Perspectives HIS 323 The Contemporary World HIS 343 American Political Thought HIS 363 United States Foreign policy HIS 423 The United States as a World Power HIS 453 Readings in World History</p> <p>Psychology PSY 323 Abnormal Psychology PSY 333 Psychology of Personality PSY 343 Social Psychology PSY 353 Child and Adolescent Psychology</p>				

Professional Education Courses 43 hours	<u>Professional Education Requirements</u>
	EDU 111 Freshman Practicum
	EDU 211 Sophomore Practicum
	EDU 232 Educational Psychology – Middle/Secondary
	EDU 301 Introduction to Teaching Practicum
	EDU 303 Introduction to Teaching
	EDU 311 Junior Practicum
	EDU 312 Exceptional Children in Schools
	EDU 323 Foundations of Education
	EDU 333 Reading in the Content Area
	EDU 432 Practicum in Teaching – Secondary Teacher
	EDU 442 Special Methods – Secondary Teacher
	EDU 462 Educational Assessment
	EDU 463 Educational Media and Technology
	EDU 412 The Middle School
	EDU 422 Middle School Methods
	EDU 472 Middle School Practicum
EDU 470 Student Teaching	
EDU 471 Student Teaching Seminar	

TOTAL IN DEGREE PROGRAM:

134-137 HRS.

JANNEN SCHOOL OF ARTS & SCIENCES

Trine University's Jannen School of Arts & Sciences includes:

- Department of Criminal Justice, Psychology and Social Sciences
- Department of Humanities and Communication
- Department of Mathematics and Informatics
- Department of Music
- Department of Science
- Academic Support Services
- English Language Center
- Learning Center
- Mathematics Help Sessions
- Writing Center

Academic programs administered by the school are as follows:

- Bachelor of Arts
 - Major
 - Communication
 - General Studies
- Bachelor of Science
 - Majors
 - Biology
 - Chemistry
 - Criminal Justice
 - Forensic Science
 - Informatics
 - Mathematics
 - Psychology
- Associate in Arts
- Associate in Criminal Justice
- Associate in Science
 - [Minors](#) in: *See page 76*
 - Biology
 - Chemistry
 - Communication
 - Criminal Justice
 - Humanities
 - International Studies
 - Mathematics
 - Music
 - Psychology

THE SCHOOL

The Jannen School of Arts and Sciences was named in honor of Robert L. Jannen, a 1950 chemical engineering graduate and member of the University's Board of Trustees, and his wife Dolores.

While Trine University is recognized for its long-standing and highly regarded programs in engineering, business, and teacher education, the Jannen School of Arts and Sciences is becoming known for its career-oriented, challenging, and competitive programs in its five departments. These quality programs prepare graduates to be successful in their careers and to pursue graduate and professional studies.

The Jannen School of Arts and Sciences has a special relationship with the Franks School of Education through secondary education majors in mathematics, science, and social studies. Dedicated faculty in the Jannen School of Arts and Sciences teach the content areas as well as the general education component for secondary education majors.

Faculty members in the Jannen School of Arts and Sciences are committed to providing an excellent foundation for all Trine University students in the areas of written and oral communication; social, historical, and global studies; the humanities; the natural sciences; and the mathematical and computational sciences. Student learning in these disciplines provides the knowledge basis for the University's general education component that complements the professional program courses for all Trine University students.

THE MISSION

In concert with the mission of Trine University, the Jannen School of Arts and Sciences provides students with the cultural, scientific, and academic platform from which to begin their journeys as lifelong learners and active contributors to the development of society.

ARTS & SCIENCES ASSOCIATE DEGREES

Jannen School of Arts & Sciences offers the following Associate degrees:

Associate in Arts

Associate in Criminal Justice

Associate in Science

In the degree program descriptions that follow, an asterisk(*) indicates courses that satisfy the university's [General Education Requirements](#).

ASSOCIATE IN ARTS

60 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 25 hours	Math elective (3)	Science elective (4)	Hum. elective (3) SS elective (3)	ENG 103 ENG 113 SP 203	BA 113 <i>or</i> INF 103
Content Requirements 35 hours	<p><u>Associate in Arts Core</u> COM 203 Media and Communication COM 213 Business Communication COM 363 Persuasion and Argumentation UE 101 University Experience</p> <p><u>Choose a minor in:</u> Communication (24)** History (24)** -*The Social Studies elective must be History Humanities (25) Music (24)**</p> <p>**Choose one free elective if the minor is Communication, History, or Music (1)</p>				

TOTAL IN DEGREE PROGRAM:

60 HRS.

ASSOCIATE IN CRIMINAL JUSTICE

60 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 26 hours	MA 113 <i>or</i> MA 153	BIO 104	ENG 153 SS elective (3) SS/HUM elec (1)	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	INF 103
Content Requirements 34 hours	GOV 113 Introduction to Government PSY 113 Principles of Psychology UE 101 University Experience LE 103 Introduction to Criminal Justice LE 153 Juvenile Justice LE 253 Probation, Parole and Community Corrections LE 263 Introduction to Criminal Law and Justice LE 273 Criminal Procedures and Evidence LE 313 Police Administration LE 343 Criminalistics and Crime Scene Investigations I LE 353 Criminalistics and Crime Scene Investigations II PSY 383 Forensic Psychology				

TOTAL IN DEGREE PROGRAM:

60 HRS.

ASSOCIATE IN SCIENCE**60 HRS.**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 25 hours	MA 113	CH 104 (lab)	ENG 153 SS elective (3)	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	INF 103
Additional Requirements 15 hours					UE 101 Gen electives (14)
Content Requirements 20 hours	Mathematics or Science courses (20) <i>Student must complete an area of emphasis which includes 20 total hours in either a science discipline or mathematics.</i>				

TOTAL IN DEGREE PROGRAM:**60 HRS.**

DEPARTMENT OF CRIMINAL JUSTICE, PSYCHOLOGY, & SOCIAL SCIENCES

The Department of Criminal Justice, Psychology, & Social Sciences' mission is to provide career-oriented higher education and to deliver quality teaching to students seeking to complete the Trine University [General Education requirements](#) as well as to meet the social sciences, humanistic, global and American perspectives required by the Common Ground component in General Education. The Department of Criminal Justice, Psychology and Social Sciences provides an educational environment in which students receive individual attention as well as excellence in teaching. The Department offers programs leading to careers in criminal justice, mental health, and social sciences education, as well as a preparation for further professional training in law, public administration, psychology, history, and social service. The Department aims to prepare graduates to be productive early in their professional careers and to assume leadership roles in the public and private sector, while providing service to society.

The Department of Criminal Justice, Psychology, & Social Sciences offers the following degrees:

- Bachelor of Science
 - Majors
 - Criminal Justice
 - Psychology
- Bachelor of Arts
 - Majors
 - General Studies

BACHELOR OF SCIENCE – CRIMINAL JUSTICE MAJOR**120 HRS.**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 <i>or</i> MA 153	BIO 104 (lab) MA or SC Elec (3)	ENG 153 Hum elective (3) HIS 103 <i>or</i> HIS 203 HIS 113 <i>or</i> HIS 213	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	SOC 103 <i>or</i> PSY 113 GOV 113 EXS 102 INF 103
Content Requirements 63 hours	UE 101 University Experience GOV 333 State and Local Government GOV 403 American Constitutional Development LE 103 Introduction to Criminal Justice LE 153 Juvenile Justice LE 253 Probation, Parole, and Community Corrections LE 263 Introduction to Criminal Law and Justice LE 273 Criminal Procedures and Evidence LE 343 Criminalistics and Crime Scene Investigations I LE 473 Law Enforcement Internship PSY 383 Forensic Electives (32) - Electives are determined in conjunction with an advisor and based on student career objectives.				
Concentrations 15 hours	Select one of the following five concentrations. (15 Hours) <u>Option A – Law Enforcement</u> LE 313 Police Administration LE 353 Criminalistics and Crime Scene Investigations II LE 423 Criminal Justice and Agency Administration PSY 443 Advanced Forensic Psychology SOC 323 The Family <u>Option B – Forensic/Correctional Psychology</u> LE 363 Institutional Corrections and Correctional Law PSY 323 Abnormal Psychology PSY 413 The Psychology of Addiction PSY 423 Counseling Theories and Practices PSY 443 Advanced Forensic Psychology <u>Option C – Agency Administration</u> LE 313 Police Administration LE 363 Institutional Corrections and Correctional Law LE 423 Criminal Justice and Agency Administration MGT 313 Human Resources management MGT 363 Organizational Behavior <u>Option D – Psychology</u> PSY 323 Abnormal Psychology PSY 333 Psychology of personality PSY 343 Social Psychology PSY 353 Child and Adolescent Psychology PSY 423 Counseling Theories and Practices <u>Option E – Indiana Law Enforcement</u> Successful completion of Indiana Law Enforcement Academy Basic Training Course				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

BACHELOR OF SCIENCE – PSYCHOLOGY MAJOR

120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42hours	MA 113 <i>or</i> MA 153	BIO 104 (lab) MA or SC Elec (3)	Hum elective (3) Hum elective (3) GOV 113 ECO 213 <i>or</i> ECO 223	ENG 103 ENG 113 SP 203 <i>or</i> COM 163	EXS 102 PSY 113 HIS 103 <i>or</i> HIS 203 HIS 113 <i>or</i> HIS 213
Program Requirements 36 hours					INF 103 UE 101
<p>Electives: 32 hours Students wishing to pursue graduate training in psychology should take: MA 113 College Algebra and MA 253 Statistics within these electives.</p>					
Content Requirements 42 hrs	<p>Primary Core Required: PSY 113 Principles of Psychology PSY 303 Research Methods in Psychology PSY 453 Clinical Internship <i>or</i> PSY 473 Psychology Capstone Demonstration</p> <p>Choose two of the following clinical courses: PSY 323 Abnormal Psychology PSY 403 Human Sexuality PSY 413 The Psychology of Addiction PSY 423 Counseling Theories and Practices</p> <p>Choose two of the following social core courses: PSY 333 Psychology of Personality PSY 343 Social Psychology PSY 373 Political Psychology SOC 313 Topics in Sociology</p> <p>Choose one of the following developmental core courses: PSY 353 Child and Adolescent Psychology SOC 323 The Family</p> <p>Choose 18 hours from any 300 level or higher psychology courses or SOC 313, SOC 323, SOC 343, excluding subject area concentration courses chosen above.</p>				

TOTAL IN DEGREE PROGRAM:

120 HRS.

BACHELOR OF ARTS - GENERAL STUDIES MAJOR

120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113	SC elective (4) SC Elective (3)	ENG 153 Hum elective (3) HIS 103 HIS 113	ENG 103 ENG 113 SP 203	PSY 113 GOV 113 EXS 102 INF 103
1 hr.					UE 101
Content Requirements 48-49 hours	<p>Select one of the options below:</p> <p><u>Option A – Pre-Legal Studies Concentration (49)</u> COM 213 Business Communication COM 363 Persuasion and Argumentation ENG 214 American Literature GOV 333 State and Local Government GOV 403 American Constitutional Development</p> <p>LE 153 Juvenile Justice, LE 263 Introduction to Criminal Law and Justice, LE 273 Criminal Procedures and Evidence <i>or</i> 9 hours from BA or LAW</p> <p>PHIL 313 Ethics PHL 343 Logic PSY 373 Political Psychology SOC 103 Principles of Sociology SOC 323 The Family Electives (6) – from LE, ENG, PSY, or COM PL 4003 Legal Capstone Experience</p> <p><u>Option B – General Social Studies Concentration (48)</u> 15 hours from each of three of the following at the 300 or higher level: GOV, HIS, PSY, ECO, GEO GS 4003 Senior Capstone Project</p> <p><u>Option C – Self-Designed Studies Concentration (48)</u> 15 to 30 hours must be taken from two to three different academic departments at the 300 level or higher. GS 4003 Senior Capstone Project</p>				
Electives 28-29 hours	Electives of 28-29 hours depending on option chosen above.				

TOTAL IN DEGREE PROGRAM:

120 HRS.

PRE-LAW

Admission to an accredited school of law normally requires a bachelor's degree. The Association of American Law Schools does not recommend a specific major, but students will be expected to have a broad academic background, a good scholastic record, and acceptable scores on the law school admission test. Usually that type of preparation is more beneficial for a prospective law student than is the specialized study of subjects closely related to law.

Any degree program that stresses the ability to communicate both verbally and in writing, encourages an understanding of human values, promotes understanding, reasoning and critical thinking, and fosters creativity is an excellent program for a student planning to pursue a law degree after graduation.

The Department of Criminal Justice, Psychology and Social Sciences offers a General Studies major with a Concentration in Pre-Legal Studies which is designed to prepare students for law school and is recommended for students intending to go to law school who do not have a strong interest in another undergraduate discipline. The department stresses that pre-law students should seek frequent, regular advice from their advisors and from the pre-law advisor located in this department.

DEPARTMENT OF HUMANITIES & COMMUNICATION

The Department of Humanities & Communication offers the following degree:

- Bachelor of Arts
Major
Communication

The Department of Humanities and Communication faculty has identified its mission as providing students a well-rounded preparation for a successful career in a variety of professions, including public relations, management, corporate communication, journalism and broadcasting.

The faculty fosters individual attention designed to support students with a multidisciplinary approach to problem solving and critical thinking required to translate what is learned into effective action. Three Communication options or tracks are available (Public Relations/Journalism, Corporate Communication and General Communication) with each designed for students to acquire leadership skills necessary to attain career goals and excel in various forms of electronic and print media.

We believe a student's education is the responsibility of all members of the campus community and accomplished in a variety of ways including Communication Department assignments with campus radio station, newspaper, yearbook, Trine University's marketing department and a variety of internships with professional organizations throughout the region.

BACHELOR OF ARTS—COMMUNICATION MAJOR

120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	Must take 1 Math (3-4 cr. hrs.) and 1 Science course (3-4 cr. hrs.) plus a Math or Science elective to total 10 credit hours		COM 233 Literature course (3) PSY 113 SS elective (3)	ENG 103 ENG 113 SP 203	COM 123 COM 163 COM 203 General Ed elect (2)
Ad d'I 30					UE 101 Free electives (29)
Content Requirements 27 hours	<p>Communication Core COM 111 Communication Practices/Professional Lab COM 153 Principles of Public Relations COM 213 Business Communication COM 253 Event Planning and Promotion COM 263 Communication Theories and Research COM 293 Argumentation and Debate COM 301 Media Practicum (taken twice) (2) COM 363 Rhetoric and Persuasion COM 433 Media Law and Ethics</p> <p>COM 4013 Senior Capstone Internship <i>or</i> COM 4291 Senior Communication Proposal <i>and</i> COM 4292 Senior Communication Project</p>				
Tracks 21 hours	<p>Choose One Track Listed Below:</p> <p>Public Relations and Corporate Communication Track COM 353 Public Relations Writing and Production COM 413 Corporate and Organizational Communications COM 453 Public Relations Planning and Campaigns MK 323 Integrated Marketing Communications MK 463 Marketing Research Communication electives (selected in consultation with advisor) (6)</p> <p>New Media Production Track COM 183 Writing for Media COM 243 Digital Media Creation COM 323 Web Content Management COM 383 Feature Reporting COM 483 Public Affairs Reporting FLM 203 Film Appreciation Communication electives (selected in consultation with advisor) (3)</p>				

DEPARTMENT OF MATHEMATICS & INFORMATICS

The Department of Mathematics & Informatics offers the following degree:

- Bachelor of Science
 - Majors
 - Informatics
 - Mathematics

BACHELOR OF SCIENCE – INFORMATICS MAJOR

The Informatics program is designed to prepare students for a wide range of endeavors in the information field, including information management, information security, research and information services, and information science.

Graduates of the Informatics program will be qualified for jobs in the information and technology industry and in business, public service, and other various professions. Possible job titles include security and performance analyst, information management specialist, network administrator, product developer, business analyst, usability engineer, database administrator, and many others.

The program also provides strong preparation for graduate studies. Graduates will qualify to be placed in prestigious graduate schools and pursue a variety of programs, including information security, information and management science, information science, information technology, and technical law.

The mission of this program is to provide students with a broadly based and sophisticated understanding of information and its technology, preparing them for careers in the rapidly emerging field defined as “informatics.”

BACHELOR OF SCIENCE INFORMATICS MAJOR

120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	Math elective (3) MA 173	Lab science elective (4)	SS elective (6) HUM elective (6)	ENG 103 ENG 133 SP 203	PSY 113 EXS 102 INF 103 Gen Ed elective (3)
Content Requirements 43 hours	INF 143 Introduction to C# INF 183 Introduction to Linux INF 213 Digital Forensic Science I INF 263 Database Concepts and Applications INF 303 Network Management INF 313 Digital Forensic Science II INF 343 Network Security INF 371 Advanced Microcomputer Lab INF 373 Advanced Microcomputers INF 403 Advanced Database INF 433 Data Mining and Data Visualization INF 493 Informatics Capstone MA 203 Discrete Mathematics for Information Sciences MA 253 Statistics MA 323 Operations Research				
Additional 35 hours	Outside Minor Studies (to be selected) 24-27 hours Electives 7-10 hours UE 101				

TOTAL IN DEGREE PROGRAM:

120 HRS

BACHELOR OF SCIENCE—MATHEMATICS MAJOR**120 HRS.**

The mathematics curriculum is a broad-based program designed to advance mathematical reasoning and to develop communication skills. Recent graduates of the mathematics program have pursued graduate degrees and some have found employment as mathematics instructors on the college level.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 312	Lab science (4) Lab science (4)	HIS elective (3) SS elective (3) HUM elective (3) HUM elective (3)	ENG 103 ENG 113 SP 203 <u>or</u> COM 163	INF 143 <i>or</i> CS 1113 ENG 153 PSY 113 EXS 102
Content Requirements 38 hours	MA 134 Calculus I MA 164 Calculus II MA 213 Calculus III MA 233 Differential Equations MA 303 College Geometry MA 313 Linear Algebra MA 403 Advanced Calculus Mathematics Electives (15)				
Additional 40 hours	Directed electives (22-26) General Electives (13-17) UE 101 University Experience				

TOTAL IN DEGREE PROGRAM:**120 HRS**

DEPARTMENT OF MUSIC

The Department of Music offers the following degree:

- Bachelor of Science
Major
Music with an Outside Minor

Music is the movement of sound to reach the soul for the education of its virtue – Plato. Music is a fundamental element of society and as such permeates our lives. Nearly every human environment incorporates music to elicit an emotional, physical, or mnemonic response in the listener.

The Music Department at Trine University enables you to bring the art of music to the world through various areas of employment. We offer a wide range of academic and performance opportunities in the field of music where you can enhance your skills as a vocalist, instrumentalist, musicologist, and/or music theorist and pair them with a variety of university minors. To develop your performance skills Trine University offers wind ensemble, chamber orchestra, two choirs, two jazz bands and is one of only three private universities in Indiana offering marching band. Many small ensembles are also offered such as musical theatre/opera ensemble, percussion ensemble, and others.

Explore

Music and an Outside Minor will provide you with a unique opportunity of training in the areas of performance, musicology, music theory, and the outside field of your choice as it relates to music. The objective is to prepare you for professional employment and for graduate study in both the public and private sectors.

Experience

Music and an Outside Minor will give you the opportunity to pursue an education in music while giving you the additional education to utilize your love of music in professional areas in and outside the performance medium. The combination of music and an outside field of your choosing will prepare you for many careers in the field of the performing arts.

Excel

Music and an Outside Minor will provide you with the opportunity to gain a solid foundation of musicianship through a rigorous program of study. You will enhance your musical skills through private instruction and by performing in large and small ensembles.

BACHELOR OF SCIENCE—MUSIC WITH AN OUTSIDE MINOR 120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 <i>or</i> MA 153	BIO 104 MA or SCI elec (3)	MUS 123 MUS 223 SS elective (6)	ENG 103 ENG 113 <i>or</i> ENG 133 SP 203	EXS 102 INF 103 Gen Ed electives (6)
Content Requirements 52 hours	<p>UE 101 – University Experience (1)</p> <p>Music Core Requirements (28) MUS 113 Music Theory I MUS 101 Sight Singing/Ear Training I MUS 213 Music Theory II MUS 201 Sight Singing/Ear Training II MUS 313 Music Theory III MUS 301 Sight Singing/Ear Training III MUS 433 Music Theory IV MUS 401 Sight Singing/Ear Training IV MUS 323 Music Theory V MUS 423 Sight Singing/Ear Training IV MUS 363 Recording Techniques/Sound Reinforcement MUS 403 Capstone Course</p> <p>Music Performance Studies (23) MUS 1000 Major Standing Jury MUS 1011 Applied Studies I MUS 1011 Applied Studies II MUS 1011 Applied Studies III MUS 1011 Applied Studies IV MUS 3000 Upper Division Standing Jury MUS 1011 Applied Studies V MUS 1011 Applied Studies VI MUS 1011 Applied Studies VII MUS 1011 Applied Studies VIII MUS 112 Piano Class I or MUS 312 Keyboard Studies I MUS 212 Piano Class II or MUS 412 Accompaniment Skills MUS 253 Techniques of Conducting MUS 121 – MUS 191 Large Ensemble I MUS 121 – MUS 191 Large Ensemble II MUS 121 – MUS 191 Large Ensemble III MUS 121 – MUS 191 Large Ensemble IV MUS 121 – MUS 191 Large Ensemble V MUS 121 – MUS 191 Large Ensemble VI MUS 121 – MUS 191 Large Ensemble VII MUS 121 – MUS 191 Large Ensemble VIII MUS 100, 200, 300, 400 Recital Hour</p>				
Additional 26 hours	<p>Outside Minor studies (24) To be selected</p> <p>Electives (2)</p>				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

DEPARTMENT OF SCIENCE

The Department of Science offers the following degree:

- Bachelor of Science
Majors
 - Biology
 - Chemistry
 - Forensic Science
 - Biology Concentration
 - Chemistry Concentration

The Department of Science also helps to coordinate the following programs:

- Pre-Med Professional Track
- Pre-Physical Therapy Professional Track

The Science Department seeks to prepare students for a professional career by providing a science foundation consisting of a body of information and the ability to use this information to solve problems. Important concepts of this information include the theory and practice of modern laboratory procedures, professional ethics, safety, statistical data handling, and scientific report writing.

The Science Department also seeks to provide non-science majors with an understanding of science as it relates to modern society.

Students who transfer into the Department of Science are expected to take at least two 300- or 400-level courses in their science major or primary teaching area in addition to SCI 412 Senior Research Seminar and SCI 422 Senior Research Project or SCI 434 Science Internship.

BACHELOR OF SCIENCE – BIOLOGY MAJOR**120 HRS**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 MA 253	BIO 114	ENG 153 HUM elective (3) PSY 113/113H SS elective (3)	ENG 103 ENG 113 <i>or</i> ENG 133 SP 203 <i>or</i> COM 163	CH 104 CH 114 INF 103
Additional 37 hours					EXS 102 UE 101 Electives (34)
Program Requirements 41 hours	<p>Required Science Courses BIO 124 Principles of Biology II Choose either the two 2-credit senior research classes or the 4-credit internship SCI 412 Senior Research Seminar <i>and</i> SCI 422 Senior Research project <i>or</i> SCI 434 Science Internship</p> <p>Choose one of the following physiology classes: BIO 283 Marine Biology BIO 304 Plant Biology BIO 354 Human Physiology BIO 343 Cell Biology BIO 404 Embryology</p> <p>Choose one of the following ecology classes: BIO 213 Conservation BIO 274 General Ecology BIO 334 Environmental Biology</p> <p>Choose one of the following organism classes: BIO 283 Marine Biology BIO 304 Plant Biology BIO 314 Animal Biology BIO 324 Microbiology</p> <p>Biology Electives: Additional BIO courses to bring the total Subject Area Requirements to 41 credit hours</p>				

TOTAL IN DEGREE PROGRAM:**120 HRS**

BACHELOR OF SCIENCE-CHEMISTRY MAJOR**120 HRS**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42hours	MA 113 MA 123	CH 104	ENG 153 HUM elective (3) PSY 113/113H SS elective (3)	ENG 103 ENG 113 <i>or</i> ENG 133 SP 203 <i>or</i> COM 163	CH 114 INF 103 MA 134
Add'l 27hours					EXS 102 UE 101 Electives (24)
Program Requirements 51 hours	CH 203 Organic Chemistry CH 211 Organic Chemistry I Laboratory CH 213 Organic Chemistry II CH 221 Organic Chemistry II Laboratory CH 234 Quantitative Chemical analysis CH 244 Inorganic Chemistry CH 324 Chemical instrumental analysis and Laboratory CH 351 Physical Chemistry I Laboratory CH 353 Physical Chemistry I CH 361 Physical Chemistry II Laboratory CH 363 Physical Chemistry II CH 434 Biochemistry MA 164 Calculus I MA 213 Calculus III PH 224/224H University Physics I and Laboratory PH 234/234H University Physics II and Laboratory SCI 412 Senior Research Seminar <i>and</i> SCI 422 Senior Research Project <i>or</i> SCI 434 Science Internship				

TOTAL IN DEGREE PROGRAM:**120 HRS**

BACHELOR OF SCIENCE-**FORENSIC SCIENCE MAJOR - BIOLOGY CONCENTRATION****125 HRS**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 124	CH 104 CH 114	ENG 153 HUM elective (3) PSY 113/113H SS elective (3)	ENG 103 ENG 113 <i>or</i> ENG 133 SP 203	EXS 102 INF 103 MA 134
Add'l 4 hours					LE 273 UE 101
Content Requirements 78 hours	<p><u>Natural Science Courses</u> BIO 114 Principles of Biology BIO 254 Anatomy CH 203 Organic Chemistry I CH 211 Organic Chemistry I Laboratory CH 213 Organic Chemistry II CH 221 Organic Chemistry II Laboratory MA 253 Statistics PH 154 College Physics I PH 164 College Physics II BIO 414 Genetics CH 434 Biochemistry CH 234 Quantitative Chemical Analysis</p> <p><u>Forensic Science Courses</u> BIO 374 Forensic Biology FS 203 Principles of Forensic Science I FS 223 Principles of Forensic Science II FS 423 Professional Practice in Forensic Science FS 373 Forensic comparative Science SCI 434 Science Internship</p> <p><u>Additional Courses</u> BIO 324 Microbiology BIO 343 Cell Biology BIO 443 Pathology BIO 454 Molecular Biology CH 324 Chemical Instrumental Analysis and Laboratory FS 351 Criminalistics and Crime Scene Laboratory</p>				

TOTAL IN DEGREE PROGRAM:**125 HRS.**

**BACHELOR OF SCIENCE-
FORENSIC SCIENCE MAJOR- CHEMISTRY CONCENTRATION 125 HRS.**

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 134	CH 104 CH 114	ENG 153 HUM elective (3) PSY 113/113H SS elective (3)	ENG 103 ENG 113 <i>or</i> ENG 133 SP 203	EXS 102 INF 103 MA 164
Add'l 4 hours					LE 273 UE 101
Content Requirements 79 hours	<p><u>Natural Science Courses</u> BIO 114 Principles of Biology CH 203 Organic Chemistry I CH 211 Organic Chemistry I Laboratory CH 213 Organic Chemistry II CH 221 Organic Chemistry II Laboratory MA 253 Statistics MA 213 Calculus III PH 224/224H University Physics I and Laboratory PH 234/234H University Physics II and Laboratory</p> <p><u>Specialized Science Courses</u> CH 234 Quantitative Chemical Analysis CH 244 Inorganic Chemistry CH 434 Biochemistry</p> <p><u>Forensic Science Courses</u> CH 374 Forensic Chemistry FS 203 Principles of Forensic Science I FS 223 Principles of Forensic Science II FS 423 Professional Practice in Forensic Science FS 373 Forensic comparative Science SCI 434 Science Internship</p> <p><u>Additional Courses</u> BIO 364 Toxicology CH 324 Chemical Instrumental Analysis and Laboratory CH 351 Physical Chemistry I Laboratory CH 353 Physical Chemistry I CH 424 Advanced Instrumental Analysis CH 474 Advanced Forensic Chemistry FS 351 Criminalistics and Crime Scene Laboratory</p>				

TOTAL IN DEGREE PROGRAM:

125 HRS.

KETNER SCHOOL OF BUSINESS

Trine University's Ketner School of Business includes two departments:

- Department of Business & Finance
- Department of Sport Management & Public Relations

The Ketner School of Business administers these academic programs:

Bachelor of Science in Business Administration

Majors

Accounting

Business Administration

Finance

Golf Management

Management

Marketing

Sport Management

- Associate Degrees

Accounting

Business Administration

- Minors **SEE PAGE 76*

Accounting

Business

Entrepreneurship

Economics

Finance

Golf Management

Leadership

Management

Marketing

THE SCHOOL

Trine University's Ketner School of Business was named in honor of Dr. Ralph W. Ketner, a distinguished alumnus and friend of the University. Dr. Ketner is a co-founder of Food Lion, one of the US's largest supermarket chains.

Courses in accounting and business law date from when the school first opened its doors on June 17, 1884, making the business program the school's oldest continuous course of study.

The Ketner School of Business at Trine University is accredited by the Accreditation Council for Business Schools and Programs (ACBSP), www.acbsp.org, for the following majors: Accounting, Business Administration, Entrepreneurship, Finance, Golf Management, Management, Marketing, and Sport Management.

MISSION

The mission of the Trine University Ketner School of Business is to prepare students for professional careers in business and related fields and to assist them in personal and professional development.

COURSES OF STUDY

The Ketner School of Business offers the programs of study listed at the beginning of this section. In addition, students may earn minors shown in the programs of study list. A 2.0 cumulative grade point average for all courses in the minor program is required for a minor to be awarded. For transfer students, at least 15 hours of the courses toward a minor must be taken at Trine University. Internship credit of up to six hours can be applied toward a minor, but the internship cannot be double counted (i.e. the hours can be applied to either a major or a minor, but not both).

In cooperation with the School of Engineering, the Ketner School of Business offers a minor in entrepreneurship. The entrepreneurship minor is designed for students who have an interest in owning a business at some point in the future. The entrepreneurship minor is available for all Trine University students regardless of major. Information regarding the entrepreneurship minor is found on page 82 of this catalog.

DEGREE REQUIREMENTS

Each of the bachelor degrees in the Ketner School of Business requires 120 semester hours unless otherwise specified. Associate degrees in the School of Business require 64 semester hours. Students are expected to earn a grade of "C" or better in all courses required for their major.

The requirements for both the bachelor degrees and associate degrees involve the following:

1. A liberal arts and sciences curriculum which serves to enrich the academic program so that it constitutes a basic cultural education. Courses in written and oral communication, humanities, social sciences, natural sciences and mathematics provide basic tools needed for applying knowledge in business administration toward worthwhile goals. The foundation of this curriculum is the [general education requirements](#).
2. A business curriculum that provides the fundamentals through which the entire business enterprise operates.
3. A business specialty curriculum that supplements the business curriculum and allows students to develop a deeper understanding in a specialized area.
4. Business electives that provide for program flexibility and allow students to complement the required credits.

In developing an academic program, each student shall have the assistance of a faculty advisor. The student, however, has the ultimate responsibility for meeting specific degree requirements. Prerequisites for individual courses must be carefully observed.

DOUBLE MAJORS

Ketner School of Business students may receive double majors. To receive a double major (e.g., management and finance), a student must meet all requirements in both majors and have a minimum of 135 semester hours of credit. Business electives may count in only one major; a single business elective cannot meet the elective requirements for two business majors.

However, a required course in one major can count as an elective in another major.

INTERNSHIPS

The Ketner School of Business requires every business student to enter into an internship during his/her course of study at Trine University.

The value of an internship to the student, to the sponsoring entity, and to the University/School of Business is considerable.

- The intern gains by actual work experience in a real-world capacity, thus clearly establishing true expectations of the job and profession;
- The company gains by being exposed early to potential employees and by having a chance to evaluate them; and
- The University gains by brokering potential employees and employers and assisting the community.

Internships are quickly becoming a requirement before a student can be considered for a permanent position by many companies.

A maximum of six semester credit hours can be earned toward degree requirements with a maximum of three hours in any one work session. (Golf Management internships are taken for six semester hours.) Internships can take place during any semester but are especially encouraged during the summer. Prerequisites include a 2.5 GPA or higher, sophomore or above class standing, and recommendation and approval by the Dean of the Ketner School of Business.

PREPARATION PROGRAM FOR NON-BUSINESS MAJORS WHO WISH TO PURSUE A MASTER'S OF BUSINESS ADMINISTRATION (MBA)

Students who would like to enter an MBA program after graduation should consider taking the following courses. Prerequisites as shown in the Course Description section of this catalog must be carefully observed.

AC	203	Accounting I	(3)
AC	213	Accounting II	(3)
BA	343	International Business	(3)
ECO	213	Microeconomics	(3)
ECO	223	Macroeconomics	(3)
FIN	303	Managerial Finance	(3)
LAW	203	Business Law I	(3)
MA	253	Statistics	(3)
MGT	353	Designing Operations	(3)
MGT	363	Organizational Behavior	(3)
MK	303	Marketing	(3)

KETNER SCHOOL OF BUSINESS ASSOCIATE DEGREES

ASSOCIATE IN ACCOUNTING

64 HRS.

The associate in accounting program is designed to prepare students for immediate entry into the accounting field. It combines a concentration in accounting and computer science with business, economics and general education subjects. This program is especially appropriate for positions in businesses that require a small but knowledgeable accounting staff. As all of the credits are fully transferable to the four-year accounting major at Trine University, it serves as an excellent program for students who subsequently plan to seek a Bachelor of Science degree with an accounting major. A specified number of credit hours must be taken in each section described below. Prerequisites as shown in the Catalog Descriptions section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section.

In the degree program descriptions that follow, an asterisk (*) indicates courses that fulfill the University's [General Education Requirements](#).

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

*ENG	103	English Composition I	(3)
*ENG	113	English Composition II	(3)

HUMANITIES

2 HRS.

*Any of the humanities courses listed in the General Education Requirements found on page 43.

MATHEMATICS & SCIENCE

7 HRS.

*Must include a minimum of three hours of science and a minimum of three hours of mathematics for a combined minimum of seven hours.

MA	103	Business Algebra	(3)
		Science elective	(4)

COMPUTER LITERACY

3 HRS.

*BA	113	Business Computer Applications	
		or	
*INF	103	Information Technology Applications	(3)

PROGRAM REQUIREMENTS

10 HRS.

UE	101	University Experience	(1)
COM	213	Business Communication	(3)
*ECO	213	Microeconomics	(3)
*ECO	223	Macroeconomics	(3)

ASSOCIATE BUSINESS CORE

18 HRS.

AC	203	Accounting I	(3)
AC	213	Accounting II	(3)
BA	123	Business Concepts	(3)

LAW	203	Business Law I	(3)
MGT	363	Organizational Behavior	(3)
MK	303	Marketing	(3)

REQUIRED ACCOUNTING COURSES **15 HRS.**

AC	303	Cost Accounting I	(3)
AC	323	Intermediate Accounting I	(3)
AC	333	Intermediate Accounting II	(3)
AC	373	Accounting Information Systems	(3)
AC	423	Income Tax	(3)

BUSINESS ELECTIVES **3 HRS.**

Students, with approval from their advisors, must select a minimum of three credit hours of electives from courses prefixed by AC, BA, INF, ENT, ECO, FIN, LAW, MGT, or MK.

TOTAL IN DEGREE PROGRAM **64 HRS.**

ASSOCIATE IN BUSINESS ADMINISTRATION**64 HRS.**

The associate in business administration degree program is designed to prepare a person for entry into business with a broad understanding of various business activities and their interrelationships. It combines course work in accounting, finance, marketing, business law, and management. Courses in economics, psychology, mathematics, computer science and communication are all part of this curriculum. Both traditional and non-traditional students will find this program of interest. All credits are transferable to a Trine University four-year business administration degree for those who choose to continue their education. A specified number of credit hours must be taken in each of the following sections. Prerequisites as shown in the Course Descriptions section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section.

In the degree program descriptions that follow, an asterisk (*) indicates courses that fulfill the University's [General Education Requirements](#).

PROGRAM REQUIREMENTS**REQUIRED HOURS****WRITTEN COMMUNICATION****6 HRS.**

*ENG 103 English Composition I (3)

*ENG 113 English Composition II (3)

HUMANITIES**2 HRS.**

*Any of the humanities courses listed in the general education requirements found on page 43.

COMPUTER LITERACY**3 HRS.**

*BA 113 Business Computer Applications

or

*INF 103 Information Technology Applications (3)

MATHEMATICS AND SCIENCE ELECTIVES**7 HRS.**

*Must include a minimum of 3 hours of science and a minimum of 3 hours of mathematics for a combined minimum of 7 hours.

MA 103 Business Algebra (3)

Science elective (4)

PROGRAM REQUIREMENTS**10 HRS.**

UE 101 University Experience (1)

COM 213 Business Communication (3)

*ECO 213 Microeconomics (3)

*ECO 223 Macroeconomics (3)

ASSOCIATE BUSINESS CORE**18 HRS.**

AC 203 Accounting I (3)

AC 213 Accounting II (3)

BA 123 Business Concepts (3)

LAW 203 Business Law I (3)

MGT 363 Organizational Behavior (3)

MK 303 Marketing (3)

BUSINESS ELECTIVES**18 HRS.**

Students, with approval from their advisors, must select a minimum of 18 hours of electives from courses in business administration, computer science and economics prefixed by AC, BA, INF, ENT, ECO, FIN, LAW, MGT, or MK.

TOTAL IN DEGREE PROGRAM:**64 HRS.**

DEPARTMENT OF BUSINESS & FINANCE

The Department of Business & Finance offers the following bachelor degrees:

- Bachelor of Science in Business Administration

Majors

Accounting

Business Administration

Finance

Management

CURRICULUM

A specified number of credit hours must be taken in each section described below. Prerequisites as shown in the course description section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section; excess credit hours may be counted under the non-specified electives category.

**BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION—
ACCOUNTING MAJOR****120 HRS.**

In the dynamic and increasingly complex business world, students need to acquire a broad education in addition to specialized skills and knowledge of the profession. Accounting education provides the technical skills necessary to function in today's business environment and provides an understanding of all aspects of business.

UNIFORM CERTIFIED PUBLIC ACCOUNTING EXAMINATION CANDIDATES

The state of Indiana and many other states require that a first-time Uniform Certified Public Accounting (CPA) Examination candidate must have at least 150 semester hours of college education, including a baccalaureate or higher degree, with an accounting concentration or its equivalent. An accounting major wishing to meet this requirement should plan an individualized program with his or her advisor.

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION ACCOUNTING MAJOR

120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 103 MA 173	SCI elective with lab (4)	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 Gen Ed elective (2)
Additional Requirements 15 hours	BA 101 University Experience BA 301 Professional Development and Strategies BA 123 Business Concepts BA 213 Advance Spreadsheet for Business COM 213 Business Communication				
Free Electives 4 hours	Free Elective (4)				
Program Requirements 63 hours	<p><u>Business Core</u> AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 Managerial Finance LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship</p> <p><u>Concentration Requirements</u> AC 303 Cost Accounting AC 323 Intermediate Accounting I AC 333 Intermediate Accounting II AC 373 Accounting information Systems AC 403 Advanced Accounting AC 423 Income Tax AC 463 Auditing FIN 413 Corporate Finance FIN 343 International Finance FIN 353 Personal Finance</p> <p>Business Electives (300-400 level from AC, BA, ENT, FIN, LAW, MGT, MK) (3)</p>				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION**BUSINESS ADMINISTRATION MAJOR****120 HRS.**

The Bachelor of Science in Business Administration prepares capable students for responsible positions in business, industry, and public service. A student who does not choose to follow a major/concentration track will take all General Education courses and all Business Core courses. The remaining credit hours will be determined by the student and their advisor with all major business courses at the 300 and 400 level.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 103 MA 173	SCI elective with lab (4)	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 Gen Ed elective (2)
Additional Requirements 11 hours	BA 101 University Experience BA 301 Professional Development and Strategies BA 123 Business Concepts BA 213 Advanced Spreadsheet for Business COM 213 Business Communication				
Free Electives 4 hours	Free Electives (4)				
Program Requirements 63 hours	<u>Business Core</u> AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 Managerial Finance LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship <u>Concentration Requirements</u> Business Electives (300-400) with the approval of Advisor and Chair (33)				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION**FINANCE MAJOR****120 HRS.**

The finance major provides students with a working understanding of the financial decision-making process, how financial markets function, and the acquisition and management of capital. Students may elect course concentrations in investment analysis and portfolio management, financial institutions and services, or corporate financial management. Students will be prepared for a variety of careers in business and in the government sector in areas such as financial analysis, capital budgeting, banking, mergers and acquisitions, cash management, financial planning, investment analysis and portfolio management, brokerage, real estate and insurance. A major in finance is also excellent preparation for graduate study in finance, business administration, or corporate and securities law.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 103 MA 173	SCI elective with lab (3 or 4)	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 Gen Ed Elec (2 or 3)
Additional Requirements 11 hours	BA 101 University Experience BA 301 Professional Development and Strategies BA 123 Business Concepts BA 213 Advanced Spreadsheets for Business COM 213 Business Communication				
Free Elect 4 hrs	<u>Free Electives</u>				
Program Requirements 63 hours	<u>Business Core</u> AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 H Managerial Finance Honors LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship <u>Concentration Requirements</u> FIN 313 Corporate Finance FIN 323 Money and Banking FIN 343 International Finance FIN 373/ECO 373 Introduction to Econometrics FIN 473 Finance Modeling FIN 403 Investments AC 303 Cost Accounting AC 423 Income Tax Finance Electives (300/400 level) (3) Business Electives (300/400 from FIN, AC courses or BA 313, BA 323, ENT 423) (6)				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION
MANAGEMENT MAJOR**

120 HRS.

Management pervades all facets of a business organization. Operations management studies the manufacturing and service processes where many new quantitative techniques are applied. Human resources involves the study of the human factor in business organizations. Students who select this major are preparing themselves for positions in firms regardless of size or organizational structure.

	Mathemat ics	Science	Hum/SS	Commu nication	Other
General Education 42 hours	MA 103 MA 173	SCI elective with lab (4)	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 Gen Ed electives (2)
Free Elect 4 hrs	Free Electives (4)				
Additional Requirements 11 hours	BA 101 University Experience BA 301 Professional Development and Strategies BA 123 Business Concepts BA 213 Advance Spreadsheet for Business COM 213 Business Communication				
Program Requirements 63 hours	<p>Business Core AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 Managerial Finance LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship</p> <p>Concentration Requirements BA 403 Business and Public Policy ENT 303 Entrepreneurial Leadership MGT 313 Human Resource Management MGT 343 Human Resource Development MGT 413 Management of Quality MGT 443 Managing Operations MK 363 Buyer Behavior MK 423 Personal Selling Management elective (3)</p> <p>Business electives (300/400 level from AC, BA, ENT, FIN, LAW, MGT, MK) (6)</p>				

TOTAL IN DEGREE PROGRAM:

120 HRS.

DEPARTMENT OF
SPORT MANAGEMENT & PUBLIC RELATIONS

The Sport Management & Public Relations offers the following degrees:

- Bachelor of Science in Business Administration
 - Majors
 - Golf Management
 - Marketing
 - Sport Management

CURRICULUM

A specified number of credit hours must be taken in each section described below. Prerequisites as shown in the course description section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section; excess credit hours may be counted under the non-specified electives category.

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION**GOLF MANAGEMENT MAJOR****120 HRS.**

The Bachelor of Science in Business Administration Golf Management major prepares students to become trained professionals ready for immediate employment in the expanding golfing industry. The program incorporates a business administration core with a concentration in golf management course work, including golf course promotion, turf management and marketing strategies.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 103 MA 173	SCI elective with lab (4)	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 EXS 102
Additional Requirements 10 hours	BA 123 Business Concepts BA 213 Advance Spreadsheet for Business BA 301 Professional Development and Strategies COM 213 Business Communication				
Program Requirements 68 hours	<p><u>Business Core</u> AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 Managerial Finance LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship</p> <p><u>Concentration Requirements</u> GM 101 Introduction to Golf Management GM 203 Golf Shop Management GM 213 Golf Club Design, Repair and Fitting GM 223 Promotion and Marketing of Golf Facilities GM 303 Teaching the Short Game GM 323 Teaching the Golf Swing GM 343 Golf Facility Operations GM 411 Food and Beverage Management GM 452 Golf Management Leadership GM 131 Player Development I GM 231 Player Development II GM 331 Player Development III GM 431 Player Development IV MK 363 Buyer Behavior MK 423 Personal Selling SM 393 Sport Psychology SM 253 Risk Management</p>				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION MARKETING MAJOR

120 HRS.

Marketing encompasses the functions of creating and satisfying the demands of consumers. It is the study of the organizations and systems involved in the rendering of personal services to the consumer and the physical distribution of goods from the producer to the consumer. The marketing major will discover career opportunities in the fields of sales management, advertising, market research, retailing, brand/product management, merchandising, and marketing management.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 103 MA 173	Science Elective With Lab (4)	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 Gen Ed elective (2)
Additional Requirements 11 hours	BA 101 University Experience BA 123 Business Concepts BA 213 Advanced Spreadsheets for Business BA 301 Professional Development and Strategies COM 213 Business Communication				
Free Electives 4 hours	<u>Free Electives</u>				
Program Requirements 63 hours	<u>Business Core</u> AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 Managerial Finance LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship <u>Concentration Requirements</u> BA 403 Business and Public Policy ENT 303 Entrepreneurial Leadership MK 323 Integrated Marketing Communications MK 363 Buyer Behavior MK 423 Personal Selling MK 313 Retail Management MK 463 Marketing Research Select any two (300-400 level from BA, COM, ENT, MGT, MK) (6) Business Electives (300-400 level from AC, BA, ENT, FIN, LAW, MGT, MK) (6)				

TOTAL IN DEGREE PROGRAM:**120 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION
SPORT MANAGEMENT MAJOR**

120 HRS.

The Bachelor of Science in Business Administration Sport Management degree program was developed to meet the growing demand in collegiate and professional sports for business professionals who possess an extensive knowledge of sports and an understanding of the concerns and needs of athletes. Graduates of this program will work with personnel and marketing professionals to promote, regulate, and administer collegiate and professional sport programs.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 18 hours	MA 103 MA 173	BIO 104	ECO 213 ECO 223 HUM elective (3) Foreign Language (3)	ENG 103 ENG 113 SP 203	MA 253 PSY 113 BA 113 EXS 102
Additional Requirements 11 hours	BA 101 University Experience BA 301 Professional Development and Strategies BA 123 Business Concepts BA 213 Advanced Spreadsheet for Business COM 213 Business Communication				
Free Electives 4 hours	<u>Free Electives</u>				
Program Requirements 63 hours	<u>Business Core</u> AC 203 Accounting I AC 213 Accounting II BA 343 International Business FIN 303 Managerial Finance LAW 203 Business Law I MGT 353 Designing Operations MGT 363 Organizational Behavior MGT 453 Strategic Management MK 303 Marketing BA 3113 Business Internship <u>Concentration Requirements</u> SM 223 History of Sport SM 253 Risk Management SM 313 Principal of Sport and Recreation Management LDR 203 Leadership Strengths and Skills SM 393 Sport Psychology SM 133 Contemporary Issues and Sports SM 404 Capstone in Sport Management SM 412 Business Planning in Sport and Recreation SM 413 Organization and Administration of Physical Education and Athletics SM 453 Facility Planning MK 323 Integrated Marketing				

TOTAL IN DEGREE PROGRAM:

120 HRS.

SCHOOL OF HEALTH SCIENCES

Trine University's School of Health Sciences includes:

- **Doctorate of Physical Therapy

- Department of Exercise Science

- Bachelor of Science
Majors
Exercise Science

- Professional Tracks
Pre-Med Professional Track
Pre-Physical Therapy Professional Track

- [Minors](#)
Athletic Training

**Trine University is seeking accreditation of a new physical therapist education program from the Higher Learning Commission of the North Central Association of Colleges and Schools, www.ncahlc.org. and CAPTE. The program will submit an Application for Candidacy, which is the formal application required in the pre-accreditation stage. Submission of this document does not assure that the program will be granted Candidate for Accreditation status. Achievement of Candidate for Accreditation status is required prior to implementation of the professional phase of the program; therefore, no students may be enrolled in professional courses until Candidate for Accreditation status has been achieved. Further, though achievement of Candidate for Accreditation status signifies satisfactory progress toward accreditation, it does not assure that the program will be granted accreditation.

DEPARTMENT OF EXERCISE SCIENCE

The Department of Exercise Science offers the following degree:

- Bachelor of Science
 - Major
 - Exercise Science
 - [Minors](#)
 - Athletic Training

The Department of Exercise Science also helps to coordinate the following program:

- Pre-Med Professional Track
- Pre-Physical Therapy Professional Track

BACHELOR OF SCIENCE—EXERCISE SCIENCE MAJOR 120 HRS.

	Mathematics	Science	Hum/SS	Communication	Other
General Education 42 hours	MA 113 MA 253	BIO 104	PSY 113 SM 393 HUM electives (6)	ENG 103 ENG 113 SP 203	BIO 254 EXS 102 Gen Ed elective (5)
Content Requirements 56 hours	Program Requirements EXS 103 Teaching Sport Skills I EXS 123 Teaching Sport Skills II EXS 243 Athletic Training SM 253 Risk Management EXS 273 Nutrition SM 313 Principles of Sport and Recreation EXS 332 Drug Education EXS 333 Kinesiology EXS 353 Exercise Physiology EXS 373 Health Problems EXS 383 Nutrition Counseling EXS 402 Exercise Leadership SM 412 Business Planning in Sport and Recreation EXS 433 Developing Health Promotion EXS 452 Fitness Evaluation Assessments EXS 463 Motor Learning EXS 464 Capstone EXS 474 Internship EXS 493 Personal Training UE 101 University Experience				
Add'l 22 hours	Electives to be determined with Advisor (22)				

TOTAL IN DEGREE PROGRAM:

120 HRS.

PRE-MED PROFESSIONAL TRACK**42 HRS.**

The Pre-Medical Professional Track is designed for students interested in preparing themselves for a career in the health sciences and can be associated with any major offered at Trine University.

PROGRAM REQUIREMENTS**REQUIRED HOURS**

General chemistry	(8)
Organic chemistry	(8)
Biochemistry	(4)
Physics	(8)
Biological sciences	(8)
Principles of Psychology	(3)
Sociology	(3)

TOTAL IN PRE-MED TRACK:**42 HRS.**

Also, students must maintain a cumulative GPA of 3.5 or better to stay in the track. They are evaluated during their senior years via benchmark interviews that address the following characteristics of a successful medical school applicant: MCAT preparation; development of personal and professional qualities; medical or graduate school applications; portfolio comprehensiveness; and community service, research, and leadership experiences.

PRE-PHYSICAL THERAPY PROFESSIONAL TRACK**41 HRS.****Requirements for the Track**

The Pre-Physical Therapy Professional Track can be associated with any major offered at Trine University, though majors in the Science Department provide the clearest path to successful entry into a Doctor of Physical Therapy degree program. In conjunction with, or in addition to, th

e curricular requirements of the major, the Pre-Physical Therapy Professional Track requires coursework in the following areas:

PROGRAM REQUIREMENTS**REQUIRED HOURS**

Biological Sciences (excluding botany and zoology)	(8)
General Chemistry	(8)
Human Anatomy (BIO 254)	(4)
Human Physiology (BIO 354)	(4)
College or University Physics I & II	(8)
Any Psychology Course	(3)
Statistics (MA 253)	(3)
Advanced Composition (ENG 453)*	(3)

TOTAL IN PRE-PHYSICAL THERAPY PROFESSIONAL TRACK: 41 HRS.

*This course has been proposed based on an identified need but is not currently offered.

**Also, students must maintain a cumulative GPA of 3.5 or better to stay in the track. They are evaluated final year via benchmark interviews that address the following characteristics of a successful physical therapy program applicant; development of personal and professional qualities; physical therapy or graduate school applications; and community service, clinical observation and leadership experiences.

COURSE DESCRIPTIONS

KEY TO COURSE PREFIXES

AC	Accounting
ARC	Architecture
ART	Art
AS	Air Science (ROTC)
AST	Astronomy
BA	Business Administration
BIO	Biology
BME	Biomedical Engineering
CE	Civil Engineering
CH	Chemistry
CHE	Chemical Engineering
CHN	Chinese
CO	Cooperative Employment
COM	Communication
COV	Community Volunteer
CS	Computer Science
EAS	Earth Science
ECE	Electrical & Computer Engineering
ECO	Economics
EDU	Education
EGR	Engineering Graphics
ENG	English
ENT	Entrepreneurship
ES	Engineering Science
ESL	English as a Second Language
ETD	Design Engineering Technology
EXS	Exercise Science
FIN	Finance
FIT	Fitness
FLM	Film
FRN	French
FS	Forensic Science
GE	General Engineering
GEO	Geography
GLY	Geology
GM	Golf Management
GS	General Studies
GOV	Government
HIS	History
HNR	Honors Seminar
HPE	Health and Physical Education
HUM	Humanities

INF	Informatics
LAW	Law
LDR	Leadership
LE	Law Enforcement
MA	Mathematics
MAE	Mechanical & Aerospace Engineering
MGT	Management
MK	Marketing
MUS	Music
PET	Plastics Engineering Technology
PH	Physics
PHL	Philosophy
PL	Pre-Legal Studies
PSY	Psychology
SA	Study Abroad
SC	Science
SM	Sport Management
SOC	Sociology
SP	Speech
SPN	Spanish
UE	University Experience
WS	Women's Studies

COURSE NUMBERING SYSTEM

Course numbers are found at the beginning of the course description immediately following the course prefix.

Courses numbered 000: preparatory, non-credit

Courses numbered 100: freshman-level courses

Courses numbered 200: sophomore-level courses

Courses numbered 300: junior-level courses

Courses numbered 400: senior-level courses

Courses numbered 500: graduate-level courses

Courses numbered 600: graduate-level courses

EXAMPLE OF COURSE PREFIX AND NUMBER

CE 3203: This course prefix and number means that this is a civil engineering junior level course.

COURSE TITLE

The course title follows the course prefix and number.

SERIES OF THREE NUMBERS FOLLOWING THE COURSE TITLE

First digit: indicates the number of class hours per week.

Second digit: indicates the number of laboratory hours per week.

Third digit: indicates the number of semester hours of credit.

Thus, a course name followed by 3-4-5 indicates three class hours each week, four laboratory hours each week, and five semester hours of credit.

COURSE LEVEL REQUIREMENTS

Courses at the 100 level within the student's major may not be taken in the senior year without permission of the department chair of the student's major.

ACCOUNTING

AC 203 ACCOUNTING I 3-0-3

This course is a study of the accounting process and the use of accounting information in business decisions. Topics include the processing of accounting information, income measurement, accrual accounting and accounting for assets, liabilities and equity in the corporate environment. The complete accounting cycle for a service and merchandising business and software applications are included.

Prerequisite: MA 103

AC 213 ACCOUNTING II 3-0-3

This course includes the accumulation and use of accounting information by management in planning, control and decision-making. Topics include product costing, budgeting, cost-volume-profit relationships, variable costing and statement of cash flows. Software applications are included.

Prerequisite: AC 203

AC 303 COST ACCOUNTING 3-0-3

Managerial accounting concepts, objectives, techniques, and systems are examined to provide information about financial and non-financial performance measurement. Cost accumulation, allocation, and variance analysis are studied in the context of performance evaluation and responsibility accounting in an organization. Emerging cost concepts and systems are also examined. The course uses computer applications.

Prerequisite: AC 213

AC 323 INTERMEDIATE ACCOUNTING I 3-0-3

This course introduces comprehensive accounting theory and practice with emphasis on financial statement preparation and analysis. Current problems of corporate accounting and reporting are thoroughly covered, including cash, inventories, fixed assets, intangible assets, and marketable securities. The course uses computer applications.

Prerequisite: AC 213

AC 333 INTERMEDIATE ACCOUNTING II 3-0-3

This is a continuation of Intermediate Accounting I. Areas covered include contingent liabilities, capital structure, leases, revenue recognition, earnings per share, pensions, and income taxes. This course uses computer applications.

Prerequisite: AC 323

AC 353 TAX AND LEGAL ISSUES FOR SMALL BUSINESS 3-0-3

This course covers tax and legal topics pertinent to small businesses, including; forming of a business organization, creating or acquiring a small business, tax planning, benefit and retirement plans, personal asset protection, and estate and succession planning.

Prerequisite: AC 213

AC 373 ACCOUNTING INFORMATION SYSTEMS 3-0-3

This course is designed to provide a working knowledge of accounting information system concepts. The course will emphasize designing and/or evaluating accounting systems in terms of both system controls and meeting internal control objectives. The course uses computer applications.

Prerequisites: BA 113, FIN 303

AC 403 ADVANCED ACCOUNTING 3-0-3

This course covers specialized topics in accounting including branches, segment reporting, business combinations, consolidated financial statement preparation and accounting for partnerships. This course uses computer applications.

Prerequisite: AC 333

AC 413 GOVERNMENTAL AND NOT-FOR-PROFIT ACCOUNTING 3-0-3

This course introduces fund accounting and covers the theory and accounting process for governmental and not-for-profit organizations. The accounting for estates and trusts is also included. This course uses computer applications.

Prerequisite: AC 333

AC 423 PERSONAL INCOME TAX 3-0-3

This course introduces basic concepts of tax law with the emphasis on the underlying concepts common to all entities as they relate to everyday economic life. Special emphasis is placed on taxation of individuals and corporations. Computerized income tax preparation and research are included.

Prerequisite: AC 213

AC 433 CORPORATE INCOME TAX 3-0-3

This course includes specialized topics including taxation of partnerships and other conduit entities. Property transactions, specialized topics and tax research are covered. Computerized preparation of tax returns for various entities is included.

Prerequisite: AC 423

AC 463 AUDITING 3-0-3

Auditing theory, objectives, and procedures leading to the auditor's opinion on the financial statements are studied. Internal control and its evaluation, auditing standards, and the use of statistical sampling in the audit process are covered in depth. This course uses auditing software applications.

Prerequisite: AC 323

AC 473 CPA TOPICS 3-0-3 (EXTRA FEES APPLY)

This course is designed for those accounting majors planning to sit for the CPA exam. It includes the solving of practical accounting problems, advanced topics such as current statements of the Financial Accounting Standards Board, current statements on auditing procedures, and tax topics. This course uses software applications.

Prerequisite: AC 333

AC 493 SELECTED TOPICS IN ACCOUNTING 3-0-3

This course treats specific or current accounting issues and problems in depth.

Prerequisite: Permission of the instructor

ARCHITECTURE

ARC 293 ARCHITECTURE APPRECIATION 3-0-3

An introduction to the built environment, prehistoric to modern, focusing on public/reverential, commercial and residential architecture. Students will be introduced to terminology, some construction techniques, socio-legal implications of high-rise structures, and architectural styles from ancient to postmodern. Structures from around the world will be viewed and discussed.

ART

ART 253 ART APPRECIATION 3-0-3

Designed as an introduction to the arts, this course develops aesthetic-critical responses and seeks to enhance the enjoyment of works of art. Painting, sculpture, architecture and other types of art are analyzed in terms of the elements of art, subject, function, medium, organization, style and aesthetic response.

AIR SCIENCE (ROTC)

AS 100 AIR FORCE LEADERSHIP LABORATORY I (0 HRS.)

A study on Air Force customs and courtesies, drills and ceremonies. Also includes studying the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers.

Corequisite: AS 101

AS 101 THE FOUNDATIONS OF THE UNITED STATES AIR FORCE I (1 HR.)

A survey course designed to introduce students to the United States Air Force and Air Force ROTC. Featured topics include: mission of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer opportunities, and an introduction to communication skills.

AS 110 AIR FORCE LEADERSHIP LABORATORY II (0 HRS.)

A study on Air Force customs and courtesies, drills and ceremonies. Also includes studying the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers.

Corequisite: AS 111

AS 111 THE FOUNDATIONS OF THE UNITED STATES AIR FORCE II (1 HR.)

Additional study of the organizational structure of the Air Force, with emphasis on leadership and communication skills.

AS 200 AIR FORCE LEADERSHIP LABORATORY III (0 HRS.)

Further study on Air Force customs and courtesies, drill and ceremonies, and military commands. Also includes additional emphasis on the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers. **Corequisite: AS 201**

AS 201 THE EVOLUTION OF USAF AIR AND SPACE POWER I (1 HR.)

A course designed to examine general aspects of air and space power through a historical perspective. Utilizing the perspective, the course covers a time period from the first balloons and dirigibles through the Korean War and into the Cold War era.

AS 210 AIR FORCE LEADERSHIP LABORATORY IV (0 HRS.)

Further study on Air Force customs and courtesies, drill and ceremonies, and military commands. Also includes additional emphasis on the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers.

Corequisite: AS 211

AS 211 THE EVOLUTION OF USAF AIR AND SPACE POWER II (1 HR.)

Further study from the Vietnam War to the space-age global positioning systems of the Persian Gulf War. Effective communication techniques are also emphasized.

AS 300 AIR FORCE LEADERSHIP LABORATORY V (0 HRS.)

Activities classified as leadership and management experiences involving the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 303

AS 303 AIR FORCE LEADERSHIP STUDIES I (3 HRS.)

A study leadership, management fundamentals, professional knowledge, and communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied.

AS 310 AIR FORCE LEADERSHIP LABORATORY VI (0 HRS.)

Activities classified as leadership and management experiences involving the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 313

AS 313 AIR FORCE LEADERSHIP STUDIES II (3 HRS.)

Further study of Air Force personnel and evaluation systems, leadership ethics and additional communication skills.

AS 400 AIR FORCE LEADERSHIP LABORATORY VII (0 HRS.)

Further activities classified as leadership and management experiences. They involve the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 403

AS 403 NATIONAL SECURITY AFFAIRS/PREPARATION FOR ACTIVE DUTY I (3 HRS.)

An examination of the national security process, regional studies, advanced leadership ethics, and Air Force doctrine.

AS 410 AIR FORCE LEADERSHIP LABORATORY VIII (0 HRS.)

Further activities classified as leadership and management experiences. They involve the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets. **Corequisite: AS 413**

AS 413 NATIONAL SECURITY AFFAIRS/PREPARATION FOR ACTIVE DUTY II (3 HRS.)

An examination of the national security process, regional studies, advanced leadership ethics, and Air Force doctrine.

ASTRONOMY

AST 201 ASTRONOMY LABORATORY 0-1-1

An introductory laboratory study of basic observational astronomy and the tools of astronomy as students explore the sky. The stars, the planets and the universe of galaxies are observed and measured by observation or computer simulation.

Corequisite or Prerequisite: AST 203

AST 203 ASTRONOMY 3-0-3

An introduction to the field of astronomy, this course is a study of the planets and the stars and their formation and life cycles. The history of the Milky Way Galaxy and the history of the cosmos are studied, with an emphasis on the solar system and methods of observation and measurement.

BUSINESS ADMINISTRATION

BA 101 UNIVERSITY EXPERIENCE FOR KETNER SCHOOL OF BUSINESS STUDENTS 1-0-1

This course offers the resources for success in learning for students new to Trine University. This course will assist students in becoming more efficient learners, understanding self and others, and learning personal life skills. This course will present

information about Trine University offices and services to familiarize students with resources and procedures.

BA 113 BUSINESS COMPUTER APPLICATIONS 3-0-3

This course emphasizes predominant software packages in word processing, spreadsheets, presentation graphics, database management, and e-mail usage, with an eventual goal of the student gaining certification in those areas.

BA 123 BUSINESS CONCEPTS 3-0-3

A survey course designed to introduce the student to business issues and practices in the United States. All major functions of business are included (management, marketing, law, finance, economics, operations, accounting, information technology) as well as issues facing the business person (ethics, globalization, motivation, etc.) Suitable for students considering a career in business as well as for non-business majors who will interact with the business enterprises (e.g., educators, engineers).

BA 213 ADVANCED SPREADSHEETS FOR BUSINESS 3-0-3

Concepts including raw data management, business analysis and reporting. Other concepts include: collaboration and workbook security, using tables to analyze and report data, integrating and manipulating data from external sources, creating and auditing complex formulas, automation features, advanced data analysis, using charts to analyze and communicate business information.

Prerequisite: INF 103 or BA 113

BA 301 PROFESSIONAL DEVELOPMENT & STRATEGIES 1-0-1

This is a practical course to assist the student in the development of a professional job search portfolio (i.e. resume, cover letter, follow-up letters). The course includes self-appraisal and career goal setting, job interview techniques, and familiarization with employment resources. Professional strategies are emphasized in the areas of business attire, etiquette and protocol, ethics, human relations, and corporate culture.

Prerequisites: Business major, junior or senior standing or permission of the instructor

BA 311X BUSINESS INTERNSHIP VARIES (1-3 HRS.)

The course involves a meaningful work experience related to the student's field of study or other functional areas of business in an approved company. The assignment and company must be approved by the School of Business Internship Coordinator. A maximum of 6 semester credit hours can be counted toward degree requirements, with a maximum of 3 credit hours for any one work session.

Prerequisites: Sophomore or above class standing, adhering to the guidelines set by the School of Business Internship Coordinator, and permission of the advisor

BA 313 INSURANCE 3-0-3

This course includes the fundamental principles and practices as they relate to life, compensation, fire, marine, and automobile insurance.

Prerequisites: LAW 203, MK 303 or permission of the instructor.

BA 323 REAL ESTATE 3-0-3

This course is the study of problems of buying and leasing real property for residence or investment purposes, including the principal commercial and financial transactions involved.

Prerequisites: LAW 303, MK 303, or permission of the instructor

BA 333 SOCIAL MEDIA FOR BUSINESS 3-0-3

Concepts include using digital and social media in a business/industry setting. Concepts include setting up and using wikis, blogs, Facebook, MySpace, Twitter, YouTube, LinkedIn, Ning, Flickr, and other online modalities as a way to increase business, marketing, research, and customer service opportunities. Group work at local businesses will be required. **Prerequisite:** BA 113

BA 343 INTERNATIONAL BUSINESS 3-0-3

This course discusses economic principles of trade as applied to international business, world international trade environment and trends, world geography and culture as it impacts international trade, knowledge of the operation of importing and exporting, aspects of manufacturing and marketing in foreign markets, and the application of the functions of business to an international business operation.

Prerequisites: ECO 213, ECO 223 or concurrent with ECO 223

BA 403 BUSINESS AND PUBLIC POLICY 3-0-3

This course includes an analysis of the legal, political, and economic framework that has shaped public policy toward business in the United States. It will include the methods as to how public policy is created and its implications for management decision making. The issues that this course will be concerned with are: how public policy is related to societal, community, employee, consumer, and environmental concerns and their implication for business.

Prerequisites: MGT 363, ECO 223, LAW 203, MK 303, or permission of the instructor (same as ECO 453)

BA 400X INDEPENDENT RESEARCH IN BUSINESS VARIES (1-3 HRS.)

Independent research under the direction of an individual instructor can be taken. A research paper is required. (Research may be done in any business major.)

Prerequisites: Senior standing, permission of the instructor or Department Chair, and the Dean of the Ketner School of Business

BIOLOGY**BIO 104 GENERAL BIOLOGY 3-2-4**

An introduction to the basic principles of biology with an emphasis on: biological chemistry, cell biology, metabolism, genetics, diversity of organisms, evolution, and ecology. A background in high school chemistry is strongly recommended. **Open to non-science majors only. This course cannot be substituted for BIO 114 for either science or engineering majors.**

BIO 114 PRINCIPLES OF BIOLOGY I 3-2-4

Five basic topics are discussed in some detail: biological chemistry, cell biology, metabolism, genetics, and animal organization and homeostasis. Laboratory exercises designed to introduce the student to scientific investigation and the structure and function of biological systems are an essential part of the course.

BIO 124 PRINCIPLES OF BIOLOGY II 3-2-4

A continuation of Biology 114, including evolutionary principles, examination of diversity of living things, diversity, structure and function of plants, animal behavior, populations, communities, ecosystems, the biosphere, and the conservation of each. **Prerequisite: BIO 114**

BIO 200X INTERNSHIP IN NATIVE PLANT PROPOGATION (VARIES 1-2 CREDIT HOURS)

Work with local plant grower propagating plants and seeds. Fall semester will involve seed collection, processing, and storage for propagation or marketing. Spring semester will involve growing of plants in greenhouses, with some possible installation into seed production beds. Either semester may include seed bed maintenance. May be repeated once in alternative semester. **Prerequisite: BIO 114**

BIO 203 OCEANOGRAPHY 2-2-3

A description of the oceans and their relation to humans. The principles of physical, chemical, geological, and biological oceanography are used to explain the ocean environment. Society's effect on the oceans and problems and potentials of utilizing the natural resources of the sea.

Prerequisites: A laboratory science and MA 113 (Same as EAS 203 and GEO 203)

BIO 211 CONSERVATION LAB 0-2-1

The lab focuses on communities and small populations by using GIS, GPS, computer modeling and the design, management and restoration practices of natural areas. Includes a variety of field trips to natural areas and implementation of hands-on management and restoration practices, including seed collection and processing, wildlife management and controlled burning.

Corequisite/Prerequisite: BIO 213

BIO 213 CONSERVATION 3-0-3

A study of biodiversity, including the negative impact of human society and what can be done to preserve it. Topics include measurement of biodiversity, ecosystem function, extinction, habitat destruction, fragmentation, degradation, over-exploitation, invasive species, climate change, conservation planning and priorities, fire, human interaction with the environment, human-modified landscapes and experimental design. Meets Ecology requirement for Biology majors.

Corequisite/Prerequisite: BIO 211

BIO 222 FIELD TRIP IN ECOLOGY I 0-4-2

Trips to various sites to observe plants and animals in a variety of habitats. Open to non-science majors. **Prerequisite: BIO 104 or BIO 114**

BIO 254 HUMAN ANATOMY 3-2-4

The anatomical features of each organ system are identified. Microstructure observation and detailed dissection in the laboratory. **Prerequisite: BIO 104 or BIO 114**

BIO 274 GENERAL ECOLOGY 3-2-4

A study of the interactions of organisms and environments, this course focuses on individuals, populations, communities, ecosystems, landscapes and cycling of matter within energy systems. Investigations focus on techniques to gauge interactions between the biological and physical environments, field and conceptual sampling methods, statistical analysis, population models, and an exploration of emerging technologies in ecology. **Prerequisites: BIO 114, MA 253**

BIO 281 MARINE BIOLOGY LAB 0-3-1

A laboratory class to accompany BIO283. Application of identification, sampling and analytical techniques to aquatic organisms and their habitats of local lakes and possibly one of the Great Lakes. Analysis of remotely sensed data. Includes three all-day or overnight required field trips. Requires snorkeling equipment. May provide opportunity to become SCUBA certified for an additional fee. **Prerequisite: BIO 283**

BIO 283 MARINE BIOLOGY 3-3-3

An introduction to organisms and processes in the marine environment, including function, biodiversity, and ecology of organisms. Topics include: the chemical and physical environment; the ecology of pelagic and benthic organisms, including those from rocky coasts, unconsolidated shores, and coral reefs; benthic plants and phytoplankton; zooplankton and nekton; marine invertebrates, fishes; marine productivity and fisheries; marine pollution and conservation.

Prerequisite: BIO 104 or BIO 114

BIO 304 PLANT BIOLOGY 3-3-4

The structure and function of the major plant phyla are studied. Methods of classification are illustrated. The physiology and evolutionary relationships are explained.

Prerequisite: BIO 114

BIO 314 ANIMAL BIOLOGY 3-2-4

The structure and function of the major animal phyla are studied. Methods of classification are illustrated. The behavioral, physiological, and evolutionary relationships are explained.

Prerequisite: BIO 114

BIO 324 MICROBIOLOGY 3-2-4

The isolation, growth, structure, function, heredity, and identification of microorganisms with emphasis on their relationship to humans. **Prerequisites: BIO 254 or CH 114**

BIO 334 ENVIRONMENTAL BIOLOGY 3-2-4

A study of the impacts and interactions of human society and the environment including ethics, risk management, economics, policy making, population growth, energy, pollution,

land use planning, soils, agriculture, and water, and their consequences. Labs include field trips to assess environmental conditions and hazards, public perception, and human impacts to the environment.

Prerequisite: BIO 114

BIO 343 CELL BIOLOGY 3-2-4

Understanding of cell biology has grown rapidly over the past two decades along with the development of genetics, biochemistry, and molecular biology. This course will introduce students to this unifying discipline which explores organization and function of the cell including structure of cellular organelles, membrane transport, cellular communication, flow of genetic material, and cell division.

Prerequisite: BIO 114

BIO 354 HUMAN PHYSIOLOGY 3-2-4

The fundamental physical chemical bases of osmoregulation, circulation, respiration (both at organism and cell levels), nerve and muscle function, nutrition and endocrine function are studied. Laboratories include electromechanical studies of isolated muscle and nerve preparations, osmoregulation in decapods, and the electrical activity of the heart.

Prerequisites: BIO 254, CH 114

BIO 364 TOXICOLOGY 3-3-4

The methods and design of both acute and chronic toxicity tests will be surveyed. Probits of percent mortality versus log dose and other appropriate statistical methods of toxin analysis are applied to laboratory data. Emphasis will be given to mechanisms of action and metabolic detoxification and elimination. Federal regulations involving manufacture use categories and proper disposal are reviewed. **Prerequisites: BIO 114, CH 114**

BIO 374 FORENSIC BIOLOGY 3-2-4

This course will introduce students to basic scientific principles and their application in professional practice of Forensic Biology. The lecture and laboratory portions will provide students with a scientific grounding to understand the application of the science of biology to legal investigations. Students will learn the principles and analytical methods over a variety of fields such as pathology, entomology, animal biology, anatomy and physiology, microbiology, serology, and molecular biology as they apply to forensic biology. Laboratory safety, quality assurance, and quality control are also discussed.

Prerequisite: BIO 104 or BIO 114

BIO 404 EMBRYOLOGY 3-3-4

Study of structural, physiological, and molecular levels of development processes. A descriptive and experimental analysis of developing systems with emphasis on ordates.

Prerequisite: BIO 314

BIO 413 ENTOMOLOGY 2-2-3

Integrated studies of the principal morphological, physiological, ecological and systematic relationships of insects. **Prerequisite: BIO 114**

BIO 414 GENETICS 3-3-4

This course provides the principles of classical and molecular genetics. Topics include Mendelian inheritance, chromosome function, linkage and recombination mapping, cellular processing of biological information, new genetic tools, evolutionary genetics, and genomics. Quality assurance is also discussed. The course will mainly consist of lectures, chromosome level experiments, and problem sets that students will solve and return.

Prerequisite: BIO 114

BIO 423 ENVIRONMENTAL TOXICOLOGY 2-2-3

How biological and chemical mechanisms are related to risk assessment of heavy metals, pesticides, food additives and environmental pollutants. Laboratory data will be used to predict possible environmental hazards. **Prerequisites: CH 203, BIO 211, BIO 213**

BIO 434 BIOCHEMISTRY 3-3-4

A study of the chemistry, kinetics, energetics, and metabolic pathways of biological molecules such as carbohydrates, lipids, proteins, nucleic acids and enzymes are discussed and supported by laboratories that illustrate biochemical reactions, separations, enzyme kinetics, and analysis.

Prerequisites: CH 211, CH 213 (Same as CH 434)

BIO 443 PATHOLOGY 3-3-3

The course is an introduction to pathology, which is the study of disease. An overview of a variety of diseases will be discussed including cardiovascular disease, asthma, infection, cancer, epilepsy, multiple sclerosis, rheumatoid arthritis, Crohn's disease, anemia, leukemia, and Alzheimer's dementia. The subspecialty of forensic pathology will also be discussed.

Prerequisites: BIO 114, junior or senior science major

BIO 454 MOLECULAR BIOLOGY 3-3-4

This course provides a comprehensive overview of the key concepts in molecular biology. Topics to be covered include nucleic acid structure and functions, biochemistry of DNA, chromosome structure, regulation of gene expression in prokaryotes and eukaryotes. Extended topics will include biotechnology methods, genetic engineering, gene therapy, protein functions, cellular communication, and programmed cell death.

Prerequisites: BIO 114, CH 211, CH 213

BIO 400X SPECIAL ASSIGNMENTS IN BIOLOGICAL SCIENCES VARIES (1-4 HRS.)

Directed reading, independent study, or research, supervised laboratory or field work. The number of credit hours will be determined by the scope of the assignment.

Prerequisite: Permission of department chair

BIOMEDICAL ENGINEERING**BME 2013 INTRODUCTION TO BIOMEDICAL ENGINEERING 3-0-3**

An introduction or overview of biology, chemistry (including organic chemistry), and physiology as they relate to biomedical engineering.

Prerequisites: CH 104, MA 134

BME 4103 INTRODUCTION TO BIOMECHANICS 3-0-3

An introduction to the kinematic geometry of human motion and the kinematics of individual human joints. Quantitative and qualitative descriptions of the action of muscles in relation to human and animal movement. Muscle models, receptors, and reflexes with application to control of multi-joint movement. Forward and inverse dynamics of multi-joint, muscle-driven systems. .

Prerequisites: CH 104 or CH 155, BME 2013, and ES 233

BME 4203 BIOMATERIALS 3-0-3

introduction to the study of both biological materials (bone, muscles, etc.) and materials for medical applications. Topics include structure-property relationships for skin, bone, ligaments, tendons, muscle, and organs; the effects of pathology and age on material properties of tissues and organs; interactions between biological tissues and biomaterials; biocompatibility; design constraints, failure modes, and manufacturing limitations, ASTM and ISO standards for biomaterial.

Prerequisites: CH 104 or CH 155, BME 2013, and ES 233

BME 4303 BIOCHEMICAL ENGINEERING 2-3-3

Microbiological and biochemical phenomena are treated from an engineering standpoint. Course topics include an overview of basic biological concepts along with the modern techniques of biotechnology. Mathematical models of enzyme and whole cell systems are derived and discussed. Commercial and laboratory reactors, as well as separation techniques, are studied.

Prerequisite: MA 233 (BME 4303 same as CHE 4073)

BME 4403 BIOMEDICAL MEASUREMENTS AND INSTRUMENTATION 2-2-3

Physiological signals, origin of biopotentials (ECG, EMG, EEG), biomedical transducers and electrodes. Biomedical signal detection, amplification, and filtering. Analog front-ends of biomedical instruments. Electrical safety in medical environment. Basic concepts of instrumentation include design criteria and operational analysis, including principles of transduction and signal processing. Practical experience is gained through use of hands-on design, construction, and testing of biomedical devices.

Prerequisite: PH 234 and ES 253 or equivalent

BME 4603 BIOMEDIAL TRANSPORT I 3-0-3

This course introduces the basic principles of mass, energy, and momentum conservation equations. Biomechanics transport phenomena are applied to biological flows, design of medical devices, and bioengineered tissues.

BME 4613 BIOMEDICAL TRANSPORT II 3-0-3

Advanced methods of analyzing and predicting transport of fluids, heat transfer, and species in biological systems.

Prerequisite: BME 4603

BME 4853 BIOMEDICAL ENGINEERING DESIGN I 2-2-3

Introduction to design methodology and practice. Product specifications. Concept generation and selection. Product design. Design for manufacturing. Economics of product

development. Prototyping. Teams of students work on a design project in the area of mechanical engineering. Design project work will continue in BME 4863.

Prerequisite: BME 3003, BME 3103, ES 313 or ChE 313

BME 4863 BIOMEDICAL ENGINEERING DESIGN II 1-4-3

Conclusion of mechanical engineering design project. Preparation of a formal written design report and oral presentation of the design. Course must be taken the semester immediately following BME 4853.

Prerequisite: BME 4853

BME 5003 PRINCIPLES OF BIOMEDICAL ENGINEERING 3-0-3

An introduction to the fundamental and interdisciplinary aspects of biomedical engineering, integrating principles of anatomy, physiology, biology, and engineering. Topics include principles of problem definition, team design, engineering inventiveness, information access, communication, scientific integrity and ethics, use of humans and animals in biomedical research, conflict of interest, intellectual property, genetic technology, and scientific record keeping. **Prerequisite: Graduate standing in biomedical engineering or consent of instructor.**

BME 5013 APPLIED ANATOMY AND PHYSIOLOGY FOR ENGINEERS 3-0-3

A quantitative approach to human physiology from the biomedical engineering perspective with an emphasis on systems physiology described using mechanical properties. Topics include the physiological and mechanical behavior of the heart, blood vessels, lungs, kidney, muscles, and bones. **Prerequisite: Graduate standing in biomedical engineering, or college-level biology course or consent of instructor.**

BME 5043 FINITE ELEMENT ANALYSIS 3-0-3

The course provides a balanced discussion of the theory and applications of the Finite Element Method using the ANSYS software package. The theoretical development of one-dimensional, two-dimensional, and three-dimensional elements is discussed. Applications of the method in the static and dynamic design of frame, thin-walled, and solid structures are presented. The course provides students with hands-on experience using ANSYS. **Prerequisite: Senior or graduate standing; ES 213 and ES 243 or equivalent; MAE 373 may be helpful, but is not required.**

BME 5103 MUSCULOSKELETAL BIOMECHANICS 3-0-3

The application of classical solid mechanics methods to evaluate the mechanical behavior of skeletal tissues, whole bones, bone-implant systems, and diarthroidal joints. Topics include mechanical behavior of tissues (anisotropy, viscoelasticity, fracture, and fatigue), structural properties of whole bones and implants (composite and asymmetric beam theories), and mechanical function of joints (contact mechanics, lubrication, and wear). Normal, healing, and degenerative states will be examined.

Prerequisite: ES 243; prerequisite or corequisite; BME 5013; graduate standing in biomedical engineering or consent of instructor.

BME 5113 KINEMATICS OF HUMAN MOTION 2-2-3

An introduction to the kinematic geometry of human motion and the kinematics of individual human joints. Quantitative and qualitative descriptions of the action of muscles in relation to human movement. Introduction to rigid body dynamics and dynamics of multi-link systems using Newtonian and Lagrangian approaches. Muscle models, receptors, and reflexes with application to control of multi-joint movement. Forward and inverse dynamics of multi-joint, muscle-driven systems.

Prerequisite: BME 5013; Corequisite: BME 5103; graduate standing in biomedical engineering or consent of instructor.

BME 5203 INTRODUCTION TO BIOMATERIALS 3-0-3

Introduction to the study of both biological materials (bone, muscle, etc.) and materials for medical applications. Topics include structure-property relationships for skin, bone, ligaments, tendons, muscle, and organs; the effects of pathology and age on material properties of tissues and organs; interactions between biological tissues and biomaterials; biocompatibility; design constraints, failure modes, and manufacturing limitations; ASTM and ISO standards for biomaterials.

Prerequisite: ES 233, ES 243; prerequisite or corequisite; BME 5013; graduate standing in biomedical engineering or consent of instructor.

BME 600X BIOMEDICAL ENGINEERING DESIGN PROJECT (VARIES 1-6 HRS.)

A design or capstone project, with industrial or real-world application, producing all necessary and appropriate documentation, and if applicable, models, and prototypes. The project should entail a minimum of 3 hours of work per week per credit hour. Students should choose the number of credits each semester based on the amount of time they expect to spend on the project. **Prerequisite: Graduate standing in Mechanical Engineering or consent of department chair.**

CIVIL ENGINEERING

CE 1021 COMPUTER TOOLS FOR CIVIL ENGINEERING 1-0-1

This course is required for all freshmen civil engineering students. Its purpose is to introduce students to computer software that can assist them in engineering problem solving. Basic programming skills will also be introduced, allowing students to customize software to meet the unique needs of specific civil engineering problems. A wide variety of problem solving approaches will be highlighted throughout the class, including iteration, optimization, and database manipulation.

CE 2001 BASIC SURVEYING LABORATORY 0-2-1

Field work component of the basic surveying course. Some of the field work will include the use of automatic and laser levels, total station instruments and data collectors, and basic GPS devices.

Corequisite: CE 2003

CE 2003 BASIC SURVEYING 3-0-3

An introductory course in the theory and practice of basic land surveying. Course topics include measurements of angles, directions, and distances; traverse computations; simple vertical and horizontal curves; earthwork and GP. **Corequisites: MA 134, CE 2001**

CE 2013 FLUID MECHANICS 3-0-3

Fundamental properties of fluids; fluid statics; kinematics of fluid motion; conservation of mass, energy and momentum as applied to compressible and incompressible fluids; similitude; Introduction to laminar and turbulent boundary layers.

Prerequisite: Grade of "C" or better in ES 213; Corequisite: MA 213

CE 3101 ENVIRONMENTAL ENGINEERING LABORATORY (AQUEOUS) 0-2-1

Standard methods for analysis of water and wastewater; measurement of fundamental properties and characteristics of dissolved and particulate constituents in water; sampling techniques and preservation of samples; presentation and interpretation of analytical data.

Corequisite: CE 3103

CE 3103 ENVIRONMENTAL ENGINEERING (AQUEOUS) 3-0-3

Environmental engineering issues, fundamentals, and applications including hydrology, water treatment, water quality management, and wastewater treatment. Laboratory portion of the course covers common environmental experiments and field trips pertaining to the aforementioned topics.

Prerequisite: CH 114; Corequisites: ES 323 or equivalent, CE 3101

CE 3201 CIVIL ENGINEERING MATERIALS LABORATORY 0-2-1

Testing and evaluation of physical and mechanical properties of engineering materials such as steel, portland cement, concrete, masonry, asphaltic concrete, and timber.

Corequisite: CE 3203

CE 3203 CIVIL ENGINEERING MATERIALS 3-0-3

Testing and evaluation of physical and mechanical properties of engineering materials. Origin, manufacture, and structural applications of metals, aggregates, bituminous materials (including superpave), portland cement, and concrete. **Corequisite: CE 3201; ES 243**

CE 3301 HYDRAULIC ENGINEERING LABORATORY 0-2-1

Flow measurement; energy losses in pipe networks; momentum of jet; Bernoulli's Equation; water surface profiles and controls; hydraulic jumps, specific energy in open channels. **Corequisite: CE 3303**

CE 3303 HYDRAULIC ENGINEERING 3-0-3

Fundamental principles and design of water and wastewater supply, storm water and sanitary sewer systems and their components, including pipes, pumps, storage facilities, detention basins, open-channels, and culverts.

Prerequisite: Grade of "C" or better in ES 323; Corequisite: CE 3301

CE 3501 STRUCTURAL ANALYSIS LABORATORY 0-2-1

Classification of structures; Force and deflection analysis of statically determinate beams, frames, and trusses by classical methods; Analysis of statically indeterminate beams and frames using the moment distribution method; Computer modeling and analysis of structures; Load effects, tributary loads, load paths, and ASCE load combinations; Construction of reaction force, shear and moment envelopes using influence diagrams.

Prerequisite: Grade of "C" or better in ES 243; **Corequisite:** CE 3503

CE 3503 STRUCTURAL ANALYSIS 3-0-3

Classification of structures; Force and deflection analysis of statically determinate beams, frames, and trusses by classical methods; Analysis of statically indeterminate beams and frames using the moment distribution method; Computer modeling and analysis of structures; Load effects, tributary loads, load paths, and ASCE load combinations; Construction of reaction force, shear and moment envelopes using influence diagrams.

Prerequisite: Grade of "C" or better in ES 243; **Corequisite:** CE 3501

CE 3513 STRUCTURAL STEEL DESIGN 3-0-3

Analysis and design of structural steel members. Column buckling and lateral stability of beams. Codes and specifications.

Prerequisite: CE 3503; **Corequisite:** CE 3203

CE 3523 INTRODUCTION TO STRUCTURAL DESIGN 3-0-3

Introduction analysis and design of reinforced concrete, structural steel, and timber members subjected to tension, compression, and flexural loads. Application codes and specifications.

Prerequisite: Grade of "C" or better in CE 3503; **Corequisite:** CE 3521

CE 3533 REINFORCED CONCRETE DESIGN 3-0-3

Material properties. Analysis, design and serviceability of reinforced concrete flexural members and columns. Design and development of reinforcement. Codes and specifications.

Prerequisite: CE 3503; **Corequisite:** CE 3203

CE 3603 TRANSPORTATION ENGINEERING (3-0-3)

An introduction to the basic design, operation, control, and planning of highway transportation. Topics include an overview of project phases and the history of transportation as well as the fundamentals of traffic operations, user characteristics, capacity, and level of service, geometrics, traffic signal timing, and transportation planning. An introduction to basic concepts and terminology for air, rail, and freight engineering will be covered. **Prerequisite:** MA 164

CE 3701 SOIL MECHANICS LABORATORY 0-2-1

Students typically perform the following laboratory tests: Atterberg Limits, sieve and hydrometer analyses, Proctor compaction, hydraulic conductivity, 1-D consolidation, direct shear, and unconfined compression. In-situ sampling and visual classification of soils will also be performed.

Corequisite: CE 3703

CE 3703 SOIL MECHANICS 3-0-3

The course serves as an introduction to geotechnical engineering and provides an overview of the fundamental properties and behavior of soils. Topics to be presented include index properties, soil classification, phase relationships, compaction, subsurface exploration, seepage, shear strength bearing capacity, and consolidation.

Prerequisite: ES 243; Corequisite: CE 3701

CE 4103 ENVIRONMENTAL ENGINEERING (NON-AQUEOUS) 3-0-3

Environmental engineering issues, fundamentals, and applications including air pollution, solid waste management, hazardous waste management, and ionizing radiation.

Prerequisite: CH 114

CE 4113 HAZARDOUS WASTE ENGINEERING 3-0-3

A study of hazardous waste regulation, treatment, disposal, and remediation of contaminated sites. Evaluation of unit operations and processes of importance in the treatment and disposal of common organic and inorganic hazardous wastes. Students conduct group design projects and/or presentations. **Prerequisite: CE 4103 or CE 3103**

CE 4123 WATER TREATMENT PRINCIPLES AND DESIGN 3-0-3

Design of water treatment plants by application of basic and engineering sciences, hydraulics, chemistry, and physics. Students conduct group design projects and/or presentations. Unit operations are evaluated and designed for conventional and advanced treatment processes.

Prerequisite: CE 3103

CE 4133 WASTEWATER TREATMENT PRINCIPLES AND DESIGN 3-0-3

Design of wastewater treatment plants by application of basic and engineering sciences, hydraulics, chemistry, biology, and physics. Plant layouts as well as the design of the elements of the plants and their operation are covered. Students conduct group design projects and presentations.

Prerequisite: CE 3103

CE 4303 OPEN CHANNEL HYDRAULICS 3-0-3

Advanced topics in open-channel hydraulics, including design of hydraulic structures, uniform flow, rigid and loose boundary channel design, gradually varied flow, unsteady flow, and flood routing techniques. **Prerequisite: CE 3303**

CE 4323 ENGINEERING HYDROLOGY 3-0-3

Fundamental processes in the hydrologic cycle including precipitation, infiltration, evapotranspiration, and runoff. Quantitative approaches for engineering hydrology to estimate flows for a variety of design problems, including routing through detention basins and river reaches.

Prerequisite: ES 323, CE 3303 Corequisite: MA 393

CE 4333 DESIGN OF WATER DISTRIBUTION SYSTEMS AND SEWERS 3-0-3

Theory of pipe networks with application to the analysis and design of municipal water distribution systems, infiltration and inflow. Wastewater flows and design of storm, sanitary and combined sewers. **Prerequisite: CE 3303**

CE 4553 TIMBER DESIGN 3-0-3

Analysis, proportioning, and connection of structural members in timber. Lateral wind force resisting systems in timber structures. Specifications and codes.

Prerequisite: CE 3503

CE 4563 BRIDGE ENGINEERING 3-0-3

Application of CE 3513 and CE 3533 to the design of bridges. AASHTO load specifications. Design of single span bridges and continuous beam bridges

Prerequisites: CE 3513 and CE 3533 or permission of the instructor

CE 4603 HIGHWAY GEOMETRIC DESIGN

Basic principles and techniques of geometric design of highways and streets. Safety and comfort for road users with due regard to social, economic and environmental constraints. Dimensions and layout of visible highway features such as alignment, sight distance and intersection. Applications of national design standards and controls criteria. **Prerequisite: CE 3603**

CE 4703 SPECIAL TOPICS IN GEOTECHNICAL ENGINEERING 3-0-3

Special topics frequently encountered in geotechnical practice. Topics may include soil and site improvement using deep dynamic compaction, vibroflotation, wick drains and geosynthetics; slope stability analyses; retaining wall design and geo-environmental concerns, such as environmental site assessments and waste liner/cover systems. Other topics may include special concerns in engineering geology. **Prerequisite: CE 3703**

CE 4713 FOUNDATION ENGINEERING 3-0-3

Evaluation of subsurface conditions in order to select appropriate foundations for structures. Topics include subsurface exploration program, evaluation of bearing capacity and settlement shallow foundations, the design of driven piles, auger-cast piles, drilled shaft foundations, and the analysis/design of intermediate foundations, such as pin piles and geopiers.

Prerequisite: CE 3703

CE 4723 PAVEMENT DESIGN 3-0-3

Design of flexible and rigid highway and airport pavements. Topics include traffic quantity estimates, subgrade testing and properties, pavement materials testing and properties, AASHTO, Asphalt Institute, and PCA design methods, reinforced subbase design, permeable pavement design, and rigid and flexible overlays.

Corequisites: CE 3203, CE 3703

CE 490X SPECIAL PROBLEMS IN CIVIL ENGINEERING (VARIES 1-4 HRS.)

To be offered to students who have demonstrated superior ability. Course content to be arranged for the individual student according to his/her interest and aptitudes. Library research or independent study may be included.

Prerequisites: Senior standing and permission of Department Chair

CE 4912 CIVIL AND ENVIRONMENTAL ENGINEERING DESIGN SEMINAR 2-0-2

Project selection and initial scope of work development for major design experience which integrates fundamental concepts of basic sciences, engineering sciences, engineering design, and communication skills. The first of a two semester senior project design sequence.

Prerequisite: 3 of 4 from the following courses: CE 3103, CE 3301, CE 3503, CE 3703

CE 4914 CIVIL AND ENVIRONMENTAL ENGINEERING DESIGN 0-4-4

An integrated approach to the design of civil engineering facilities, from inception, feasibility, planning, socioeconomic considerations, environmental impact, safety, and engineering analysis and design to a final project report. The second of a two semester senior project design sequence.

Prerequisite: Must have taken CE 4912 the previous semester

CHEMISTRY

CH 104 GENERAL CHEMISTRY I 3-3-4

Fundamentals of chemistry with emphasis on atomic structure, stoichiometry, thermochemistry, properties of solution, properties of matter. The laboratory is quantitative in nature.

Prerequisite: MA 113

CH 104H HONORS GENERAL CHEMISTRY I 3-3-4

Fundamentals of chemistry will be reviewed and specific topics discussed in-depth in a student-centered atmosphere. The course is geared towards collaborative learning and traditional lectures will be kept to a minimum. Topics include, but are not limited to, atomic structure, stoichiometry, thermochemistry, properties of solution, properties of matter.

Prerequisite: MA 113 and admission into the Honors Program, or permission of the instructor.

CH 114 GENERAL CHEMISTRY II 3-3-4

A continuation of CH 104. Emphasis is on chemical equilibria, thermodynamics, kinetics, acid-base reactions, electrochemistry, and organic chemistry. Includes laboratory time.

Prerequisite: CH 104

CH 114H HONORS GENERAL CHEMISTRY II 3-3-4

A continuation of CH 104H. The course will be structured similarly to CH 104H with collaborative, student-centered learning emphasized. Topics include, but are not limited

to, chemical equilibria, thermodynamics, kinetics, acid-base reactions, electrochemistry and organic chemistry. **Prerequisite: CH 104H or permission of the instructor**

CH 144 CHEMISTRY — IDEAS AND APPLICATIONS 3-2-4

An integrated view of organic and biological chemistry for non-science majors, emphasizing the importance of chemistry to daily living and chemical principles related to everyday experiences. Simulated chemical problems in the laboratory. This course cannot be substituted for CH 104 or CH 114 for either science or engineering majors.

CH 203 ORGANIC CHEMISTRY I 3-0-3

A study of the methods of preparation, structure, and characteristic reactions of the more important type of aliphatic compounds, including industrial uses and methods of synthesis.

Prerequisite: CH 114

CH 211 ORGANIC CHEMISTRY I LABORATORY 0-3-1

Laboratory synthesis and experiments illustrative of the methods used in working with organic compounds. **Corequisite: CH 203**

CH 213 ORGANIC CHEMISTRY II 3-0-3

A continuation of CH 203 with a study in a similar manner of aromatic compounds.

Prerequisite: CH 203

CH 221 ORGANIC CHEMISTRY II LABORATORY 0-3-1

The laboratory work illustrates the synthesis and reaction of aromatic compounds.

Prerequisite: CH 211; Corequisite: CH 213

CH 232 QUANTITATIVE ANALYSIS 1-3-2

Principles of volumetric, spectrophotometric, and electrochemical analysis are stressed in the laboratory; whereas, the lecture material will emphasize the approach and solution to problems dealing with stoichiometry of mixtures, ionic equilibrium, electrochemical processes, and other material related to quantitative analysis.

Prerequisite: CH 114

CH 234 QUANTITATIVE CHEMICAL ANALYSIS 3-3-4

A quantitative treatment of analytical chemistry with a focus on the approach to solving problems. Topics of discussion include: the recognition and evaluation of error, critical and statistical analysis of data, further studies of equilibrium (acid/base, buffers, solubility and electrochemistry), and the principles of chemical separation and spectroscopy. The laboratory portion reinforces material learned in the classroom by providing practical experience in the areas of volumetric, gravimetric, spectrophotometric, and chromatographic processes. **Prerequisite: CH 114**

CH 244 INORGANIC CHEMISTRY 3-3-4

An introduction to inorganic chemistry, including the study of coordination compounds, bonding in transition metals, symmetry, descriptive chemistry of elements, and complex ions. **Prerequisite: CH 114**

CH 324/324L CHEMICAL INSTRUMENTAL ANALYSIS 3-3-4

This course focuses on the principles and applications of modern instrumental methods of analysis. Topics include spectroscopy, chromatography, and mass spectrometric methods of analysis. Selected topics in the area of electrochemical, thermal and surface analytical techniques may also be explored. In the laboratory, students will gain practical hands-on instrumental experience reinforcing the concepts covered in the lecture. **Prerequisite:** CH 213, CH 234

CH 351 PHYSICAL CHEMISTRY I LABORATORY 0-3-1

Laboratory experiments included in the areas studied in CH 353.

Prerequisite: CH 232; **Corequisite:** CH 353

CH 353 PHYSICAL CHEMISTRY I 3-0-3

An in-depth study in real gases, thermodynamics, kinetics, chemical and physical equilibrium, and electrochemistry.

Prerequisites: CH 114, MA 213, PH 224

CH 361 PHYSICAL CHEMISTRY II LABORATORY 0-3-1

Laboratory experiments included in the areas studied in CH 363.

Prerequisite: CH 353; **Corequisite:** CH 363

CH 363 PHYSICAL CHEMISTRY II 3-0-3

Fundamentals of quantum theory of atoms and molecules, and spectroscopy.

Prerequisite: CH 353

CH 374 FORENSIC CHEMISTRY 3-2-4

The course includes a general discussion of the important relationships between chemistry and forensic science in today's and historical contexts. Basic statistical methods, data handling, and quality control procedures are discussed. The quality control and quality assurance sections focus on the responsibilities of the analyst, the laboratory, and the certification requirements. An introduction to the instruments and techniques involved in forensic chemical analysis include thin layer and paper chromatography, gas chromatography-mass spectrometry, FT-infrared and differential scanning calorimetry. Many of these instruments are used by students in the laboratory to analyze drug surrogates, accelerants, colorants and pigments, inks and paints, and polymers and fibers.

Prerequisite: CH 232 and CH 203

CH 424 ADVANCED INSTRUMENTAL ANALYSIS 3-2-4

Theory and practice of modern instrumental methods of analysis. Fundamental principles, applications, and limitations of various instrumental methods will be discussed. Particular emphasis will be placed on detection limits, sources of "noise", and the methods used to reduce noise and enhance signal strength.

Prerequisite: CH 324

CH 434 BIOCHEMISTRY 3-2-4

The chemical and physical behavior of biologically important compounds such as carbohydrates, lipids, proteins, nucleic acids, and enzymes are discussed. The various metabolic pathways are discussed in light of their organic mechanisms. **Prerequisite: CH 211, CH 213 (same as BIO 434)**

CH 400X SPECIAL ASSIGNMENTS IN CHEMISTRY VARIES (1-6 HRS.)

Directed readings, independent study, or research.

Prerequisite: Permission of the Department Chair

CH 474 ADVANCED FORENSIC CHEMISTRY 3-3-4

The course includes a discussion of the analytical, quantitative and qualitative chemical procedures required for preparation of circumstantial evidence from laboratory analysis for prosecution of court cases. Statistical methods, particularly proper sampling, data handling, and quality control procedures are discussed. Quality assurance (QA), quality control (QC), and total quality management (TQM) are explored in some detail. Laboratory procedures will include wet chemistry and spot testing as well as use of thin layer chromatography, gas chromatography with mass spectrometry and nitrogen/phosphorous detectors, FT-infrared (ATR) and Raman spectroscopy, polarizing microscopy, and other instrumental techniques. The instruments are used by the students to analyze materials typical of the case load of forensic laboratories: drug surrogates, accelerants, colorants and pigments, inks and paints, and polymers, fibers and plant materials. **Prerequisite: CH 324 and CH 374**

CHEMICAL ENGINEERING

CHE 122 INTRODUCTION TO CHEMICAL & BIOLOGICAL ENGINEERING 2-0-2

An introduction to the field of Chemical Engineering & Biological Engineering. The tools of Chemical Engineering are introduced including mobile computational devices and Computer applications. Chemical production facilities will be included. Basic Biological Principles are reviewed including - The monomers and polymers of biological substances as well as cell structure and function will be introduced. The Central Dogma of biology will be introduced and explained.

Prerequisite: GE 101

CHE 203 MATERIAL BALANCES 3-0-3

This course is an introduction to the practice of chemical engineering. Fundamental principles are applied to chemical engineering problems involving conservation of mass. Stoichiometry is also reviewed. Process flow diagrams and piping and instrumentation diagrams will be presented.

Prerequisite: C or better in both CH 104 and CH 114; Corequisite: PH 224

CHE 212 ENERGY BALANCES 2-0-2

This course is a continuation of CHE 203 with an emphasis on problems involving the conservation of mass and energy.

Prerequisite: C or better in CHE 203; Corequisite: CHE 222 and CHE 252

CHE 222 SUSTAINABILITY AND PROCESS MEASUREMENT LABORATORY 1-3-2

This laboratory introduces students to the process of writing laboratory reports. The laboratory includes the measurement of process variable and the reinforcement of fundamental concepts related to conservation principles. Statistical analysis of data is included. Safety and sustainability is also covered. **Corequisite: CHE 212**

CHE 252 INTRODUCTION TO STATISTICAL AND COMPUTATIONAL METHODS IN CHEMICAL ENGINEERING 2-0-2

Spreadsheets and mathematical worksheets, both computer and mobile application based, will be used extensively for the calculation and analysis of chemical processes. Statistics will be introduced in the context of chemical process and product analysis.

Corequisite: CHE 212

CHE 303 CHEMICAL ENGINEERING FLUID DYNAMICS 3-0-3

Fluid mechanics applied to chemical processes will be introduced. Topics include fluid statics, rheological properties of fluids, laminar and turbulent flow in compressible and incompressible systems. Transfer equipment will also be introduced as well as the concept of net positive suction head. Fluid transport system design will be included.

Prerequisite C or better in both ChE 203 and ChE 212

CHE 313 CHEMICAL ENGINEERING THERMODYNAMICS I 3-0-3

This course will review the laws of thermodynamics and introduce students to thermodynamic cycles and systems. Equations of state for single component systems are introduced. Estimation of physical and thermodynamic properties will be covered

Prerequisite: MA 213 and a C or better in CHE 212

CHE 333 UNIT OPERATIONS LABORATORY I 2-3-3

A laboratory course to study both heat transfer and fluid flow. Identification prevention and mitigation of laboratory and industrial hazards will be covered. Statistics and technical writing are required. **Prerequisite: CHE 222, CHE 252, CHE 303, and CHE 373**

CHE 372 CHEMICAL ENGINEERING THERMODYNAMICS II 2-0-2

Phase and Chemical Reaction equilibrium will be covered in this course. Emphasis is placed on multi-component non-ideal systems.

Prerequisite: CHE 313

CHE 373 CHEMICAL ENGINEERING HEAT TRANSFER 3-0-3

Heat transfer will be studied and applied to chemical processes. Heat transfer coefficient prediction with and without phase change will be included. Commercially available heat transfer equipment will be studied. Radiation heat transfer, evaporation as well as unsteady state heat transfer will be studied. A design project involving heat transfer equipment will be included in this class.

Prerequisite: C or better in both CHE 203 and 212

CHE 383 MASS TRANSFER 3-0-3

This course will study the phenomena of mass transfer as it relates to chemical separation processes. Diffusion coefficients and mass transfer coefficients will be introduced and estimated. Rate based separation calculations will be studied. Applications include absorption and cooling water towers. **Prerequisite: CHE 373 and CHE 313**

CHE 393 STAGewise SEPARATIONS 3-0-3

The design and characterization of stage-wise and continuous separation processes are covered in this course. Both graphical and rigorous numerical techniques are used. Applications include distillation, absorption, stripping and liquid-liquid extraction

Corequisite: CHE 373 and CHE 303

CHE 3103 PLASTICS AND CORROSION 3-0-3

An introduction to the engineering properties of plastics and the fundamentals of corrosion. The effect of the environment on the corrosion of metals, weathering and the deterioration of plastics are examples of some of the topics covered.

Prerequisites: CH 104, PH 224

CHE 412 APPLIED NUMERICAL METHODS 2-0-2

Advanced engineering mathematics will be introduced. Numerical techniques will be discussed and applied to chemical engineering problems. **Prerequisite: CHE 453**

CHE 433 UNIT OPERATIONS LABORATORY II 2-3-3

This is a laboratory course devoted to the study of mass transfer and chemical reaction kinetics. Statistical techniques will be integrating into these experiments along with statistical design of experiments. **Prerequisite: CHE 333 and CHE 393**

CHE 453 CHEMICAL ENGINEERING KINETICS 3-0-3

A study of chemical reaction processes with applications to equipment design.

Prerequisites: CHE 383, CHE 393, MA233

CHE 463 CHEMICAL PROCESS DYNAMICS AND CONTROL 2-3-3

An introduction to process dynamics and the application of control systems.

Prerequisite: MA 233

CHE 473 CHEMICAL PROCESS DESIGN I 3-0-3

Economic design of commonly used chemical process components such as piping systems, pumps, process vessels, heat exchangers, fired heaters, and distillation columns. Methods employed for design include shortcut calculations and computer methods.

Prerequisite: CHE 372, CHE 383 and CHE 393

CHE 483 CHEMICAL PROCESS DESIGN II 3-0-3

Capstone design experience unifying the principles of previous course work. Comprehensive projects that incorporate appropriate engineering standards and multiple realistic constraints.

Prerequisites: CHE 453, CHE 473, and ES 382

CHE 400X SPECIAL PROBLEMS IN CHEMICAL ENGINEERING VARIES (1-4 HRS.)

Course content arranged according to the student's abilities and with the permission of the chair of the department. No student may pursue this course off campus during his or her last semester prior to graduation.

CHE 4043 AIR ENVIRONMENTAL CONTROL 3-0-3

Air pollution control regulations and the equipment that is used to monitor and control air pollution are studied. Characterization of particulate and gases and vapors are included. Control technologies such as cyclones, ESP, bag houses, incinerators, and adsorption are presented.

Prerequisite: Junior standing

CHE 4073 BIOCHEMICAL ENGINEERING 2-3-3

Microbiological and biochemical phenomena are treated from an engineering standpoint. Course topics include an overview of basic biological concepts along with the modern techniques of biotechnology. Mathematical models of enzyme and whole cell systems are derived and discussed. Commercial and laboratory reactors, as well as separation techniques, are studied.

Prerequisite: MA 233 (CHE 4073 same as BME 4303)

CHE 4083 PLANT MANAGEMENT 3-0-3

A comprehensive overview of the factors and issues which must be considered for the successful management and operation of a chemical plant. Typical areas addressed include process evaluation and optimization, maintenance operations and planning, environmental pollution control and hazardous waste management, manufacturing economics, plant safety, labor relations, community relations, and regulatory compliance.

Prerequisite: Junior standing

CHE 4173 BIO-SEPARATION PROCESSES 2-3-3

This course will examine the fundamentals of separation processes used to isolate and purify biochemical products such as whole cells, enzymes, food additives, and pharmaceuticals. Topics to be discussed include cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation processes. The laboratory portion of the course will include experiments covering the above topics.

Prerequisites: CHE 303, CHE 373 or permission of instructor

CHE 4193 HIGH POLYMER PROCESSES 2-3-3

The chemical and engineering aspects of high-polymers, structure, property, and relationships. Physical methods of characterizing high polymers, basic chemistry and kinetics of polymerization reactions, industrial polymerization processes. Compounding and processing of plastics and elastomers, molding, extrusion, and other polymer-manipulation techniques.

Prerequisites: CH 203

CHE 4223 SELECTED TOPICS IN THE ENGINEERING SCIENCES 3-0-3

This course is divided into three modules, each five weeks long. The first module will cover basic electricity and circuit analysis, as well as process measurement and

instrumentation. The second module will introduce statics and strengths of materials while the final module will introduce the properties of materials and material science.

Prerequisite: PH 224

CHE 4273 PHARMACEUTICAL PROCESSES 2-3-3

The objective of this course is to provide students with an overview of the pharmaceutical process industry from an engineering standpoint. Special emphasis will be given to biologically derived pharmaceuticals. Topics in the course include the drug discovery, drug development, and drug manufacturing processes, including cGMP. The course also covers fermentation selection, operation and control, and unit operations associated with recovery and purification. The course concludes with finished product preparation and packaging. The laboratory time will be used to tour pharmaceutical production facilities.

Prerequisites: CHE 303, CHE 373 or permission of instructor

CHINESE

CHN 113 CHINESE I 3-0-3

An introduction to the Mandarin Chinese language and Chinese culture. Pronunciation, alphabet, and basic grammar skills are emphasized. No previous study of Chinese is required.

CHN 123 CHINESE II 3-0-3

Continued study of pronunciation and basic grammar skills are emphasized. Review of basic grammatical features and alphabetic system.

Prerequisite: CHN 113 or by placement

COOPERATIVE EMPLOYMENT

CO 050 CO-OP EMPLOYMENT

For cooperative education (Co-op) students only. Co-op employment in a professional environment with emphasis on training oriented to students who are majoring in an engineering, environmental science, or computer science program. Co-op students must pre-register for this course before each semester's work assignment. The final cooperative education (Co-op) work assignment must be within the calendar year prior to graduation. While enrolled in this course, a student is considered a full-time Trine University student.

Prerequisite: Sophomore standing with a minimum GPA of 2.4

CO 453 CO-OP WORK EXPERIENCE 3 CREDITS

To obtain cooperative education endorsement on the degree, the student must register for this course. While enrolled in this course, the student must complete a formal report on his/her co-op work experience. The report must be completed by the eighth week of the semester.

Prerequisites: Senior standing, minimum of three semesters of CO 050 Co-op Employment

COMMUNICATION

COM 111 COMMUNICATION: PRACTICES AND PROFESSIONS (1-2-1)

A lab in which students conduct self-assessment and career planning, considering numerous communication career options, including requisite knowledge and skills, entry and career salary levels, employment projections and effects of new technology and business developments. Graduate and law school options are also considered. Students learn how to conduct successful internship and job searches, including how to develop effective portfolios, job application letters, and resumes, as well as skills in persuasive interviewing.

COM 123 INTRODUCTION TO NEW MEDIA 3-0-3

An examination of the history of the media stressing the nature, controls under which they operate, economic and political foundations, social implications, and its future roles.

COM 153 PRINCIPLES OF PUBLIC RELATIONS 3-0-3

Considers the nature, history, and types of public relations. Analyzes PR's crucial management functions and the role of research in planning, executing, and evaluating PR efforts, as well as changes in PR due to social and new media. Notes PR's relationship to management and marketing as well as PR's varied careers and career flexibility that PR education and training provides.

COM 163 INTERPERSONAL COMMUNICATION 3-0-3

Communication concepts and principles are pragmatically applied to interpersonal communication in work, college, dating, family, and social settings. Communication exercises, role plays, and case studies enable students to analyze communication dynamics and improve communication skills employing language, nonverbal communication, listening, perception of self and others, relationship development, and assertiveness. Extensive training in conflict management skills and analysis.

COM 183 WRITING FOR MEDIA 3-0-3

Introduction to writing for the media (print, broadcast, online). Course examines Associated Press (AP) style, as well as techniques for newsgathering, writing headlines, the inverted pyramid structure, and more.

Prerequisite: ENG 113 or 133

COM 203 MEDIA AND SOCIETY 3-0-3

A systematic approach to mass media in terms of structure, functions and effects; includes such topics as meaning, perception, selectivity, ethics persuasion, subliminal seduction, violence and erotica, political socialization, learning, agenda-setting, and uses and gratifications.

Prerequisite: ENG 113 or ENG 133

COM 213 BUSINESS COMMUNICATION 3-0-3

Emphasis on effective research, writing, and document design in project management, including proposals, periodic and progress reports, formal completion reports, and

correspondence. Also considers communication in meetings, the employment process, and presentations using PowerPoint. **Prerequisite: ENG 113 or 133**

COM 233 INTERCULTURAL COMMUNICATION 3-0-3

Considers interrelationships between communication and culture, the diversity between and within cultures, and both the challenges and the richness of communication posed by such diversity, including within U.S. culture. Topics include cultural patterns, worldview and perception, cultural identity, verbal and nonverbal communication, listening, family and relationships, and business. **Prerequisite: ENG 113 or 133**

COM 243 DIGITAL MEDIA CREATION 3-0-3

Examines the technologies and techniques used in digital media creation. Work may involve digital photography, video, and other forms as well as integration of these forms into larger pieces of media such as websites and news packages. **Prerequisite: ENG 113 or 133**

COM 253 EVENT PLANNING AND PROMOTION 3-0-3

Considers event planning and promotion as typical duties for public relations professionals. While learning duties, techniques and procedures for promoting and planning and promoting an event either by itself or as part of a larger PR campaign, students plan, promote, and execute a substantial event. **Prerequisite: COM 153 or sophomore standing**

COM 263 COMMUNICATION THEORIES AND RESEARCH 2-2-3

Considers the nature of theorizing and the evolution and usefulness of communication theories. Includes general communication theories and theories specific to contexts and to communication professions, including public relations, organizational communication, journalism, and media. Also considers the nature and use of quantitative, qualitative, and hermeneutic research, both in developing and testing theories and in application by communication professionals.

COM 283 SPORTS WRITING 3-0-3

Techniques, instruction and practice in news gathering, evaluation, reporting, writing and editing local, regional and national sports news. Topics will include research, style, interviewing skills, how newsroom decisions are made for sports stories and features. Each student will be required to submit articles to the Triangle and other local media for possible publication.

Prerequisites: ENG 113, COM 183

COM 293 ARGUMENTATION AND DEBATE 2-2-3

Develops knowledge and skill in reasoning and decision-making, including how to identify the types, parts, and potential weaknesses of inductive arguments and how to use deductive reasoning to organize arguments in speeches, debate cases, and reasoned writing, such as proposals and reports. After learning how to analyze issues for propositions of fact, value, and policy, and after reasoning and critical listening lab exercises, students debate in lab to sharpen their skills. **Corequisite: SP 203 or permission of instructor**

COM 301 MEDIA PRACTICUM 0-2-1

Practical media experience through work at WEAX, The Triangle, the Sports Information Office, Brand and Integrated Marketing, or another approved media-oriented work experience. May be repeated, but only if duties and skills learned are different each time, up to a total of four credits. **Prerequisite: COM 213 or ENG 133, COM 253, or permission of instructor**

COM 323 THE BUSINESS OF ELECTRONIC MEDIA 3-0-3

This course examines how electronic media organizations throughout the U.S. are dealing with today's competitive pressures, new technologies, and financial strains. Discuss how radio and television programming...practices that once galvanized families during respective golden ages of radio/TV...to the explosion of electronic media choices that are currently available to audiences and advertisers. **Prerequisite: Junior standing or permission of instructor**

COM 343 WEB CONTENT MANAGEMENT 3-0-3

Examines blogging, content management software (such as Word Press), distribution of content through social media and other formats, and the business side of the merging online media landscape. **Prerequisite: Junior standing or permission of instructor**

COM 353 PUBLIC RELATIONS WRITING AND PRODUCTION 3-0-3

Application of persuasive writing and communication principles and of document and visual design principles to the PR writing process, including changes due to social and new media. Develops knowledge and skill in writing, designing, and producing varied PR formats, such as news releases, media advisories, media kits, backgrounders, features, brochures, newsletters, and public service announcements. Considers persuasive factors in electronic media, such as video and audio news releases and new media.

Prerequisites: COM 213 OR ENG 133, COM 253, or permission of instructor

COM 363 RHETORIC AND PERSUASION 3-0-3

Considers classical and contemporary rhetorical theory and concepts as well as practical persuasion theories and concepts. Discusses rhetoric as not only functioning to get audiences to believe or act a certain way, but also as creating understandings of reality, knowledge, social cohesion and division, and power relationships, and as symbolic action. Particular attention is given to how language choices "frame" views of reality, and students analyze how media persuasively "frame" their understandings.

Prerequisite: co-req: SP 203 or permission of instructor

COM 373 TOPICS IN COMMUNICATION 3-0-3

Detailed survey of one of the major areas within the discipline of communication. The course changes each time it is offered, with the specific topic announced in the class schedule.

Prerequisite: Junior standing or permission of instructor

COM 383 FEATURE REPORTING 3-0-3

An intermediate look at writing in the media. It examines feature style writing, in particular, such as features, reviews, interviews, profiles, and more across print, broadcast, and online media. **Prerequisite: COM 183**

COM 413 CORPORATE AND ORGANIZATIONAL COMMUNICATION 3-0-3

Principles and skills for effective communication within task-oriented teams, nonprofit organizations, and corporations. Considers communication techniques to improve meetings, problem-solving, decision-making, and communication climate, while fostering cohesiveness and productivity. Also considers the role of communication consultants and trainers and of internal media such as newsletters, brochures, and electronic communication. Team projects apply techniques and refine communication skills essential for internal contexts. Teams conduct a client-based communication audit or ethnography of an organization or corporate office. Participation in development of content for the Triangle, the Modulus, and/or WEAX is also required.

Prerequisite: COM 213 or ENG 133

COM 422 CAMPUS MEDIA MANAGEMENT 0-4-2

Experience in assuming substantial student management responsibilities at WEAX, The Triangle, or The Modulus. **Prerequisite: COM 101 and COM 301**

COM 453 PUBLIC RELATIONS PLANNING AND CAMPAIGNS 3-0-3

Knowledge and skills needed in the public relations planning, decision-making, and problem-solving process of research, objectives, programming, and evaluation. Case studies and problems apply planning and execution of PR campaigns and relations with a variety of publics: media, employees, members, communities, government and the public, investors, consumers, international, and special groups. Includes crisis and emergency PR and PR aspects of integrated marketing communications. Individuals develop oral and written client-based campaign proposals to solve problems or to utilize opportunities, while teams develop and execute a short term PR campaign for a campus or community client. **Prerequisites: COM 213 or ENG 133**

COM 483 PUBLIC AFFAIRS REPORTING 3-0-3

Advanced analysis of writing in the media. Examining public affairs style reporting, in particular, such as politics, government, social issues, public policy, and more across print, broadcast, and online media.

Prerequisite: COM 183

COM 400X ELECTIVE INTERNSHIP IN COMMUNICATION (VARIES 1 – 3 CREDITS)

Elective internship with variable credit of from one to three hours, with a minimum of 40 hours of work per credit hour. May be repeated for credit with a different internship, with a maximum of six hours of elective internship credit.

Prereq: Communication major, 2.5 G.P.A., Permission of Advisor

COM 4013 SENIOR CAPSTONE INTERNSHIP IN COMMUNICATION (3 HRS.)

An internship including capstone requirements, such as submission of a proposal and of written and oral final reports, requiring a minimum of 100 hours of work.

Prerequisites: Senior Communication major, 2.5 G.P.A.

COM 410X INDEPENDENT STUDIES IN COMMUNICATION (Varies 1-4 HRS.)

An individualized reading and research project in the communication discipline.

Prerequisite: Permission of the Department Chair

COM 4281 SENIOR COMMUNICATION PROJECT PROPOSAL 1-2-2

Application of communication principles and skills by planning and developing a formal proposal for a capstone communication campaign or project. **Prerequisite: Senior Communications major**

COM 4292 SENIOR COMMUNICATION PROJECT 0-4-2

Application of communication principles and skills by implementing and evaluating a capstone communication campaign or project. **Prerequisite: COM 4281**

COMMUNITY VOLUNTEER

COV 101 COMMUNITY VOLUNTEER 0-2-1

Students perform volunteer work assisting and advancing adult literacy in Steuben County under the direction of the Steuben County Literacy Coalition. The course is graded on a pass/fail basis and may be taken twice.

COMPUTER SCIENCE

CS 1113 OBJECT-ORIENTED JAVA PROGRAMMING 3-0-3

An introduction to object-oriented programming using the Java language. Students will: use primitive data types and expressions; understand APIs; effectively use existing classes; use selection and iteration control structures; create classes; use data structures such as arrays; create applets; effectively use debugging techniques and IDE.

Corequisite: MA 103 or higher

CS 1123 C++ AND OBJECT-ORIENTED DESIGN 3-0-3

This course covers the C++ programming language with emphasis placed on object-oriented design. Students will: use pointers and arrays; use header files; overload operators; use functions of the standard library; determine a plan for testing a piece of software; organize a program to determine classes and objects; design a graphical user interface using Qt GUI

Prerequisite: CS 1113 with a grade of "C" or above

CS 2103 ALGORITHM DESIGN AND ANALYSIS 3-0-3

The theory of programming, reinforced with practical activities. Students will: analyze algorithms for asymptotic required memory and time; implement stacks, queues,

dictionaries, priority queues using arrays and linked lists; apply recursion, backtracking, and dynamic programming; use classic strategies like greedy search and branch-and-bound; use trees and graphs to solve problems; explain theory of computation (automata and Turing machines); explain complexity classes like P and NP.

Prerequisites: CS 1123

CS 2503 SOFTWARE ENGINEERING 3-0-3

Is an introduction to software engineering from requirements definitions, through system modeling, specification and design, to verification and validation. Students will: explain project management issues including software cost estimation; determine applicable SDLC models; explain Agile methods (XP and Scrum); gather requirements; design architecture of a software system; create tests to assure quality of software; design and implement an effective graphical user interface. **Prerequisite: CS 1123**

CS 3303 NET-CENTRIC COMPUTING 3-0-3

The development of web-based applications using databases while gaining an understanding of the underlying network concepts. Students will: describe the functions of each layer in the layered network model; setup Ubuntu client/servers including virtual machines; use network management and network security tools; build web applications using Python and PHP; create and integrate MySQL database and SQL in application programs.

Prerequisite: CS 1123

CS 3883 COMPUTER SECURITY 3-0-3

Covers issues and solutions in the area of computer security with emphasis on secure software development. Students will: discuss various attacks and vulnerabilities in a computer system (malware, denial of service, XSS, SQL injection, etc.) and choose corresponding solutions; compare cryptographic algorithms and security protocols; incorporate authentication and security protocols in applications; discuss internet privacy and ethical issues; apply security concepts, technologies and best practices to develop secure applications.

Prerequisite: CS 1123

CS 3933 SOFTWARE ANALYSIS AND DESIGN 3-0-3

This is a project-oriented course that teaches the code development process to students who can use an object-oriented computer language. Students will: identify activities of software project engineering; write a formal requirements document; perform object-oriented analysis of client requirements; use UML class and sequence diagrams to support object-oriented design; apply some software design patterns; implement designed software in a team supported by a version-control tool; use a professional-caliber GUI library to advantage; and follow coding standards. **Prerequisite: CS 2503**

CS 4033 SPECIAL TOPICS 3-0-3

Addresses advanced topics that vary by year. **Prerequisite: consent of instructor**

CS 4103 ADVANCED SOFTWARE DEVELOPMENT 3-0-3

Tools and techniques required to develop complex applications using contemporary software development methods. Students will: develop apps for Android smartphones and tablets; develop software-as-a-service applications; use cloud computing technologies; integrate a database in applications; use Agile and test-driven development methods.

Prerequisite: CS 1123 with a grade of "C" or above

DESIGN ENGINEERING TECHNOLOGY (SEE ETD)**EARTH SCIENCE****EAS 203 OCEANOGRAPHY 2-2-3**

A description of the oceans and their relation to humans. The principles of physical, chemical, geological, and biological oceanography are used to explain the ocean environment. Society's effect on the oceans and problems and potentials of utilizing the natural resources of the sea included. **Prerequisite: A lab science and MA 113 (Same as BIO 203 and GEO 203)**

EAS 213 PHYSICAL GEOGRAPHY 3-0-3

An analysis of the spatial and functional relationships among landforms, climates, soils, water, and the living world. This course also addresses the connections between environmental processes and human activity, such as human impact on the environment. **(Same as GEO 213)**

EAS 253 WEATHER & CLIMATE 3-0-3

Elementary description of the atmosphere: its motion systems, thermal characteristics, clouds and precipitation, weather map interpretation and analysis; climates of the United States. The course conveys meteorological concepts in a visual, practical, and non-mathematical manner.

EAS 273 GEOLOGY 3-0-3

An introduction to the field of geology. Study of minerals and rocks and their formation, within the context of the earth's geologic history. Emphasis on soils, running water, and groundwater. Plate tectonics, glaciers, volcanoes, erosion, and weathering are also covered. Non-lab science only. (Same as GLY 273)

ELECTRICAL AND COMPUTER ENGINEERING**ECE 103 PROTOTYPING AND PROJECTS 2-2-3**

Is an introduction to electrical and computer engineering which includes a strong experimental and project component. Students will: learn the principles of electrical phenomena, the mathematics used to describe power and signals, Boolean logic and its implementation including Programmable Logic Controllers.

ECE 211 CIRCUITS LABORATORY 0-2-1

The laboratory supports the Circuits class through the experimental characterization of passive circuits and their response prediction using component models. Students will: use typical electronics-laboratory test equipment for circuit characterization, write an experimental logbook, model electrical components to better predict a circuit's actual response, measure time response and frequency response. **Corequisite: ECE 213**

ECE 213 CIRCUIT ANALYSIS 3-0-3

This course prepares students for all subsequent circuits-based courses. Linear circuit analysis is studied by placing emphasis on the modified nodal admittance matrix method and circuit transformations. Students will: formulate a solution for any circuit containing terminally-defined resistors, capacitors, inductors, coupled inductors, ideal transformers, dependent and independent sources; use professional software to simulate circuits and to facilitate computations and mathematical operations.

Prerequisite: MA 134; ECE 103

ECE 231 DISCRETE ELECTRONICS LABORATORY 0-2-1

This laboratory provides a comprehensive hands-on opportunity to implement electronic design concepts. The pn junction diode, and MOS transistors and their biasing techniques are extensively introduced to teach operational perspectives and circuit design. Students will: work in a team environment to perform and solve technical problems; understand load lines and design transistors to operate in different regions; design rectifiers, filters, multipliers, and clampers using pn junction diodes; design circuits using TINA simulation software; implement the design in proto board.

Corequisite: ECE 233

ECE 233 DISCRETE ELECTRONICS 3-0-3

This is a first course in semiconductor electronics with emphasis on electronic circuits and devices for low-voltage control, signal conditioning, and switching. Students will: explain the basic operation of junction diodes, BJT's, and FET's, including major limitations; analyze the operation of circuits using practical device models; use SPICE-based software as both an analysis and design tool for electronic circuits; design practical circuits using these devices

Corequisite: ECE 231; Prerequisite: ECE 213

ECE 243 ANALOG SIGNALS 3-0-3

This course bridges the gap between the device-based topics of circuits and the signals-and-systems topics of DSP, controls, and communications. Mathematical concepts relating to complex numbers and matrices are developed and frequency domain analysis is discussed in depth. Students will: calculate with complex numbers; analyze continuous-time circuits in the time domain, phasor domain, and frequency domain, and decide the appropriate domain to use for analysis

Prerequisites: MA 164, ECE 213 with a grade of "C" or above, ECE 263 with a grade of "C" or above

ECE 261 DIGITAL SYSTEMS LABORATORY 0-2-1

The lab provides a comprehensive hands-on opportunity to implement digital design concepts. Logic gates, logic tools, Hardware Description Language (HDL) and Field Programmable Gate Array (FPGA) design boards are used extensively to provide different variations of digital design. Students will: Work in a team environment to solve technical problems; understand switch-bounce problems and design a de-bounced switch; design adders, comparators, multiplexers, tri-state buffers and decoders using AND/OR/NOT/NAND/NOR logic gates; design memory cells, BCD-7-segment decoders, flip-flops and counters using logic gates and HDL; implement the design in an FPGA board.

Corequisite: ECE 263

ECE 263 DIGITAL SYSTEMS 3-0-3

This course explores the introductory concepts of digital systems using combinational and sequential logic circuits. Digital design automation tools and Hardware Description Language (HDL) are also introduced. Students will: demonstrate that they understand number systems and Boolean algebra; understand and design combinational logic circuits including multiplexers, comparators, decoders, and adders; understand and design sequential logic circuits including latches, flip-flops and counters; design combinational and sequential circuits using HDL and perform timing analysis; understand the memory hierarchy, ROMs, RAMs and FLASH memories; understand Programmable Logic Devices (PLDs), CPLDs and FPGAs.

Corequisite: ECE 261

ECE 271 MICROCONTROLLERS LAB 0-2-1

This course teaches students to implement and test inexpensive hardware-software systems that offer a user interface, a digital signal generator, a sampled feedback controller, and subsystem interfacing. Students will: test a feedback system using experiments they design, and determine if project goals are met; design and implement a working feedback controller for a real physical system; team-up on most labs and on one formal report; solve the problem posed in the feedback project; report findings in formal written documents; use lab bench tools to develop and debug code.

Prerequisite: Corequisite: ECE 273

ECE 273 MICROCONTROLLERS 3-0-3

This course teaches students to design inexpensive hardware-software systems that offer a user interface, a digital signal generator, a sampled feedback controller, and subsystem interfacing. Students will: analyze a microcontroller system for timing; solve problems written in prose by showing a hardware/software system that addresses the problem; empathize with stakeholders of a medical device; teach themselves to use an unfamiliar on-chip peripheral from the manufacturer's data sheet; address power consumption/battery life; use a compiler/assembler/simulator to develop correctly working code; use the UML to aid design work; respect the IEEE code of ethics.

Prerequisite: ECE 263 and CS 1113 or equivalent; Corequisite: ECE 271

ECE 301 ELECTRICAL MACHINES LABORATORY 0-2-1

This laboratory supports the machines class through experimental work with dissectible and purpose-built machines. Students will: assemble and test commutator machines,

synchronous machines, and induction machines; characterize machine performance in terms of regulation, efficiency and power; carry out tests to determine a synchronous generator's synchronous reactance **Corequisite: ECE 303**

ECE 303 ELECTRICAL MACHINES 3-0-3

Rotating electrical machinery are studied from the magnetic-field interaction viewpoint. Machine operating principles are studied in detail and electrical circuit models are used to quantify machine/power system interactions. Students will: calculate the power-torque-speed performance of various DC and AC machines; model and calculate synchronous and induction machine performance in the steady state; calculate and present machine capability limits.

Prerequisite: ECE 213; Corequisite: ECE 301

ECE 313 ELECTRICAL POWER 3-0-3

An introduction to three-phase power generation, transmission, distribution, and utilization. Steady-state power system performance measures: efficiency, ratings, voltage regulation, static stability, and reactive power control are used as unifying concepts across a study of the main power system components. Students will: calculate transmission line capacity, generator capability limits, transformer regulation, and load power consumption in balanced and unbalanced three-phase systems.

Prerequisite: ECE 213

ECE 323 DYNAMIC ELECTROMAGNETIC FIELDS 3-0-3

This class discusses electromagnetic fields and calculations involving Maxwell's equations. Students will: apply Maxwell's equations in integral and differential form to calculate electromagnetic fields; calculate transmission line fields; calculate potentials; and describe how plane waves propagate in free space and in other uniform materials. The course may also cover antennas. **Prerequisite: MA 233, PH 234**

ECE 333 ANALOG IC's 3-0-3

The design and test of circuits that include analog integrated circuits such as operational amplifiers, ADCs and DACs, and modulation or demodulation devices. Students will: explain the basic operation of op-amps, including major limitations; analyze the operation of circuits using practical device models; use SPICE-based software as both an analysis and design tool; analyze frequency-domain and time-domain characteristics of analog systems that include filtering, feedback, modulation, rectification, and sampling

Prerequisite: ECE 213

ECE 351 CMOS VLSI DESIGN LAB 0-2-1

This lab provides an extensive opportunity to implement CMOS VLSI design concepts. Students will: use VLSI design tools for design projects on inverters, multiplexers, comparators, oscillators, and flip flops.

Corequisite: ECE 353

ECE 353 CMOS VLSI DESIGN 3-0-3

The design of special purpose digital systems using VLSI technology is investigated using CMOS technology. MOSFET modeling, dynamic power dissipation, clocking strategies and

transistor delays are considered. Students will: understand MOS device modeling and DC transfer characteristics; understand parasitic R,L,C and delay estimation and transistor sizing; understand sequential circuits and clocking strategies; design static and dynamic CMOS VLSI circuits; understand dynamic power dissipation and low power VLSI design techniques; use VLSI tools to simulate and produce technical reports.

Prerequisites: ECE 233; Corequisite: ECE 351

ECE 361 LOGIC & COMPUTER DESIGN LAB 0-2-1

The lab provides an opportunity to implement digital design concepts in Altera Field Programmable Gate Arrays (FPGAs) and Complex Programmable Logic Devices (CPLDs). Students will: complete assigned design projects using HDL and schematic tools, and implement completed design projects using Altera FPGAs and CPLDs; work in a group setting to implement a challenging design project on the design board and make a group presentation of this design.

Corequisite: ECE 363

ECE 363 LOGIC & COMPUTER DESIGN 3-0-3

The course builds on the Digital Systems class and provides an in-depth analysis of digital design and computer architecture. Core topics include Finite State Machine (FSM) controllers and pipeline design using Hardware Description Language (HDL). Students will: understand and design sequential circuits and perform timing analysis; understand and design FSM controllers and next state decoders; understand and design pipelined processors and cache memories; design of an onboard 32x32 register file; work in a group setting to come up with innovative ideas to design and implement an FSM, a controller and a cache memory.

Prerequisite: ECE 263,; Corequisite: ECE 361

ECE 371 EMBEDDED SYSTEMS LABORATORY 0-2-1

In support of ECE 373, this lab puts students in small teams to explore isolated subsystems from the course project in the usual lab format, and then provides structured time to achieve and demonstrate progress in the project. Students will: work in small teams; show that they can use the tools and techniques of modern embedded systems to implement their designs; assume responsibility for designing the tests or experiments needed to verify their work; demonstrate communication skills in formal reports and demonstrations.

Corequisite: ECE 373

ECE 373 EMBEDDED SYSTEMS 3-0-3

Building on ECE 273 (Microcontrollers), this course focuses on real-time multitasking and RTOS and includes a design project to explore these ideas, and the course also looks at enabling techniques such as mixed C and assembly, control of linking, external memory, self-programming, and fail-safety. Students will: explain and apply real-time multitasking concepts; design and implement an embedded system; design recovery from exceptional conditions; incorporate into their work complex peripherals like PWM-capable timers.

Prerequisite: ECE 273; Corequisite: ECE 371

ECE 403 DIRECT GENERATION TECHNIQUES 3-0-3

The direct electrical energy conversion and storage methods are studied in depth. Direct conversion involves the conversion of energy directly to electrical form with no electromechanical interface. Students will: study conversion technologies including heat transfer, chemical cells, solar arrays, and fuel cells. The course also investigates the current and future trends in energy storage techniques.

Prerequisite: ECE 213

ECE 441 COMMUNICATION SYSTEMS LABORATORY 0-2-1

A lab to investigate means of and results of moderate-frequency signal processing in the service of communications, using both integrated circuits and simulated components. Students will: determine bandwidth and bands of interest; identify distortion and aliasing; and apply lab tools to moderate-frequency designs.

Corequisite: ECE 443

ECE 443 COMMUNICATION SYSTEMS 3-0-3

The course investigates ways of processing a signal both to prepare it for effective transmission through some medium or media that may be carrying other signals, and to reconstruct the original signal at the receiving end. Students will: analyze and design basic communication systems using block-diagram models of filters, samplers, and modulators; compare and contrast multiple-access communication techniques including AM, FM, coding and keying; calculate the basic quantities such as channel capacity, probability of error, and bandwidth needed to transmit analog or digital signals in base-band or in pass-band.

Prerequisite: ECE 243; **Corequisite:** ECE 441

ECE 453 RANDOM PROCESSES IN ELECTRICAL AND COMPUTER ENGINEERING 3-0-3

Concepts of random processes are applied to electrical and computer engineering applications. In addition to the mathematical topics described below, each student will present on a particular application which may include: oversampling A/D, queuing inside a computer processor, quality control, voice recognition, and interferometric measurements. Students will: describe a random process by a probability density and probability distribution; identify whether a process is stationary and ergodic; compute the auto-correlation, cross-correlation, spectral density and cross-spectral density of a random process.

Prerequisite: MA 393

ECE 461 DIGITAL SIGNAL PROCESSING LAB 0-2-1

MATLAB is used to demonstrate concepts from digital signal processing. Students will: sample and filter audio signals; filter images; demonstrate effects of insufficient sampling, aliasing, rounding, or instability; design digital filters.

Corequisite: ECE 463

ECE 463 DIGITAL SIGNAL PROCESSING 3-0-3

This course emphasizes analysis and design of systems for processing digital signals using frequency domain techniques. Students will: analyze signals in the frequency domain;

describe digital systems in the frequency domain; sample, quantize, and reconstruct signals; design digital filters.

Prerequisite: ECE 243; Corequisite: ECE 461

ECE 481 INSTRUMENT SYSTEMS LABORATORY 0-2-1

This course discusses data acquisition of both analog and digital signals. Students will: process input data from sensors; read data into a computer using multiple methods; characterize signal noise; use Labview for data acquisition and analysis.

Corequisite: ECE 483

ECE 483 INSTRUMENT SYSTEMS 3-0-3

This course discusses theoretical and practical ideas related to data acquisition of both analog and digital signals. Students will: analyze input data from sensors; characterize signal noise; compare GPIB, USB, and other data buses for instrumentation systems; use Labview or Matlab for data acquisition and analysis.

Corequisite: 481; Prerequisite: ECE 213

ECE 4001 CONTEMPORARY ISSUES FOR ENGINEERS 1-0-1

This is a seminar-based weekly course covering global perspectives on business and engineering, and the effects and responsibilities of engineers in society. Students will: understand sustainability and diversity and develop a broader perspective necessary to understand the impact of engineering solutions in an environmental and societal context; understand the complex global economy.

Prerequisite: Senior standing

ECE 4002 PROJECT MANAGEMENT 2-1-2

Students will: work with a team to identify or elicit details of end-user needs; produce and present a project proposal; identify and assign responsibilities to team members based on an accepted proposal; work across disciplines to deliver a product or service to a client; explain both highly-structured and more agile engineering design processes.

Prerequisite: Advisor's consent

ECE 4003 DESIGN PROJECT 3-0-3

Students will: design and prototype a product; work with team members from other disciplines to collectively solve engineering problems; obtain and utilize information sources to solve engineering problems; consider the perspective of stakeholders as an integral part of the design process; identify economic, environmental, social, ethical, and safety implications of the design; demonstrate communication skills necessary for successful teamwork; write a formal report that documents the entire design-cycle, from initial concept to a functioning prototype; and give an oral report presenting the final product.

Prerequisite: EE Majors: ECE 4002, ECE 243, ECE 483

CpE Majors: ECE 4002, ECE 243, ECE 373

ECONOMICS

ECO 213 MICROECONOMICS 3-0-3

Introduction to the theory of demand and supply and price determination in market economies. The study of individual consumers and producers, different market structures and the distribution of income.

ECO 223 MACROECONOMICS 3-0-3

Introduction to the theory of national income determination for the United States and other global economic systems. The study of fiscal and monetary policy tools and the government's role in promoting stability and growth, and the causes of unemployment, inflation, and trade deficits.

ECO 303 QUANTITATIVE ANALYSIS IN BUSINESS 3-0-3

This course builds on designing operations and applies quantitative techniques to common business problems, preparing the student to make data-driven decisions. Topics include decision theory, Bayesian analysis, forecasting, linear programming, dynamic programming, game theory, transportation models, assignment and scheduling modeling, simulations, and queuing theory.

Prerequisites: MA 253, MGT 353

ECO 323 MONEY AND BANKING 3-0-3

This course is a study of the principles of monetary economics. An analysis of the structure and operation of financial institutions and the Federal Reserve System is included. The function of monetary policy within the framework of macroeconomic theory is examined.

Prerequisite: ECO 223 (Same as FIN 323)

ECO 333 PUBLIC FINANCE 3-0-3

This course involves an investigation of the role of the public sector in economic development. Fiscal policy and the practice of public finance are examined. Topics cover cost functions for public goods, externalities, and fiscal federalism.

Prerequisite: ECO 223

ECO 343 ECONOMIC GEOGRAPHY 3-0-3

A spiritual approach to economics, the course considers historical, present and future economic activities, developments, and trends, in a global context, with the goal of answering the two basic questions of geography: "where?" and "why there?".

Prerequisite: ECO 223 (Same as GEO 343)

ECO 363 COMPARATIVE ECONOMIC SYSTEMS 3-0-3

A comparison of the capitalist, socialist, communist and mixed economies, theory, history, and application of the system in selected countries.

Prerequisite: ECO 223

ECO 373 INTRODUCTION TO ECONOMETRICS 3-0-3

This course is designed for the finance and economics students as a continuation of MA 253 (Statistics). Students will first revisit the topics of probability, distributions, and hypothesis testing, exploring these topics more thoroughly. Most of the semester will be devoted to building solid theoretical and practical foundation of econometrics. Students will proceed from the simple regression model onto multiple regression analysis in the context of cross-sectional data, time series data, and finally panel data. Violations and fixes to serial correlation and heteroskedasticity problems will be studied. Students will be asked to demonstrate and apply the concepts studied while carrying out an empirical research project. **Prerequisite: ECO 213, ECO 223, MA 253 (Same as FIN 373)**

ECO 383 INTERNATIONAL ECONOMICS 3-0-3

Introduction to the fundamental theories of international specialization and exchange, and international payments; the analysis of processes and organizations for maintaining equilibrium of international economic relationships. **Prerequisite: ECO 223**

ECO 393 ECONOMIC HISTORY OF THE UNITED STATES 3-0-3

A survey of major economic developments in American history. Stresses the changed conditions and values in moving from an agricultural to an industrial society.

Prerequisites: HIS 103, HIS 113 (Same as HIS 393)

ECO 453 BUSINESS AND PUBLIC POLICY 3-0-3

This course includes an analysis of the legal, political and economic framework that has shaped public policy toward business in the United States. It will include the methods as to how public policy is created and its implications for management decision making. The issues that this course will be concerned with are: how public policy is related to societal, community, employee, consumer, and environmental concerns and their implication for business. (same as BA 403)

Prerequisites: MGT 363, ECO 223, LAW 203, MK 303, or permission of the instructor

ECO 400X INDEPENDENT STUDIES IN ECONOMICS VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research or supervised field work. Maximum 4 hours credit.

Prerequisite: Permission of Department Chair

EDUCATION

Information presented in this catalog is subject to change at any time depending on actions taken by state (IDOE/OELD) and national (CAEP) accrediting agencies. A student will be responsible for meeting any requirements for licensure that are in effect at the time she/he seeks to be licensed. The requirements may differ from what is presented in this document. Students should remain alert to changes in requirements. Updated information is available from the Franks School of Education.

EDU 111 FRESHMAN PRACTICUM 1-0-1

A study of teaching as a career. The candidate examines conditions and responsibilities at lower elementary, upper elementary, middle school, high school, and alternative school levels. Field experience. **Prerequisite: strong interest in a teacher education major**

EDU 211 SOPHOMORE PRACTICUM 1-5-1

A study of the responsibilities of teaching in a specific setting. The candidate is assigned to an area school according to subject matter and grade level of planned certification. Field experience.

Prerequisite: EDU 111; education major

EDU 212 INTRODUCTION TO MUSIC FUNDAMENTALS 2-0-2

A study of general music fundamentals and methods. There is an emphasis on integrated instruction and the appropriate use of music to enhance the cognitive and psychomotor domains. Open to elementary and HPE majors. **Prerequisite: Benchmark #1**

EDU 222 EDUCATIONAL PSYCHOLOGY FOR EARLY CHILDHOOD/MIDDLE CHILDHOOD TEACHERS 2-1-2

A study of the application of basic psychological principles to classroom instruction and the school environment at the K-6 level. Current research about motivation, theories and philosophies of how children learn, and major theories of child growth and development are explored. All developmental domains of children from birth through early adolescence are examined. Field experience. **Prerequisite: Benchmark #1**

EDU 232 EDUCATIONAL PSYCHOLOGY FOR MIDDLE GRADE AND SECONDARY TEACHERS 2-1-2

A study of the application of basic psychological principles to classroom instruction and the school environment at the middle and high school levels. Motivation, principles of learning, crucial issues and alternative learning environments are explored. All developmental domains of the early adolescent through young adult are examined. Field experience.

Prerequisite: Benchmark #1

EDU 301 INTRODUCTION TO TEACHING PRACTICUM 0-5-1

An in-depth study of the responsibilities of teaching in a specific setting. The candidate is assigned to an area school according to subject matter and grade level of planned certification. Field experience. **Prerequisite: Benchmark #1; Corequisite: EDU 303**

EDU 303 INTRODUCTION TO TEACHING 3-0-3

A study of the problems, purposes, and responsibilities of teaching, including educational standards, deductive and inductive instructional strategies, assessment, needs of diverse learners, daily and long-range planning, classroom management, and parental involvement in the schools. **Prerequisite: Benchmark #1; Corequisite: EDU 301**

EDU 311 JUNIOR PRACTICUM 1-1-1

A study of educational programs and practices in schools with multicultural populations. Field experience. **Prerequisite: Benchmark #1**

EDU 312 EXCEPTIONAL CHILDREN IN THE SCHOOLS 2-1-2

A study of exceptional children and programs in K-12 educational settings. Areas of study are program design, identification processes, curriculum development, inclusion, mainstreaming and program evaluation. Special education areas of concentration include learning disabilities, visual/hearing impaired, physically handicapped, emotionally handicapped, and mentally handicapped. (Gifted area of concentration includes academic.) Field experience.

Prerequisite: Benchmark #1

EDU 323 FOUNDATIONS OF EDUCATION 3-0-3

A study of the historical, philosophical, and social aspects of American public education. The legal and financial basis of public education and the rights and responsibilities of teachers and students are reviewed. Significant professional issues are identified and explored.

Prerequisite: Benchmark #2

EDU 333 READING IN THE CONTENT AREA 3-1-3

A study of content area reading at the middle and high school levels. An emphasis on comprehension, study skills, and reading strategies appropriate for the various subject matter disciplines. Field experience. Open to secondary and all-grade majors only.

Prerequisite: Benchmark #2

EDU 342 THE KINDERGARTEN EXPERIENCE 2-1-2

A study of developmentally appropriate learning environments and practices for kindergarten teachers and their students. Integrated methods of teaching early and emergent literacy skills, math, social studies, science, art, health, technology, and music are explored in light of the cognitive, emotional, social, and physical development of children between the ages of 4-6 years old. In addition to raising awareness for identifying special needs, multicultural issues within the socio-cultural environment are addressed.

Prerequisite: Benchmark #1, EDU 222

EDU 353 CHILDREN'S LITERATURE 3-0-3

Major emphasis is placed on selection and reading of quality children's literature associated with early childhood, middle childhood, and early adolescent stages of development. Literary genres are studied in relation to their value to children. Ways to best present literature in the classroom are explored, including children's responses to

literature. Open to elementary education majors only. **Prerequisites: Benchmark #1, EDU 301, EDU 303**

EDU 412 THE MIDDLE SCHOOL 2-1-2

A study of the historical and philosophical origins of the middle school. The changing cognitive, physical, social and emotional needs of the middle level learner are examined; team teaching, exploratory, advisor-advisee, intramural activities; scheduling; teacher qualities; parent expectations are examined. **Prerequisites: Benchmark #1, EDU 301, EDU 303**

EDU 422 MIDDLE SCHOOL METHODS 2-1-2

A study of instruction and techniques for successful teaching of middle-level students. Emphasis on planning, application, team teaching, interdisciplinary teaching, interrelationship of subject matter. Field experience. **Prerequisite: EDU 412**

EDU 432 PRACTICUM IN TEACHING—SECONDARY 0-10-2

A supervised field-based experience at the secondary (9-12) level, with an emphasis on effective teaching methods and the philosophy of education. Open to secondary and all-grade majors only.

Prerequisite: Benchmark #2; Corequisite: EDU 442

EDU 441 TEACHING OF READING PRACTICUM 0-5-1

An in-depth study of the responsibilities of teaching reading in an elementary setting. Field experience. Open to elementary majors only.

Prerequisite: Benchmark #2; Corequisite: EDU 445

EDU 442 SPECIAL METHODS FOR THE SECONDARY TEACHER 2-1-2

A study of teaching methods designed to facilitate competency in specific subject areas; methods, daily and long-range planning, classroom management, instructional technology, curriculum development, secondary school organization, individualized instruction, motivation, concept development, and interdisciplinary teaching. Open to secondary and all-grade majors only. Field experience. **Prerequisite: Benchmark #2; Corequisite: EDU 432**

EDU 445 TEACHING OF READING 5-0-5

A study of multiple approaches used in the teaching of reading including balanced reading programs, phonics, and literature-based programs. A study of reading methods, strategies, and techniques designed to help children who are experiencing difficulties learning to read. Open to elementary majors only. **Prerequisite: Benchmark #2; Corequisite: EDU 441**

EDU 452 ART FOR THE ELEMENTARY TEACHER 2-1-2

A study of discipline-based art education as it applies to the elementary classroom. Emphasis on the preparation of art projects and the use of art as a tool of learning using a variety of mediums and materials. Open to elementary majors only. Field experience.

Prerequisite: Benchmark #2

EDU 454 METHODS OF TEACHING MATHEMATICS AND SCIENCE 4-4-4

A study of methodologies, techniques, and materials used in the teaching of mathematics and science at the K-6 level. Emphasis is on hands-on science and the use of math manipulatives. National and state curriculum standards specific to teaching mathematics and science are examined and included as critical components of effective lesson/unit planning. Open to elementary majors only. Field experience.

Prerequisite: Benchmark #2

EDU 462 EDUCATIONAL MEASUREMENT 2-0-2

A study of methods of assessment and evaluation that include standardized tests, teacher-made tests, authentic assessment, rubrics, portfolios, performance assessment, informal assessment.

Prerequisite: Benchmark #2

EDU 463 EDUCATIONAL MEDIA AND TECHNOLOGY 2-1-3

A study of instructional media and technology used in K-12 settings.

Prerequisite: Benchmark #2

EDU 464 METHODS OF TEACHING LANGUAGE ARTS AND SOCIAL STUDIES 4-1-4

A study of methodologies, techniques, technology, and curricular resources used in the teaching of language arts and social studies at the K-6 level. National and state curriculum standards specific to teaching social studies and oral/written expression in language arts are examined and included as critical components of effective lesson/unit planning. Field experience. Open to elementary majors only. **Prerequisite: Benchmark #2**

EDU 470 SUPERVISED STUDENT TEACHING 1-40-10

Observation, participation, and teaching in a school under the direction of a master cooperating teacher and university supervisor. Candidate is assigned to an area school for 10 to 11 full weeks according to subject matter and grade level of planned certification.

Prerequisites: senior status; 2.5 GPA in major, overall; Benchmark #3; Corequisite: EDU 471

EDU 471 STUDENT TEACHING SEMINAR 1-0-1

Analysis, synthesis, and reflection based on the student teaching experience.

Prerequisites: senior standing; 2.5 GPA in major, overall; and Benchmark #3;

Corequisite: EDU 470

EDU 472 PRACTICUM IN TEACHING—MIDDLE 0-10-2

A supervised field-based experience at the middle school (5-8) level, with an emphasis on effective teaching methods and the philosophy of education.

Prerequisites: EDU 422, Benchmark #2

EDU 482 PRACTICUM IN TEACHING—ELEMENTARY 0-10-2

A supervised field-based experience at the elementary (K-6) level, with an emphasis on effective teaching methods and the philosophy of education.

Prerequisite: Benchmark #2

EDU 400X DIRECTED STUDIES IN EDUCATION VARIES (1-6 HRS.)

Individual projects, research, and/or directed studies of contemporary issues in the field of professional education. Credit arranged on an individual basis.

Prerequisite: Approval of the Dean of the Franks School of Education

ENGINEERING GRAPHICS

EGR 143 ENGINEERING GRAPHICS 2-2-3

Graphical communication for engineers using sketching and computer-aided drafting. The fundamentals of orthographic projection, isometric projection and descriptive geometry are taught. An introduction to three dimensional models using solid modeling computer software is also covered. Emphasis is placed on developing the skills needed for mechanical engineering design.

EGR 153 ENGINEERING GRAPHICS FOR CE 3-0-3

Graphical communication by means of sketching and computer-aided drafting. Fundamentals of orthographic projection and descriptive geometry. This course stresses applications of graphic communications, both manually and through the use of CAD systems.

EGR 453 ADVANCED PARAMETRIC DESIGN 1-4-3

An introduction to Unigraphics NX design software which includes modeling basics as well as an in depth look at the advanced capabilities of the software as it applies to engineering design.

Prerequisite: EGR 143 or ETD 263

ENGLISH

ENG 014 ACADEMIC WRITING 4-0-0

Review and practice of the basic skills and rules necessary for successful academic writing. This is a non-credit preparatory course.

ENG 024 ACADEMIC READING 4-0-0

Review and practice of the basic skills necessary for successful academic reading. This is a non-credit preparatory course.

ENG 034 ENGLISH PREPARATORY INDEPENDENT STUDY 4-0-0

This is a non-credit preparatory course.

ENG 103 ENGLISH COMPOSITION I 3-0-3

Intensive training in methods of exposition leading to the ability to write coherent, clear, and persuasive essays.

Prerequisite: Adequate SAT verbal score or ACT English score, class rank, and high school G.P.A., or successful completion of non-credit preparatory English courses.

ENG 104 INTENSIVE ENGLISH COMPOSITION I 4-1-4

Intensive training in methods of exposition leading to the ability to write coherent, clear and persuasive essays. This course also reviews the major conventions used in writing English. A one-hour weekly lecture will provide a general review of these conventions, along with a one-hour weekly lab to provide further instruction either on an individual or group basis.

Prerequisite: "C" or better in ENG 024, or adequate SAT Verbal or ACT English score.

ENG 113 ENGLISH COMPOSITION II 3-0-3

Continuation of ENG 103. Concentration on research paper and library methods.

Prerequisite: "C" or better in ENG 103 or ENG 104

ENG 133 TECHNICAL COMMUNICATION 3-0-3

Emphasizes written and oral communication in professional situations for technical fields. Concentration on project-oriented instruction and assessment, which includes creating technical documents (email, reports, proposals, instructions, et. al.) and adapting them to specific audiences and tasks.

Prerequisite: "C" or better in ENG 103 or ENG 104

ENG 153 INTRODUCTION TO LITERATURE 3-0-3

Introduces the student to literature of some complexity and sophistication, developing a critical vocabulary and skills in reading on an advanced level. Analysis of genre: short fiction, poetry, and drama.

ENG 204 BRITISH LITERATURE 4-0-4

A survey of British literature to the present. **Prerequisite: ENG 103 or ENG 104**

ENG 214 AMERICAN LITERATURE 4-0-4

A survey of American literature to the present. **Prerequisite: ENG 103 or ENG 104**

ENG 233 MYTHOLOGY 3-0-3

An introduction to world mythology, with emphasis on Greek and Roman legends.

Prerequisite: ENG 103 or ENG 104

ENG 253 READINGS IN WORLD LITERATURE 3-0-3

Readings in selected major works which have influenced thought and culture. Selections may be drawn from (but not limited to) such writers as Dante, Juvenal, Confucius, Montaigne, Rabelais, Cervantes, Moliere, Goethe, and Dostoyevsky.

Prerequisite: ENG 103 or ENG 104

ENG 263 CONTEMPORARY THEMES IN LITERATURE 3-0-3

A critical study of works of literature selected for their relevancy to current social, ethnic, minority, and ethical problems. Special emphasis placed upon minority writers.

Prerequisite: ENG 103 or ENG 104

ENG 273 CREATIVE WRITING 3-0-3

Directed experiments in the original composition of literary essays, plays, short stories, longer narratives, or poems. **Prerequisite: ENG 103**

ENG 323 RESTORATION AND EIGHTEENTH CENTURY LITERATURE 3-0-3

A study of literature from 1660-1798. Authors studied include Moliere and Restoration playwrights, Swift, Pope, Voltaire, Dr. Johnson, and others.

Prerequisite: ENG 103 or ENG 104

ENG 333 STUDIES IN LITERATURE 3-0-3

Study of selected authors and topics. May be repeated for credit so long as course content is not substantially duplicated.

Prerequisite: ENG 103 or ENG 104

ENG 363 THE ENGLISH LANGUAGE 3-0-3

A systematic study of the development of the English language from its medieval beginnings; some consideration of contemporary dialectic and semantic differences; work with etymology.

Prerequisite: ENG 113

ENG 403 BRITISH AND AMERICAN NOVELS I 3-0-3

A chronological study of the major thematic and structural developments in the novel from its beginnings to the 21st century. Social commentary and satire on classes, monarchy, empire, war, education, religion, marriage, middle class morality. **Prerequisite: ENG 103 or ENG 104**

ENG 423 DRAMA 3-0-3

Studies of selected playwrights, movements, trends, and developments in world drama from the beginnings to the present day. **Prerequisite: ENG 103 or ENG 104**

ENG 433 SHAKESPEARE AND HIS TIMES 3-0-3

The close reading of at least eight plays by Shakespeare. Discussion of his life and times, the sonnets, his themes, and the differences between texts and productions. **Prerequisite: ENG 103 or ENG 104**

ENG 443 POETRY 3-0-3

An investigation of the poetic process through the careful examination of selected poems and statements about poetry. **Prerequisite: ENG 103 or ENG 104**

ENG 400X DIRECTED STUDIES IN ENGLISH VARIES (1-3 HRS.)

For senior students of superior ability able to assume a larger share of the responsibility for designing and pursuing a reading research project which is academically respectable.

Prerequisite: Permission of Department Chair

ENG 401X CAPSTONE STUDY IN ENGLISH 4-0-4

A capstone course for students who plan to enter law or graduate school and who are capable of writing a polished, academically significant research paper in the field of English.

Prerequisite: Permission of Department Chair

ENTREPRENEURSHIP

ENT 303 ENTREPRENEURIAL LEADERSHIP 3-0-3

This course examines leadership, influence, and power as it relates to entrepreneurship with a strong emphasis on entrepreneurial character traits and business ethics. Historical, literary, and contemporary examples of successful entrepreneurs provide a framework for examining the theories of leadership and power. **Prerequisite: Junior standing or permission of instructor**

ENT 323 ENGINEERING CONCEPTS (FOR NON-ENGINEERING MAJORS) 3-0-3

Fundamental engineering concepts are introduced, with an emphasis on developing foundations for lifelong learning of technological issues. Broad-based technologies and the importance of technical communication are emphasized. Current and future technologies are discussed by visiting practitioners. Not open to students enrolled in the engineering and technology programs.

Prerequisite: Junior standing or permission of instructor

ENT 333 ENTREPRENEURSHIP SEMINAR SERIES 3-0-3

Through case studies, simulations, guest lectures, and reading, students become aware of legal business structures, legal issues related to emerging ventures (patents, copyrights, trademarks, licensing, franchising, employment law, etc.), venture financing, and venture marketing.

Prerequisite: ENT 313 or 323

ENT 413 CREATIVITY–PRODUCT/SERVICE DEVELOPMENT 3-0-3

This course explores the nature of creativity from four interacting viewpoints: person, process, product, and environment. Its goal is to develop students' awareness of their creative potential. Activities include group work, discussion, and the development of an idea or invention.

Prerequisite: BA 123 or ENT 313

ENT 423 ENTREPRENEURSHIP & VENTURE PLANNING 3-0-3

This course focuses on entrepreneurship and small business management. Through case studies, simulations, guest lectures, reading and business plan development, students become aware of the unique challenges facing small business owners and entrepreneurs. Students become familiar with the resources available to small business owners by developing and presenting a business start-up plan. **Prerequisite: ENT 413**

ENT 463 INTERNSHIP 3-0-3

Students will be assigned to a real world new venture, small business, or corporate new product development department to gain experience in the art and science of entrepreneurial/entrepreneurial thinking, problem solving, and decision making. The term of the internship will vary depending on the nature of the position and responsibilities. Ideally, students will be assigned the internship during the summer between their junior and senior year. **Prerequisite: Junior Standing**

ENGINEERING SCIENCE**ES 213 STATICS 3-0-3**

The first course in engineering mechanics. Subjects cover includes; force and moment vectors, equivalent systems, trusses, frames, and machines, equilibrium of particles and rigid bodies, static friction, centroids and moments of inertia. **Corequisites: MA 164, PH 224**

ES 223 DYNAMICS 3-0-3

Kinematics of absolute and relative motion of particles and rigid bodies. Subjects include; kinetics of particles and particle systems. Principles of work and energy, impulse and momentum, and impact. Kinetics of rigid bodies in plane motion.

Prerequisite: Grade of C or better in ES 213, MA 164 and PH 224

ES 233 ENGINEERING MATERIALS 3-0-3

A study of the structure and properties of materials. Materials covered include metals, ceramics, polymers, and composites. Mechanical properties are emphasized, electrical properties, thermal properties, and environmental interactions are addressed. Structural features at the atomistic level, the crystal structure level, and the microstructure level of single and polyphase materials are studied in terms of their effects on material properties.

Prerequisite: CH 104; Corequisite: PH 224

ES 243 SOLID MECHANICS 3-0-3

Concepts of stress and strain in engineering materials. Subjects include; Hooke's law and Poisson's relationship, analysis of axial, shear, flexural, and torsional stresses, combined stress, shear and moment distribution in beams, and deformation of structural members.

Prerequisite: Grade of C or better in ES 213

ES 253 ELECTRICAL SCIENCE 3-0-3

Basic voltage-current-energy relationships in circuit elements. Fundamental circuit laws. Resistive networks and network theorems. Sinusoidal steadystate response and phasors. Power and energy in AC circuits. **Prerequisites: MA 134, PH 224**

ES 313 THERMODYNAMICS 3-0-3

Introduction to properties of substances and ideal gases by use of tables. Introduction to thermodynamic concepts of systems, control volumes, heat, work and internal energy. Formulation of the First and Second Laws of Thermodynamics with engineering applications, Vapor Water Systems Ranking cycle, First and Second Law analysis of power plant cycles.

Prerequisites: Grade of "C" or better in MA 164, PH 224, and ES 213

ES 323 FLUID MECHANICS 3-0-3

Fundamental properties of fluids. Fluid statics. Kinematics of fluid motion. Conservation of mass, energy and momentum as applied to compressible and incompressible fluids. Similitude. Introduction to laminar and turbulent boundary layers.

Prerequisite: ES 213; Corequisite: MA 213

ES 343 HEAT TRANSFER 3-0-3

Introduction to heat transfer analysis. Study of the primary modes of heat transfer: conduction, convection, and radiation. Engineering applications include heat exchangers, cooling of electronic components, engines, insulation.

Prerequisites: ES 313, MA 233, and ES 323 or MAE 3033

ES 382 ENGINEERING ECONOMICS 2-0-2

An introduction to the economics component of design and problem solving. Application of economic concepts from present and future value of money, depreciation, and taxes to problems involving replacement studies and selection between alternative uses of capital. Methods include equivalent worth, rate of return, and incremental techniques.

Prerequisite: Junior standing or permission of instructor

ES 4703 OPERATION MANAGEMENT AND QUANTITATIVE DECISION ANALYSIS 3-0-3

Understand quantitative tools available to plan and manage a project, service or production orientated operation. The class will provide insight into the quantitative decision making and optimization techniques including linear programming, queuing theory and various simulation methodologies. The discussion topics will also include project management, forecasting, inventory management, aggregate planning, materials resource planning, short term scheduling, lean production systems, maintenance and reliability.

Prerequisites: MA 253 or MA 393 (Students cannot receive credit for this course and MGT 443)

ENGLISH AS A SECOND LANGUAGE**ESL 0003 GRAMMAR LITERACY**

Students practice the fundamental English skills of reading, spelling, listening, and speaking while focusing on the most basic of grammar points. Students are introduced to singular and plural nouns, pronouns and possessive adjectives, the present and past tense of "be" and the simple present and present progressive tenses.

ESL 0012 BASIC VOCABULARY

Students are introduced to basic vocabulary items from everyday life such as household and classroom items, clothing, days of the week, seasons, numbers, and colors. Students learn to spell and pronounce new words and use them in elementary-level conversations.

ESL 002X READING LAB

The ESL Reading Lab provides ESL students with guided time for sustained silent reading with the major goals of improving their reading comprehension and their reading speed

while beginning the process of reading for pleasure. The number of hours varies (1-2 credit hours), and students may take the course multiple times.

ESL 0052 BASIC LISTENING

Beginning students will practice the most basic listening skills to help them understand every day greetings and conversations. They will also practice basic survival language skills such as discussing living situations, communicating with medical professionals, making emergency phone calls, and interacting in public settings, among others.

ESL 006X SPECIAL TOPICS IN ESL SURVIVAL SKILLS

This course will be tailored to meet the immediate language learning needs of true beginning-level learners of English. The number of hours will vary (from 1-5 hours), and student may take the course multiple times.

ESL 0090 ESL STUDIES

This is a series of individualized sessions for each student in the ESL program. All ESL students must register for this class every semester until they finish the program. With the consultation of all the students' current instructors, the ESL director will work with each student throughout the semester to identify the individual student's strengths and weaknesses and to advise appropriate courses of action for optimum success at Trine University. This course may be taken multiple times, and the final grade for this course will be the average of all current ESL courses. Academic probation may be given on the basis of the grade in this course.

ESL 0100 ESL LAB I

Students use interactive software to improve their basic English skills. This course may be taken multiple times and is graded on a Satisfactory/Unsatisfactory basis.

ESL 0103 GRAMMAR I

Students focus on parts of speech, word order, imperatives, determiners and statements, questions and negation in the present, present progressive, and simple past tenses.

ESL 0112 VOCABULARY I

Students learn to recognize, spell, and pronounce over 2,500 essential vocabulary words for everyday situations. They also practice using new vocabulary words in basic everyday dialogues and conversations.

ESL 0123 READING I

Students learn to use word skills, context clues, and structural clues to determine meaning. Emphasis is placed on main ideas and details of beginning-intermediate reading passages with reading of limited non-prose graphs and charts included. Students demonstrate their skills in written reports, class discussions, presentations, or interviews on outside readings.

ESL 0133 WRITING I

Using their new vocabulary and grammar skills, students learn to write complete sentences with appropriate word order, spelling, and punctuation in the present and past tenses. Students later practice paragraph writing and elementary methods of cohesion.

ESL 0141 PRONUNCIATION

Students practice producing all the sounds of Standard American English along with proper stress and intonation.

ESL 0142 PRONUNCIATION & CONVERSATION

Students practice producing all the sounds of Standard American English along with proper stress and intonation while practicing conversational skills.

ESL 0152 LISTENING I

Students practice listening to and engaging in basic conversations while building a basic vocabulary and verbal and non-verbal conversational skills. Students also learn culturally appropriate social conventions.

ESL 016X SPECIAL TOPICS IN ESL SKILLS

This course will be tailored to meet the immediate language learning needs of ESL (English as a Second Language) students. The number of hours will vary (1-5), and students may take the course multiple times.

ESL 0201 IRREGULAR VERBS

Students practice spelling, pronunciation, and usage of over 140 American English irregular verbs. Students learn the parts of the verb and when to use them. In addition, students learn and practice over 120 phrasal verbs and idioms that contain irregular verbs. Emphasis is placed on grammar, writing, test-taking skills, and critical thinking.

ESL 0203 GRAMMAR II

Students practice using and understanding simple and progressive forms of present, past, and perfect tenses, the four forms of the future as well as future time clauses, adjectives and adverbs, and basic modal usage.

ESL 0212 IDIOMS

Students learn nearly 500 idioms, phrasal verbs, and colloquial expressions and how to use them appropriately in writing and conversation.

ESL 0223 READING II

Students learn to use word skills, context clues, and structural clues to determine meaning. Students learn to find main ideas and details of intermediate-advanced reading passages, and they practice non-prose reading such as menus, graphs, tables, charts, and maps. Restatement and inference practice is also provided to help prepare the students for college-level reading assignments. Out-of-class readings with book reports and individual presentations are required.

ESL 0233 WRITING II

Students practice basic composition skills such as pre-writing, organization, appropriate topic choices, transitions, main idea sentences, topic sentences, appropriate detail, sentence combining, spelling, and punctuation.

ESL 0242 SPEAKING II

Students practice every-day dialogues with formal / informal variations attached to various cultural situations as they continue practicing culturally appropriate social conventions and honing their pronunciation skills.

ESL 0252 LISTENING II

Students learn to distinguish and produce American English phonetic sounds, to determine meaning from tone of voice, and to hear and understand idiomatic speech at normal speed with pauses, slurs, and inflections.

ESL 0303 GRAMMAR III

Students review all verb tenses and expand their knowledge of modal usage. Students learn when to use gerunds and infinitives as well as adjective clauses and the passive voice. Students also learn to form and respond to negative questions and tag questions, and they are introduced to conditional structures.

ESL 0312 VOCABULARY III

Students focus on English-English dictionary use and prefix, suffix, and root word usage. Students learn to use context, word parts, and logic to discover the meaning of unfamiliar words.

ESL 0323 READING III

Students practice all reading skills at an advanced level to prepare for college-level reading assignments. Discussion and critical-thinking skills are emphasized. Students also write book reports and give presentations on outside readings.

ESL 0333 WRITING III

Students review basic composition skills and focus on more advanced skills such as coherence devices, multiple support techniques, proper formatting, usage of secondary sources, and avoidance of plagiarism. Students also learn appropriate organization for various types of compositions such as comparison/contrast, process, narrative, cause-effect, and persuasive essays.

ESL 0342 SPEAKING III

Students practice more advanced conversational skills and learn basic public speaking skills. Students are given various assignments which require interviews with native speakers, presentations for outside audiences, and community service.

ESL 0343 LISTENING & SPEAKING III

Students practice listening and responding to advanced conversations, speeches, and academic lectures. Students learn effective note-taking strategies and discuss information from listening exercises. Students are given various assignments which require

interviewing native speakers, listening to news broadcasts, and giving informal and formal presentations in class.

ESL 0352 LISTENING III

Students practice listening and responding to conversations, speeches, and academic lectures. Students learn effective note-taking strategies and discuss information from listening exercises.

ESL 0403 GRAMMAR IV

Students review all verb tenses, the passive voice, modals, gerunds and infinitives. Students practice conditionals, indirect speech, and embedded questions. Emphasis is on writing and editing skills.

ESL 0423 READING & VOCABULARY IV

Students practice college-level reading skills while enhancing their advanced vocabulary skills. Emphasis is on discussion, critical thinking, and formal presentations.

ESL 0433 WRITING IV

Students review basic composition skills with a focus on more advanced skills such as coherence devices, multiple support techniques, proper formatting, usage of secondary sources, and avoidance of plagiarism. Emphasis is on appropriate organization for various types of compositions and on research skills.

ESL 0443 ADVANCED COMMUNICATION SKILLS

Students engage in listening and speaking activities which require critical thinking, comprehension from context and tone, academic note taking, listening to and responding to both conversational and academic American English spoken at normal speed, and pronouncing all the sounds of Standard American English with appropriate prosody. Students will also practice giving academic presentations using different technological media about projects which require interacting with English speakers both in and outside the classroom.

ESL 0453 ADVANCED CLASSROOM SKILLS

Students learn effective time management and study skills. They learn about and discuss appropriate classroom etiquette in different cultural settings and how to communicate well with U.S. faculty members. Students also learn effective methods of preparing for and taking academic tests including the TOEFL.

ETD - DESIGN ENGINEERING TECHNOLOGY**ETD 101 INTRODUCTION TO ENGINEERING TECHNOLOGY 1-0-1**

This course is required for all freshman engineering technology students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the university as possible while working toward their degree. The course will cover community building, academic goals,

effective learning methods, University orientation, and personal and professional development.

ETD 103 BASIC TECHNICAL DRAWING 2-2-3

A course in the fundamentals of drafting. Use of instruments and materials, lettering and techniques of penciling. Primary emphasis is on shape and size description of three-dimensional objects. Preparation of drawings for various reproduction processes. Application of drawing geometry and study of sections and conventional practices.

ETD 113 GEOMETRIC DIMENSIONING AND TOLERANCING 3-0-3

Introduction to geometric dimensioning and tolerancing including advanced applications of dimensioning principles, tolerances and precision dimensioning. Introduction to part measurement techniques as it relates to geometric dimensioning and tolerancing.

Prerequisite: ETD 103

ETD 123 MANUFACTURING MATERIALS AND PROCESSES 3-0-3

An introduction of the physical and mechanical properties of polymers, ceramics, composites, and metal alloys. These four materials classes are quantitatively discussed in relation to modern industrial use. Processes include molding, casting, heat treating and testing of metals, machining, welding and forming in relation to product design and function.

ETD 163 ENVIRONMENTAL HEALTH AND SAFETY 3-0-3

This introductory level course investigates safety philosophy and the principles of safety. The student will study occupational safety and industrial hazard control with a focus on the basic principles of accident prevention. The analysis of safety performance, cost and identification of accident potential is also studied. Emphasis is placed on concepts and techniques proven useful in reducing accidents and injuries.

ETD 173 COMPUTER AIDED 3-D MODELING 1-4-3

An Introductory course which studies the concept of parametric modeling and its application in industry. In this course students will learn the fundamentals of 3D parametric modeling utilizing SolidWorks software which includes the study of detail drawing creation, and assembly modeling. **Prerequisite: ETD 103 or EGR 143**

ETD 203 BASIC MECHANISMS 3-0-3

An introduction to kinematics and simple mechanisms. This course studies vector algebra, linkages, mechanism design, velocity and acceleration of mechanisms, and cams and gears. The use of graphical and analytical methods is employed. **Prerequisites: MA 123, PH 154**

ETD 233 ENGINEERING & MANUFACTURING SYSTEMS 3-0-3

A study of engineering and manufacturing systems such as engineering documentation systems, design control and lean manufacturing technologies.

Prerequisites: ETD 173

ETD 243 STATICS AND STRENGTH OF MATERIALS 3-0-3

Principles of statics, including the analysis of structures using both analytic and graphical

methods and friction along inclined surfaces. A more in depth study of the physical properties of engineering materials through analysis of simple direct and combined stresses, determination of structural sizes as function of unit stress, and beam bending and deflection.

Prerequisites: MA 123

ETD 253 DIMENSIONAL METROLOGY 3-0-3

Emphasis on methods and principles of measuring basic physical qualities for inspection and quality control. Laboratory work in measuring physical variables such as size, flatness, circularity, and total run-out. An introduction and project work in related areas, such as reverse engineering, functional gauge design, and statistical process control.

Prerequisites: ETD 113, ETD 123, ETD 173

ETD 263 DESIGN, ANALYSIS, AND PROTOTYPING 1-4-3

The use of the solid models and simulation as an engineering tool for problem solving. The process necessary and creation of rapid prototypes using various systems. A study of advanced techniques using computer simulation to generate results with finite element analysis.

Prerequisite: ETD 233

ETD 273 ELECTRICAL FUNDAMENTALS 3-0-3

Electrical circuit principles. Basic circuit laws, motors, generators, controls, distribution systems, and electrical codes are presented. Theory of electricity and magnetism, electrical phenomena, and measurements. Circuits, power, AC phenomena, capacitance, and conduction are studied.

Prerequisite: PH 154

ETD 313 DESIGN FOR MANUFACTURE AND ASSEMBLY 3-0-3

Principles and methodologies for designing parts and products for: ease and efficiency of manufacture and assembly; maintenance and usability during the service life, along with disposal and recycling at the end of service life. Students will be able to apply DFMA principles to lower the cost of designing, commissioning, and using new products.

Prerequisite: ETD 123, ETD 233

ETD 353 THERMODYNAMICS AND HEAT TRANSFER FOR TECHNOLOGISTS 3-0-3

This course is an introduction to the basic properties of substances and ideal gases through the use of tables and an overview of thermodynamic concepts of systems, control volumes, heat, work and internal energy. The introductory study of heat transfer analysis and the primary modes of heat transfer: conduction, convection, and radiation will also be covered. **Prerequisite: PH 164 or equivalent engineering physics course.**

ETD 363 ELEMENTS OF MACHINES 3-0-3

The study of design principles and calculations of machine elements. To consideration of loads, stresses, and deformations as they relate to design is presented. Failure theories, mechanical material properties, and fatigue are also studied.

Prerequisite: ETD 243, PH 154

ETD 433 COMPUTER NUMERICAL CONTROL PRINCIPLES 2-2-3

History of numerical control and comparison with conventional machining systems. Standard coding system and control terminology. Job planning and preparation.

Prerequisites: ETD 123 and ETD 263, or permission of instructor.

ETD 463 SENIOR DESIGN PROJECT I 2-2-3

Introduction to product analysis, development and design. Conceptual design, design for manufacture, reverse engineering, concurrent engineering, designing for special needs, prototyping, and product safety. Integration of previous work into complete product design project. **Prerequisite: Senior Standing**

ETD 473 SENIOR DESIGN PROJECT II 1-4-3

Study of advanced design methods as used in engineering design. A study of the design process as practiced in the industrial setting. The procedures used from the start of a design until its final production including presentations and design reports.

Prerequisites: ETD 463

EXERCISE SCIENCE

EXS 102 LIFETIME WELLNESS 2-1-2

Positive wellness based on the value of physical activity and healthy choices is explored. The lab consists of clinical experience with personal wellness status. Personalized exercise prescriptions will be provided.

EXS 103 TEACHING OF SPORT SKILLS I 3-0-3

The purpose of this class is to give the student an understanding of the skills, rules, and strategies for a wide range of sports. The use of proper teaching progressions and techniques will be covered and the students will be asked to write lesson plans and demonstrate their ability to teach. **(Sport Management and Exercise majors/minors only.)**

EXS 123 TEACHING OF SPORT SKILLS II 3-0-3

This class builds on what was taught in EXS 103. The purpose of this class is to give the student an understanding of the skills, rules, and strategies for a wide range of sports. The use of proper teaching progressions and techniques will be covered and the students will be asked to write lesson plans and demonstrate their ability to teach. **(Sport Management and Exercise Science majors/minors only.)**

EXS 131 FIRST AID 1-1-1

Classroom discussion and practical application of basic first aid principles. American Red Cross certification available.

EXS 212 ADAPTIVE PHYSICAL EDUCATION 1-2-2

Classroom discussion and supervised lab experience that familiarizes students with a general knowledge of adaptive physical education and the inclusion process from assessment to writing I.E.P. goals.

EXS 243 ATHLETIC TRAINING 2-2-3

The role of the athletic trainer is examined. Qualifications, relationships and responsibilities of the trainer in relation to the athlete, coach, team physician and community are discussed. Practical application for injury recognition, evaluation, management, and rehabilitation.

EXS 273 NUTRITION 3-0-3

A review of the nature of nutritional needs. Focus will include the function of nutrients in the body, weight control and the importance of balanced diets.

EXS 332 DRUG EDUCATION 2-0-2

Examines the effects of alcohol, tobacco, and the "illicit" drugs on the physical, psychological, and social health of the individual. Performance-enhancing drugs are investigated.

Prerequisite: Junior standing or permission of instructor

EXS 333 KINESIOLOGY 3-0-3

The study of the general body mechanics of the human organism; the activities of the physical education program in their relation to coordination and the proper body mechanics, analysis of movement. **Prerequisite: Junior standing or permission of instructor**

EXS 353 EXERCISE PHYSIOLOGY 3-0-3

The study of body composition, muscular strength, power and endurance. The response of the cardiovascular and respiratory systems to exercise, and the developmental stages of growth are also explored. **Prerequisite: Junior standing or permission of instructor**

EXS 373 HEALTH PROBLEMS 3-0-3

A theoretical and practical treatment of the concepts of disease prevention and health promotion. Topics include alcohol, tobacco and drug abuse, physical fitness, nutrition, chronic and communicable diseases, human sexuality and stress management.

Prerequisite: Junior standing or permission of instructor

EXS 383 NUTRITION COUNSELING 3-0-3

This class will equip the student with knowledge and an understanding of protocol to give nutrition counseling to a wide range of clients based on their health history and personal wellness and fitness goals. **Prerequisite: EXS 273**

EXS 393 ADVANCED ATHLETIC TRAINING 2-3-3

Builds on experiences gained in EXS 243. Includes prevention, evaluation and treatment of athletic-related injuries. Emphasis given to injury assessment and topics related to sports medicine. Examines relationship of athletic trainers in management and care of injuries and their role as professional allied health practitioners.

Prerequisites: BIO 254, EXS 243

EXS 402 AEROBIC LEADERSHIP (2 HRS.)

The purpose of the aerobic leadership class is to provide students with the principles and skills necessary to successfully lead activity classes aimed at the wellness goals of improving cardiovascular fitness, muscular strength and endurance, and body composition in the general population. Class instruction includes proper form sequencing, cueing, movement rhythm, and appropriate music selection. **Prerequisite: Junior standing or permission of instructor**

EXS 403 REMEDIAL EXERCISE & REHABILITATION 2-3-3

Students become familiar with common physical therapy modalities and their use in sports medicine. Where applicable, the following will be covered for each modality: physics, biophysics, effects, power application, indications and contraindication. Safety is emphasized during instruction and practical experience. **Prerequisites: BIO 254, EXS 243, EXS 353**

EXS 423 EVALUATION OF ATHLETIC INJURIES 2-3-3

Specialized course dealing with anatomy, kinesiology, injury symptoms and specific tests to help trainers recognize and evaluate athletic injuries.

Prerequisites: BIO 254, EXS 243

EXS 433 DEVELOPING HEALTH PROMOTION PROGRAMS FOR ADULTS 3-0-3

Presentation and examination of health promotion strategies and programs that emphasize lifestyle behaviors that impact health and wellness. **Prerequisite: Junior standing or permission of instructor**

EXS 443 THERAPEUTIC MODALITIES 2-3-3

Explores principles of therapeutic rehabilitation of orthopedic injuries including the role of the athletic trainer in the implementation and supervision of a sound rehabilitation program. Special topics include aquatic therapy, the body's response to healing and exercise, development of exercise programs, development and evaluation of tests, measurement techniques and programs, and applications of therapeutic exercise equipment and supplies.

Prerequisites: BIO 254, EXS 243

EXS 452 FITNESS EVALUATION ASSESSMENTS 2-0-2

Examination of fitness and wellness assessment techniques. Students are expected to demonstrate competencies in a wide variety of testing and assessment procedures for analyzing fitness and wellness levels. Includes submax testing, blood pressure, body fat analysis, strength assessment, nutritional analysis, and individual exercise program development. American College of Sport Medicine protocol is utilized. **Prerequisite: Junior standing or permission of instructor**

EXS 463 MOTOR LEARNING 3-0-3

A study of the science of perceptual/motor learning including an understanding of the research in this area and application to the teaching of a variety of motor skills to people of different ability levels. The student should understand the problems that a learner faces in the acquisition of a variety of motor skills, develop a researched-based vocabulary, and

have the ability to apply this knowledge by designing a teaching strategy that can assist the learner in this process. **Prerequisite: Junior standing or permission of instructor**

EXS 464 CAPSTONE EXPERIENCE IN FITNESS AND EXERCISE SCIENCE (4HRS.)

A culminating final project, representative of the student's knowledge obtained in the Sports Management department. The project is to exemplify the student's professionalism and familiarity with the subject matter. The analysis is focused on independent study and the development of the student project. **Prerequisite: Junior standing or permission of instructor**

EXS 471 ADVANCED GLOBAL PERSPECTIVES HEALTH AND WELLNESS 3-0-3

The Global Understanding in Health and Wellness course is a study abroad trip intended to assist students in the comparative analysis of holistic health and wellness practices between the U.S. and selected countries. The trip will include site visits to holistic health centers, various cultural tours and key visits to international health and Olympic sport facilities. Students will be expected to complete assigned readings on key health and wellness practices in facilities. Students will be expected to complete assigned readings on key health and wellness practices in the U.S. and other countries to understand the interests and concerns of the global health and wellness community.

Prerequisites: EXS 473; sophomore, junior, or senior standing with 2.5 GPA

EXS 473 GLOBAL PERSPECTIVES HEALTH AND WELLNESS 3-0-3

The Global Understanding in Health and Wellness course is a study abroad trip intended to assist students in the comparative analysis of holistic health and wellness practices between the U.S. and selected countries. The trip will include site visits to holistic health centers, various cultural tours and key visits to international health and Olympic sport facilities. Students will be expected to complete assigned readings on key health and wellness practices in facilities. Students will be expected to complete assigned readings on key health and wellness practices in the U.S. and other countries to understand the interests and concerns of the global health and wellness community.

Prerequisites: sophomore, junior, or senior standing with 2.5 GPA

EXS 474 INTERNSHIP IN FITNESS AND EXERCISE SCIENCE (4 HRS.)

Observation of and participation in a field-related experience under the direction of a field supervisor and a University supervisor. Internship opportunities are limited to EXS majors only and must have the approval of the Department Chair. **Prerequisite: Junior standing or permission of instructor**

EXS 483 INTERNSHIP IN SPORTS MEDICINE (3 HRS.)

Field experiences involving conference, clinic and workshop attendance. Techniques and practice of written simulation and oral practical applications. Provides opportunity to interact with other allied health practitioners. **Prerequisites: BIO 254, EXS 243, EXS 353**

EXS 493 PERSONAL TRAINER CERTIFICATION PREPARATION (3 HRS.)

The purpose of this class is to prepare the student for the national certification exam by the National Council on Strength and Fitness. Certification is a necessity for a career in health promotion/fitness/strength and conditioning training. The course is designed by

the National Council on Strength & Fitness for the specific purpose of preparing students to take their nationally recognized exam. Some of the course objectives are to learn to use evaluation protocols for health related fitness and to teach principles of exercise prescription, health programming and periodization. This class is intensive and should only be taken by graduating seniors in this field. **Prerequisite: Senior standing or permission of instructor**

FINANCE

FIN 303 MANAGERIAL FINANCE 3-0-3

This course is a study of the principles of managerial finance including time value of money, capital budgeting, methods of financing, working capital management, financial statement analysis, and other financial topics.

Prerequisites: AC 213, ECO 213, ECO 223, MA 253, or permission of the instructor

FIN 323 MONEY AND BANKING 3-0-3

This course is a study of the principles of monetary economics. An analysis of the structure and operation of financial institutions and the Federal Reserve System is included. The function of monetary policy within the framework of macroeconomic theory is examined.

Prerequisite: ECO 223 (Same as ECO 323)

FIN 343 INTERNATIONAL FINANCE 3-0-3

This course involves a study of the topics essential to the understanding of international finance. Topics include foreign exchange markets and currency risk, international financial markets, international banking, trade financing, country risk analysis, accounting and taxation issues, capital budgeting, international lending, and borrowing techniques.

Prerequisite: FIN 303

FIN 353 PERSONAL FINANCE 3-0-3

An overview of financing decisions made by individual investors for personal financial needs. The course will cover pension investing, tax considerations, retirement planning, and various investment products available to investors. **Prerequisite: MA 103**

FIN 373 INTRODUCTION TO ECONOMETRICS 3-0-3

This course is designed for the finance and economics students as a continuation of MA 253 (Statistics). Students will first revisit the topics of probability, distributions, and hypothesis testing, exploring these topics more thoroughly. Most of the semester will be devoted to building solid theoretical and practical foundation of econometrics. Students will proceed from the simple regression model onto multiple regression analysis in the context of cross-sectional data, time series data, and finally panel data. Violations and fixes to serial correlation and heteroskedasticity problems will be studied. Students will be asked to demonstrate and apply the concepts studied while carrying out an empirical research project. **Prerequisite: ECO 213, ECO 223, MA 253 (Same as ECO 373)**

FIN 403 INVESTMENTS 3-0-3

An overview of the security markets, sources of investment information, and the classic process of analyzing and valuing securities is presented. Investment opportunities in a wide variety of financial and real assets are explored. The concept of portfolio theory in terms of risk and return is examined. **Prerequisite: FIN 303**

FIN 413 CORPORATE FINANCE 3-0-3

An analytical approach to financial management of a corporation. Areas covered include: long term financing, financial structure, cost of capital, dividend policy, mergers, reorganization, and international financial management. **Prerequisite: FIN 303**

FIN 473 FINANCE TECHNOLOGIES 3-0-3

This course is a study of the principles of managerial finance, investments, and other topics relevant to the field of finance. Students explore how to use technologies, such as Excel, WINKS, and others to solve financial problems. **Prerequisites: BA 213, FIN 303**

FIN 493 TOPICS IN FINANCE 3-0-3

Offered to examine specific or current business or special financial issues. Possible examples could include asset management, corporate financing, securities analysis and management of financial institutions. **Prerequisite: FIN 303**

FIN 503 FINANCIAL ANALYSIS FOR DECISION MAKING 3-0-3

This course reviews the economic and organizational context in which resource allocation decisions are made. Primary tools to be used include spreadsheet analysis, financial simulation, and case studies. Topics to be included are: the capital expenditure decision process, reviewing capital investment projects, capital expenditures, EVA, lease-versus-buy decisions and cash flow analysis. **Prerequisite: Graduate standing or approval of instructor**

FILM**FLM 203 FILM APPRECIATION 3-2-3**

Acquaints the student with the art of film criticism. Presents basic cinema vocabulary, information about film production, theory and history of film, and practice in analysis of individual films.

FITNESS**FIT 2101 WALKING/JOGGING 0-2-1**

Introduction to power walking and the fundamentals of jogging.

FIT 2111 RACQUET SPORTS 0-2-1

Introductory look at rules, skills, strategy, and etiquette of tennis, racquetball, badminton, and table tennis.

FIT 2131 GOLF/BOWLING 0-2-1

Introduction to the proper etiquette and fundamentals of golf and bowling. Service fee will be added for course enrollment.

FIT 2151 SOCIAL BOARD GAMES 0-2-1

The objective of this activity class is to expose the students to the history, rules, strategies and fundamentals of a variety of social board games including Chess, Checkers, Backgammon, Cranium, Scrabble, Trivial Pursuit, Pictionary, Taboo, and Monopoly.

FIT 2211 AEROBICS 0-2-1

Development of cardiovascular conditioning through dance & bench step aerobics.

FIT 2221 GOLF I 0-2-1

The course is an introduction to the game of golf. Golf history, terminology, rules, and etiquette will be introduced. The student will gain the golf skills (swing, pitching, chipping, and putting) to play a 9-hole round of golf.

Prerequisite: FIT 2131 or permission of instructor

FIT 2271 CONDITIONING 0-3-1

Development of cardiovascular and strength conditioning. Course will meet three days a week or the equivalent of three hours per week.

FIT 2331 INDOOR/OUTDOOR SOCCER 0-2-1

The objective of this activity class is to improve the student's knowledge of the skills and strategies of indoor and outdoor soccer through a series of drills and games.

FIT 2341 LACROSSE 0-2-1

The objective of this activity class is to introduce the game of lacrosse, its history, the skills, and the strategy of the game.

FIT 2351 KARATE 0-2-1

Introduction to the fundamentals, skills, and rules of karate.

FIT 2361 BALL ROOM DANCING 0-2-1

The objective of this activity class is to expose the student to a number of social dances including the fox trot, waltz, tango, salsa and swing. The proper steps, form, and coordination with the music will enhance the student's confidence on the dance floor.

FIT 2831 BASKETBALL 0-2-1

The objective of this activity class is to improve the student's knowledge of the skills and strategies of basketball through a series of drills and games.

FIT 400X SPECIAL PROJECTS IN FITNESS VARIES (1-3 HRS.)

Credit earned through directed reading, independent study, research or supervised lab or field work. Maximum three hours credit.

Prerequisite: Permission of Department Chair

FORENSIC SCIENCE

FS 203 PRINCIPLES OF FORENSIC SCIENCE I 3-0-3

This course is designed as an introduction and overview of the various branches of forensic science such as pathology, toxicology, anthropology, and entomology, and how the various fields play a part in the criminal justice system as they relate to the collection and analysis of crime scene evidence. General topics in forensic science such as ethics, crime scene investigation procedures, and law will be discussed.

Prerequisite: Forensic Science majors or permission of department chair

FS 213 DIGITAL FORENSIC SCIENCE I 3-0-3

This course introduces the student to investigative techniques involving computers and other electronic devices. Topics include investigative procedures, computer hardware, data recovery methods, and laws concerning digital devices. This course also covers how computers are used in investigations.

Prerequisite: ENG 113 or ENG 133, INF 103, INF 183 (FS 213 same as INF 213 and LE 213)

FS 223 PRINCIPLES OF FORENSIC SCIENCE II 3-0-3

This course is a continuation of FS 203. It is designed to introduce the principles of the forensic science laboratory including such topics as microscopy, DNA techniques, latent print analysis, controlled substance analysis, and informatics.

Prerequisite: FS 203

FS 343 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS I 3-0-3

Introduction to criminalistics and crime scene investigation. Methods of processing a crime scene: documentation, location, and collection of evidence, proper collection and handling procedures, selection and presentation for analytical examination, and presentation of the process and findings in court. **(Same as LE 343)**

Prerequisite: Junior standing or permission of instructor

FS 351 CRIMINALISTICS AND CRIME SCENE LABORATORY 0-2-1

The study of types of chemical and physical analyses associated with crime scene investigations.

Prerequisite: FS 343 or LE 343 (Same as LE 351)

FS 353 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS II 3-0-3

Advanced criminalistics and crime scene investigation. A detailed review of current methodology of collection, processing and court presentation of evidence. Analysis of the roles of law enforcement and forensic scientists. **Prerequisite:** FS 343 or LE 343 (Same as LE 353)

FS 371 FORENSIC COMPARATIVE SCIENCE LAB 0-2-1

An introduction to the actual examination of finger, palm, and sole images; shoe sole images; fired bullets and cartridge cases; tool marks; and physical comparison of broken and torn items which might be found at crime scenes.

Prerequisite: FS 351 and FS 353, or by permission of the department chair

FS 373 FORENSIC COMPARATIVE SCIENCE 2-1-3

An introduction to the examination process of comparative science evidence. The philosophical study presented will provide the foundation for the student to judge sufficiency of details when determining the source of crime scene evidence. Practical comparative exercises of fractures and tears, firearm and tool marks, finger and palm print, and shoe and tire print examinations, will be included within the class. The class will be approximately half lecture and half examination exercises. scenes.

Prerequisite: Junior standing in Forensic Science or by permission of the department chair

FS 383 FIRE, ARSON, & EXPLOSION INVESTIGATIONS (3 CR.HRS.)

An in-depth study of fire, arson, and explosion scene investigation. Emphasis will be placed on the use of the Scientific Method, the principles and techniques of scene preservation and analysis, management of investigation functions, documentation of the scene, and determination of the origin and cause of fires. **Prerequisite: CH 144 or CH 104, LE 263 or LE 273**

FS 422 EXPERT TESTIMONY IN FORENSIC SCIENCE 2-0-2

Consideration of a scientist's role in courtroom testimony, communication of scientific data to the general public, courtroom demeanor, trial preparation, and mock trial experiences.

Prerequisite: Senior standing in forensic science program or permission of department chair, SP 203

FS 423 PROFESSIONAL PRACTICE IN FORENSIC SCIENCE 3-0-3

This course will consider the scientist's role in courtroom testimony, communication of scientific data to the general public, courtroom demeanor, trial preparation, and mock trial experiences. Topics pertinent to employment and active participation in the forensic science community will also be discussed.

Prerequisite: Senior standing in forensic science program or permission of department chair, SP 203

FRENCH

FRN 113 FRENCH 3-0-3

An introduction to the French language with an emphasis on reading and writing in French. Vocabulary development and the basics of French structure are also covered. No previous study of French is required.

FRN 123 FRENCH II 3-0-3

A continuation of French 113, integrating listening, speaking, and reading, and writing skills. Basic grammar and French cultures are covered. **Prerequisite: FRN 113**

FRESHMAN STUDIES

BA 101 INTRODUCTION TO BUSINESS 1-0-1

This course is required for all freshman business students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the University as possible while working towards their business degrees. The course will cover community building, academic goals, effective learning methods, University orientation, and personal and professional development.

GE 101 INTRODUCTION TO ENGINEERING 1-0-1

This course is required for all freshman engineering students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the University as possible while working towards their engineering degrees. The course will cover community building, academic goals, effective learning methods, University orientation, and personal and professional development.

UE 012 ACADEMIC FOUNDATIONS 2-1-0

This course helps students develop the proficiency needed to be successful in other college courses. The focus is on preparing students to do college level reading and writing and learning by building on each student's academic skills. This is a non-credit, preparatory class.

UE 101 UNIVERSITY EXPERIENCE 1-0-1

This course offers resources for success in learning for students new to Trine University. This course will assist students in becoming more proficient learners, understanding self and others, and learning personal life skills. This course will present information about Trine University offices and services to familiarize students with resources and procedures.

GENERAL ENGINEERING

GE 101 INTRODUCTION TO ENGINEERING 1-0-1

This course is required for all freshman engineering students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the University as possible while working towards their engineering degrees. The course will cover community building, academic goals, effective learning methods, University orientation, and personal and professional development.

GE 113 INTRODUCTION TO ENGINEERING DESIGN 0-6-3

Fundamental concepts of engineering design and development are introduced. Teams of students investigate an engineering problem, research alternative solutions, develop a design, and build and evaluate a prototype.

GE 301 ENGINEERING INTERNSHIP (1 HR.)

This course involves a meaningful work experience related to the student's field of study in engineering. The Engineering Internship Coordinator must approve the assignment and company. Employment is full-time during the summer semester. This course may be taken a maximum of two times.

Prerequisites: Engineering major, 2.5 GPA, junior standing, adherence to the guidelines set by the Engineering Internship Coordinator and permission of the student's department chair

GE 313 SPC AND LEAN MANUFACTURING 3-0-3

This course provides the knowledge needed to effectively use Statistical Process Control (SPC). The relationship to quality costs, on-time delivery, concepts of variation, and an analysis of the organization-specific SPC applications will be introduced. Utilizing SPC to improve and maintain consistent production will be covered. The use of Lean manufacturing to shorten the time between the customer order and the product build/shipment by eliminating sources of waste will also be covered through the study of system performance, identification and elimination of waste, elimination of sources of variability, and a good understanding and use of the principles of operations management.

Prerequisite: MA253 or equivalent introductory statistics course.

GE 401 PROFESSIONAL PRACTICE 1-0-1

This course covers the two broad areas of professional practice. The first consists of topics pertinent to career aspects of the profession: job search activities, graduate school information, lifelong learning, professional registration, and the role of professional societies. The second area concerns the social responsibilities of the practicing professional engineer: professional ethics, the role of engineering in public policy, the need for knowledge of current affairs, and consideration of the impact of technology upon society.

Prerequisite: Senior standing in engineering

GE 413 DESIGN OF EXPERIMENTS 3-0-3

This course will highlight optimization and improvement of products or manufacturing processes by using statistical techniques to design and analyze experiments. The concepts of factorial and fractional factorial designs of experiments will be introduced. Six Sigma and Lean applications of Microsoft Excel and Minitab software programs for hypothesis testing, analysis of variance, and measurement systems analysis will also be covered.

Prerequisite: MA253 or equivalent introductory statistics course.

GEOGRAPHY

GEO 203 OCEANOGRAPHY 2-2-3

A description of the oceans and their relation to humans. The principles of physical, chemical, geological, and biological oceanography are used to explain the ocean environment. Society's effect on the oceans and problems and potentials of utilizing the natural resources of the sea.

Prerequisites: A laboratory science and MA 113 (Same as EAS 203 and BIO 203)

GEO 213 PHYSICAL GEOGRAPHY 3-0-3

An analysis of the spatial and functional relationships among landforms, climates, soils, water, and the living world. This course also addresses the connections between environmental processes and human activity, such as human impact on the environment. (Same as EAS 213)

GEO 303 HUMAN GEOGRAPHY 3-0-3

Topical studies to show how human beings have altered and adapted to their physical environments over time through technology, migration, and demographic changes. Focus is on cultural identity and landscape, cultural interaction, and conflict.

Prerequisite: Junior standing or permission of instructor

GEO 313 GEOGRAPHY OF NORTH AMERICA 3-0-3

A regional approach to the United States and Canada. An in-depth look at economic, political, historical, and cultural developments in the context of the physical environment. Focus on the present and the future of each region, as well as how those futures are intertwined. Global context is also considered. **Prerequisite: Junior standing or permission of instructor**

GEO 323 WORLD GEOGRAPHY 3-0-3

A study of the major cultural regions of the world, with emphasis on human social development (economic, cultural, historical, political), in the context of a given physical environment. Focus is on the present and future of each region, as well as how those futures are intertwined.

Prerequisite: GEO 303

GEO 343 ECONOMIC GEOGRAPHY 3-0-3

A spatial approach to economics, the course considers historical, present and future economic activities, developments, and trends, in a global context, with the goal of answering the two basic questions of geography: "where?" and "why there?". **Prerequisite: ECO 223 (Same as ECO 343)**

GEO 353 POLITICAL GEOGRAPHY 3-0-3

The politics of place. A review of the basic concepts and principles of geopolitics, designed to help students understand the connections between place and political decision-making. The course explores the applications of these concepts using past and present world events, as well as projecting possible futures. **Prerequisite: GOV 113 (Same as GOV 353)**

GEO 400X INDEPENDENT STUDIES IN GEOGRAPHY VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research or supervised field work. Maximum four hours credit.

Prerequisite: Permission of Department Chair

GEOLOGY

GLY 271 GEOLOGY LABORATORY 0-1-1

An introductory laboratory study of basic physical geology. The laboratory emphasizes skills needed for the identification of minerals and rocks, for the interpretation of land surface features based on topographic maps and for the understanding of folding, faulting, and rock relationships through the interpretation of geologic maps.

Corequisite or Prerequisite: GLY 273

GLY 273 GEOLOGY 3-0-3

An introduction to the field of geology. Study of minerals and rocks and their formation within the context of the earth's geologic history. Emphasis on soils, running water, and groundwater. Plate tectonics, glaciers, volcanoes, erosion, and weathering are also covered. **(Same as EAS273)**

GOLF MANAGEMENT

GM 101 INTRODUCTION TO GOLF MANAGEMENT 1-0-1

This course includes an introduction to university life, time management, study skills, and financial responsibility in addition to exploring the golf industry, career opportunities available, and skills and talents necessary for successful employment in the golf industry.

GM 131 PLAYER DEVELOPMENT I 1-0-1

This course designed to promote game improvement, further explore teaching methodology, and improve technical game skills for Golf Management Majors.

GM 201 GOLF COURSE ARCHITECTURE 1-0-1

Students will study site selection, planning the layout, and designing golf holes and athletic fields for a variety of facilities and patrons. USGA, California, and topsoil greens design and construction are studied. Students will study methods of construction for golf, urban, and recreational turf sites.

GM 203 GOLF SHOP MANAGEMENT 3-0-3

This is an introduction to the management of various types of golf facilities. Topics of study include Business Planning, Personnel Management, Tournament and Handicapping Operations, Golf Car Fleet Operations, Merchandising and Inventory Management and Customer Relations.

GM 213 GOLF CLUB DESIGN, REPAIR AND FITTING 3-0-3

This course gives students a historical perspective on club design. Students then have opportunity to learn basic club repair and fitting techniques using various industry tools and methodologies.

GM 223 PROMOTION AND MARKETING OF GOLF FACILITIES 3-0-3

This is a study of the various tools and techniques in golf facility promotion. Social media, traditional advertising mediums, special promotions, sales, brochures, tournaments, fundraisers, and other advertising opportunities are explored. Students determine target markets for various golfing functions that align with the overall business plan for the facility.

GM 231 PLAYER DEVELOPMENT II 1-0-1

This course designed to promote game improvement, further explore teaching methodology, and improve technical game skills for Golf Management Majors.

GM 233 INTERSHIP 3-0-3

Students will be assigned to golf courses or golf facilities to gain experience in golf operations and management. The term of each internship will vary from three to ten weeks, depending on the nature of the position and responsibilities.

Prerequisite: Sophomore standing or permission of instructor

GM 303 TEACHING THE SHORT GAME 2-0-3

This is a comprehensive study of the methods of teaching and executing the chip shot, the pitch shot, putting, and bunker play. Students will have opportunities to conduct lessons to demonstrate their teaching style. Golf management majors only.

Prerequisite: Junior standing or permission of instructor

GM 323 TEACHING THE GOLF SWING 3-0-3

This course examines the principles and theories of golf instruction. Study examines terminology, teaching approaches and styles, practice drills and exercises, teaching aids, and other related areas in the teaching of the swing. Students explore teaching styles for individual and group instruction, golf schools, and demonstrations. Golf management majors only.

Prerequisite: Junior standing or permission of instructor

GM 331 PLAYER DEVELOPMENT III 1-0-1

This course designed to promote game improvement, further explore teaching methodology, and improve technical game skills for Golf Management Majors.

GM 343 GOLF FACILITY OPERATIONS 3-0-3

Students will study the grassroots of golf facilities: agronomy, course architecture and construction (including irrigation, drainage, contouring), and structural facilities (maintenance barns, pro shop, dining areas, practice areas, driving ranges, golf car storage, etc.). The relationships between inside and outside operations at golf facilities will also be examined. **Prerequisite: Junior standing or permission of instructor**

GM 411 FOOD AND BEVERAGE MANAGEMENT 1-0-1

This course is an introduction to food and beverage industry, including operations and legal issues. Food and beverage service levels at golf facilities will be examined from concessions all the way up to fine dining. **Prerequisite: Junior standing or permission of instructor**

GM 431 PLAYER DEVELOPMENT IV 1-0-1

This course designed to promote game improvement, further explore teaching methodology, and improve technical game skills for Golf Management Majors.

GM 452 GOLF MANAGEMENT LEADERSHIP 2-0-2

This course integrates information in other Golf Management classes to allow students to develop unique leadership styles and methods. Students will also develop a portfolio, revise resumes and cover letters, and apply/interview, for careers upon graduation.

Prerequisite: Senior standing or permission of instructor

GM 400X RESEARCH TOPICS IN GOLF MANAGEMENT VARIES (1-4 HRS.)

Special studies of topics related to golf management conducted in independent study under the direction of the staff. May be taken in conjunction with internships, and may be taken for variable credit, for a maximum of four credits.

Prerequisite: Junior standing or permission of instructor

GOVERNMENT

GOV 113 INTRODUCTION TO GOVERNMENT 3-0-3

An examination of the origins and operations of the national political machinery; the development, functions and philosophy of political parties; the problems and tasks of leading governmental agencies.

GOV 313 COMPARATIVE GOVERNMENTS 3-0-3

A comparison of the systems, philosophies and functions of the governments of England, France, the United States, Germany and the countries of the former Soviet Union.

Prerequisite: GOV 113

GOV 323 THE CONTEMPORARY WORLD 3-0-3 (Same as HIS 323)

An analysis of current global issues from a historical perspective with an emphasis on developing an awareness of cultural diversity and an understanding of the role of international governmental and nongovernmental organizations. **Prerequisites: GOV 113 or HIS 113**

GOV 333 STATE AND LOCAL GOVERNMENT 3-0-3

The general relationship between the states and the federal government; organization, functions, and divisions of authority between the executive, legislative and judicial. The functions, powers, and forms of county and municipal governments. **Prerequisite: GOV 113**

GOV 343 AMERICAN POLITICAL THOUGHT 3-0-3 (Same as HIS 343)

A survey and analysis of significant political ideas from colonial times to present. Some of the ideas discussed in the survey include the philosophies of liberalism, conservatism, and pragmatism, as well as the political thinking of such men as Alexander Hamilton, Thomas Jefferson, John C. Calhoun, Henry Thoreau, Herbert Spencer and Lester Ward.

Prerequisite: GOV 113

GOV 353 POLITICAL GEOGRAPHY 3-0-3

The politics of place. A review of the basic concepts and principles of geopolitics, designed to help students understand the connections between place and political decision-making. The course explores the applications of these concepts using past and present world events, as well as projecting possible futures. **Prerequisite: GOV 113 (Same as GEO 353)**

GOV 363 UNITED STATES FOREIGN POLICY 3-0-3

A history of United States involvement in world affairs from the War for Independence to the present; the close relationship between the foreign policy and domestic concerns is emphasized; an analysis of the policy-making bureaucracy.

Prerequisites: HIS 103, HIS 113, or GOV 113 (Same as HIS 363)

GOV 373 POLITICAL PSYCHOLOGY 3-0-3

An examination of the role of group dynamics and personality variables in contemporary political issues, including leadership and power, political attitudes, current social movements, conflict resolution, coalition formation, cross-cultural comparison of political attitudes and other issues. **Prerequisite: PSY 113 or GOV 113 (Same as PSY 373)**

GOV 403 AMERICAN CONSTITUTIONAL DEVELOPMENT 3-0-3

A study of the historical and judicial developments of the Constitution of the United States by analyzing court decisions and the philosophies of the justices of the Supreme Court. Emphasis on the court's role in the development of national economic policy, with a focus on the court's position on civil rights and liberties, political freedom and social equality.

Prerequisites: HIS 103, HIS 113, GOV 113 (Same as HIS 403)

GOV 400X INDEPENDENT STUDIES IN GOVERNMENT VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research or supervised field work. Maximum 4 hours credit.

Prerequisite: Permission of Department Chair

GENERAL STUDIES**GS 4003 SENIOR CAPSTONE PROJECT (3 HRS.)**

The capstone project will give students the opportunity to demonstrate the integration of the two to three academic programs they have chosen for the self-directed concentration. The project will include an oral and written presentation encapsulating the rationale for the programs selected and the nature of the relationship between them.

Prerequisite: Senior standing

HISTORY

HIS 103 AMERICAN HISTORY I 3-0-3

Traces the major trends in the history of the United States from colonial times to the end of Reconstruction. Concentrates upon the diplomatic, political, economic, intellectual, and cultural achievements of the American nation, set within the larger framework of the European world.

HIS 113 AMERICAN HISTORY II 3-0-3

Increasing emphasis on the post Civil War industrial development of the United States and its subsequent role as a great world power to present.

HIS 203 WORLD CIVILIZATION I 3-0-3

A historical review of human civilization from prehistoric times through the Renaissance. The class focuses upon the political, economic, and cultural achievements of various civilizations of the world.

HIS 213 WORLD CIVILIZATION II 3-0-3

A survey of major civilizations of the world in the post-Renaissance period, including Asian, African, and Western European civilizations in the areas of politics, economics, and scientific, and cultural developments. Emphasis is placed on the increasing interdependence of world civilizations and people.

HIS 251 ANCIENT GREECE FROM THE PERSIAN THROUGH PELOPONNESIAN WARS 1-0-1

An examination of the culture of Athens and Sparta during the 5th century B.C., concentrating on the Persian and Peloponnesian wars and their lasting effects on Western Civilization.

(Same as PHL 251)

HIS 253 THE JAPANESE PEOPLE 3-0-3

A humanistic approach to the study of the Japanese people. An emphasis on using a historical context to reveal domestic political, social, and economic associations, as well as important achievements in literature, religion, philosophy and art.

HIS 323 THE CONTEMPORARY WORLD 3-0-3

An analysis of current global issues from a historical perspective with an emphasis on developing an awareness of cultural diversity and an understanding of the role of international governmental and nongovernmental organizations.

Prerequisite: GOV 113 or HIS 113 (Same as GOV 323)

HIS 343 AMERICAN POLITICAL THOUGHT 3-0-3

A survey and analysis of significant political ideas from colonial times to the present. Some of the ideas discussed in the survey include the philosophies of liberalism, conservatism, and pragmatism, as well as the political thinking of such men as Alexander Hamilton, Thomas Jefferson, John C. Calhoun, Henry Thoreau, Herbert Spencer, and Lester Ward.

Prerequisite: GOV 113 (Same as GOV 343)

HIS 363 UNITED STATES FOREIGN POLICY 3-0-3

A history of the United States involvement in world affairs from the War of Independence to the present, the close relationship between the foreign policy and domestic concerns is emphasized; an analysis of the policymaking bureaucracy.

Prerequisites: HIS 103, HIS 113, or GOV 113 (Same as GOV 363)

HIS 393 ECONOMIC HISTORY OF THE UNITED STATES 3-0-3

A survey of major economic developments in American history. Stresses the changed conditions and values in moving from an agricultural to an industrial society.

Prerequisites: HIS 103, HIS 113 (Same as ECO 393)

HIS 403 AMERICAN CONSTITUTIONAL DEVELOPMENT 3-0-3

A study of the historical and judicial developments of the Constitution of the United States by analyzing court decisions and the philosophies of the justices of the Supreme Court. Emphasis on the court's role in the development of national economic policy, with a focus on the court's position on civil rights and liberties, political freedom, and social equality.

Prerequisites: HIS 103, HIS 113, GOV 113 (Same as GOV 403)

HIS 423 THE UNITED STATES AS A WORLD POWER 3-0-3

A study of social, economic, intellectual, and political developments within the United States from approximately 1939 to the present. Emphasis is placed on relating America's developments to its role in international affairs.

Prerequisite: HIS 113

HIS 433 THE AMERICAN REVOLUTION 3-0-3

A history of the War of Independence and the formation of national government to 1787.

Prerequisite: HIS 103

HIS 443 READINGS IN AMERICAN HISTORY 3-0-3

An independent study and research on selected topics in American History. Open to students with departmental approval. **Prerequisite: Junior standing or permission of instructor**

HIS 453 READINGS IN WORLD HISTORY 3-0-3

An independent study and research on selected topics in World History. Open to students with departmental approval. **Prerequisite: Junior standing or permission of instructor**

HIS 400X INDEPENDENT STUDIES IN HISTORY VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research, or supervised field work. Maximum 4 hours credit.

Prerequisite: Permission of Department Chair

HONORS SEMINAR

HNR 121 INTRODUCTION TO HONORS SEMINAR 1-0-1

An introduction to the Honors Program. Current topics will be discussed in an informal atmosphere. Emphasis will be placed on thinking critically as well as the ability to convey one's opinions through written essays. **Prerequisite: Admission into the Honors Program**

HNR X1X HONORS HUMANITIES SEMINAR (1-2 HRS.)

An honors seminar on special topics in the humanities. May be retaken for credit as long as the topics differ.

HNR X2X HONORS SOCIAL SCIENCES SEMINAR (1-2 HRS.)

An honors seminar on special topics in the social sciences. May be retaken for credit as long as the topics differ.

HNR X3X HONORS MATHEMATICS/ SCIENCE SEMINAR (1-2 HRS.)

An honors seminar on special topics in mathematics or science. May be retaken for credit as long as the topics differ.

HNR X4X HONORS SEMINAR (1-2 HRS.)

An honors seminar on special topics not considered to be either a humanity or a social science. May be retaken for credit as long as the topics differ.

HEALTH AND PHYSICAL EDUCATION

HPE 202 INTRODUCTION TO ADAPTIVE PHYSICAL EDUCATION 1-2-2

Classroom discussion and supervised lab experience that familiarizes students with a general knowledge of various disability groups and the physical education needs of these special students.

HPE 221 OFFICIATING 0-2-1

Knowledge of the rules and officiating practices of sports.

HPE 232 PHYSICAL EDUCATION FOR THE ELEMENTARY SCHOOL TEACHER 1-2-2

Methods of elementary school physical education which meet the developmental needs of children. Focus on curriculum and skill attainment. Field experience in area schools.

HPE 342 SCHOOL AND COMMUNITY HEALTH 2-0-2

Knowledge of observing and understanding the health needs of school-aged children. The role of the school health program, students' habits, attitudes and understanding of good health practices are explored. Focus on health programs amenable to community action.

Prerequisite: Junior standing or permission of instructor

HPE 352 FAMILY LIFE EDUCATION 2-0-2

Investigation of the biological, psychological and sociological components of sexuality and family life. Issues discussed include the anatomy and physiology of the reproductive systems, gender roles, family living, marriage, parenthood, divorce, and abuse/violence.

Prerequisite: Junior standing or permission of instructor

HUMANITIES

HUM 233 SPECIAL TOPICS IN LANGUAGE AND HUMANITIES 3-0-3

Studies of one of the major topics in the Humanities, focusing on carefully chosen modes of expression that shape our culture. Topic will be announced in the class schedule. This course will change every time it is offered and may therefore be repeated for credit.

HUM 401 HUMANITIES PORTFOLIO 3-0-1

Exploring the relationship of coursework taken in a humanities minor as it relates to human experience, diversity, and communication through a variety of artistic forms.

Prerequisite: Completion of all other coursework in humanities minor

INFORMATICS

INF 103 INFORMATION TECHNOLOGY APPLICATIONS 3-0-3

Terminology, concepts, principles, and use of computer in solutions of business, scientific and educational decision-making problems. Introduction to system structures, storage media, peripheral equipment, communications and Web development. Emphasis on topics in human-computer interaction and human factors, collaborative technologies, ethics, privacy, and ownership of information and information sources, information representation and the information life cycle, the transformation of data to information. Hands on assignments: word processing, spreadsheet analysis, database, presentation graphics, and collaboration software.

Prerequisite: Computer Literacy

INF 132 INTEGRATED DEVELOPMENT (VISUAL BASIC) 2-0-2

User interface design fundamentals using VBasic, control objects, event-driven Windows applications, forms, functions, arrays, parameter passing, graphical user interface, using components of an integrated development environment.

Prerequisite: MA 103 or MA 113 or equivalent.

INF 143 INTRODUCTION TO C# 3-0-3

An introductory course in the fundamentals of C# including user interface design, control objects, event-driven applications, forms, functions, arrays, parameter passing, and using the components of an integrated development environment.

PREREQUISITES: MA 103 or MA 113 or equivalent

INF 163 STRUCTURED LOGIC AND DESIGN (C PROGRAMMING) 3-0-3

Algorithmic problem solving and programming using top-down design, stepwise refinement and functional decomposition. Declarations, operations, assignment conditional and loop statements, parameter passing, arrays, and structures.

Prerequisites: MA 103 or MA 113 or equivalent.

INF 183 INTRODUCTION TO LINUX 3-0-3

This course is intended to introduce students to the Linux operating system with emphasis on systems installation, configurations, customization, and maintenance of Linux-based systems. **PREREQUISITE: INF 103**

INF 213 DIGITAL FORENSIC SCIENCE I 3-0-3

This course introduces the student to investigative techniques involving computers and other electronic devices. Topics include investigative procedures, computer hardware, data recovery methods, and laws concerning digital devices. This course also covers how computers are used in investigations. **Prerequisite: ENG 113 or ENG 133, INF 103, INF 183 (INF 213 same as FS 213 and LE 213)**

INF 263 DATABASE CONCEPTS AND APPLICATIONS 3-0-3

Concepts including entity-relationship diagrams, normalization to fifth normal form, database optimization. Other concepts include: file organization, data base representation, descriptions, software reliability, security, integrity, relational data bases, query languages.

Prerequisite: INF 103

INF 303 NETWORK MANAGEMENT 3-0-3

Introduction to network management, including concepts and theory of data communications, network design, network security, network management tools, and network management tasks.

Prerequisites: INF 103

INF 311X INFORMATICS INTERNSHIP (1-3 HOURS)

This course involves meaningful work experience related to the student's field of study or other functional areas of Informatics at an approved company. The assignment must be approved by both the student's advisor and the department chair. A maximum of three (3) credit hours may be granted in a given semester.

Prerequisite: Informatics major, 3.0 GPA, Junior/Senior standing, and permission of advisor and department chair.

INF 313 DIGITAL FORENSIC SCIENCE II 3-0-3

This course continues the Digital Forensics 1 course by advancing into more detailed analysis techniques as expected by law enforcement and the court system. Topics include evidence collection procedures, detailed hardware analysis and report preparation.

Prerequisite: INF 213

INF 343 NETWORK SECURITY 3-0-3

Introduction to network security, including concepts and theory of security policies,

access control methods, site security, network security, system security, user security, application security, and managing security functions through cryptographic services, protocols, authentication, authorization, and access control technologies.

Prerequisite: INF 303

INF 371 ADVANCED MICROCOMPUTER LABORATORY 0-2-1

Students work with both hardware and software components.

Co-requisite: INF 373

INF 373 ADVANCED MICROCOMPUTERS 3-0-3

Hardware considerations include system board features, memory, hard drive, floppy drives, I/O devices, and comparison of CPU features, CMOS/BIOS firmware. Operating system features, configurations, setup options, multimedia technology, software installation, configuration. Students present PC-related topics.

Prerequisite: INF 103 and INF 143

INF 400X INDEPENDENT RESEARCH IN INFORMATICS (1-3 HOURS)

Independent research under the direction of an individual instructor. A research paper or project is required.

Prerequisite: Informatics major, 3.0 GPA, Junior/Senior standing, and permission of advisor and department chair.

INF 403 ADVANCED DATABASE 3-0-3

Advanced topics for relational and object oriented data base, enhanced query, tables, report features, macros, and Visual Basic applications, relational algebra including RAR modeling. SQL informatics applications development. **Prerequisite: INF 263**

INF 411X SPECIAL TOPICS IN INFORMATICS (1-3 HOURS)

Addresses advanced topics in Informatics that vary by year.

Prerequisite: Junior/Senior standing, and permission of advisor and department chair.

INF 413 GEOGRAPHIC INFORMATION SYSTEMS 3-0-3

This course introduces students to the concepts, techniques, and tools of Geographic Information Systems (GIS), which is a computer-based data processing tool used to manage and analyze spatial information. Topics covered include data acquisition, management, manipulation, and analysis, and cartographic output for applications of GIS in scientific and technological operations such as environmental assessment, analysis or natural hazards, site analysis for business and industry, resource management, and land-use planning. Through hands-on exercises with ArcGIS and/or projects with other related software packages, students will acquire basic skills in GIS. **Prerequisites: INF 263 and Junior Standing**

INF 433 DATA MINING AND DATA VISUALIZATION 3-0-3

This course is designed to study the principles and practices of data mining and tasks both descriptive (e.g. exploratory data analysis, classification, association) and prescriptive (e.g. prediction, regression and estimation) to analyze and obtain patterns in large

observational data sets. This course will also include the application of diverse visualization practices. **PREREQUISITE: INF 263**

INF 493 INFORMATICS CAPSTONE 3-0-3

In this course, Informatics majors apply the techniques they have learned in prior course work to a significant project of their own definition. The project may be completed through group effort. The design of the course follows the goals for the capstone experience. Students define the information problem for themselves, determine what techniques to use for the information problem they identify, and integrate human-centered and technical dimensions of information systems.

Prerequisite: Senior Standing

LAW

LAW 203 BUSINESS LAW I 3-0-3

This course is an introduction to the American legal system. It includes a survey of courts, legal procedures, torts, and criminal law. It involves an intensive study of the common law of contracts, including contract formation, performance, breach and remedies, as well as a study of the law of sales under the Uniform Commercial Code.

LAW 303 BUSINESS LAW II 3-0-3

This course is a study of the law of agency, partnerships, corporations, and other business organizations. It includes a study of negotiable instruments, secured transactions, surety ship, bankruptcy, securities regulation, and related legal issues.

Prerequisite: LAW 203

LAW 403 EMPLOYMENT LAW 3-0-3

This course is a survey of the law relating to the employment relationship, with a major emphasis on federal law. The course covers unions and collective bargaining under the National Labor Relations Act. Discrimination in employment will address the Civil Rights Act of 1964 as amended, the Equal Pay Act, the Age Discrimination in Employment Act, the Americans with Disabilities Act, and related statutes. State and federal law with regard to employment-at-will, privacy, whistleblower protection, and related issues will also be discussed.

Prerequisites: LAW 203, MGT 363

LAW 413 INTERNATIONAL LAW 3-0-3

The legal considerations governing international business transactions. Introduction to the international legal environment including the status of international law, international dispute settlement, conflicts of law. A more detailed study of the international contracting process, international payment mechanisms, carriage contracts, insurance issues, and related subjects. Government regulation of international business will also be addressed.

Prerequisites: LAW 203, BA 343

LAW 503 PUBLIC POLICY AND THE LEGAL ENVIRONMENT 3-0-3

This course includes an analysis of the legal, political and economic framework that has shaped public policy toward business in the United States. It will include the methods as to how public policy is created and its implications for management decision-making. The issues that this course will be concerned with are: how public policy is related to societal, community, employee, consumer, and environmental concerns and their implication for business.

Prerequisite: Graduate standing or approval of instructor

LAW ENFORCEMENT**LE 103 INTRODUCTION TO CRIMINAL JUSTICE 3-0-3**

This course is an introduction to the criminal justice system that covers the processes, institutions and administration of justice in the United States. The course will concentrate on the purposes and history of the three primary parts of the criminal justice system: law enforcement, courts, and corrections.

LE 153 JUVENILE JUSTICE 3-0-3

A comprehensive review of the nature and etiology of juvenile delinquency. The legal and philosophical basis of the juvenile justice process, procedures, and programs of prevention and rehabilitation.

LE 213 DIGITAL FORENSIC SCIENCE I 3-0-3

This course introduces the student to investigative techniques involving computers and other electronic devices. Topics include investigative procedures, computer hardware, data recovery methods and laws concerning digital devices. This course also covers how computers are used in investigations.

Prerequisite: ENG 113 or ENG 133, INF 103, INF 183 (LE 213 same as FS 213 and INF 213)

LE 253 PROBATION, PAROLE & COMMUNITY CORRECTIONS 3-0-3

An introduction to community-based corrections within the criminal justice system. A comprehensive review of the philosophies, and practices, traditional and nontraditional approaches, and exemplary programs of the juvenile, and adult systems.

LE 263 INTRODUCTION TO CRIMINAL LAW AND JUSTICE 3-0-3

A survey of the American criminal justice system, its legal bases, and the interrelationships between local, state and national agencies. Specific attention will be focused on criminal law, criminal liabilities and punishments.

LE 273 CRIMINAL PROCEDURES AND EVIDENCE 3-0-3

An examination of the various aspects of criminal procedures and their bases in the Constitution and in law. Topics include arrest, search and seizure, interrogation, and the exclusionary rule.

LE 313 POLICE ADMINISTRATION 3-0-3

Historical and legal perspectives of policing in the United States. Issues include: organizational theory, police responsibilities, and leadership roles in contemporary law enforcement organizations. **Prerequisite: LE 103**

LE 343 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS I 3-0-3

Introduction to criminalistics and crime scene investigation. Methods of processing a crime scene: documentation, location, and collection of evidence, proper collection and handling procedures, selection, and presentation for analytical examination, and presentation of the process and findings in court. **(Same as FS 343)**

LE 351 CRIMINALISTICS AND CRIME SCENE LABORATORY 0-2-1

The study of types of chemical and physical analyses associated with crime scene investigations.

Prerequisite: LE 343 (Same as FS 351)

LE 353 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS II 3-0-3

Advanced criminalistics and crime scene investigation. A detailed review of current methodology of collection, processing, and court presentation of evidence. Analysis of the roles of law enforcement and forensic scientists. **Prerequisite: LE 343 (Same as FS 353)**

LE 363 INSTITUTIONAL CORRECTIONS AND CORRECTIONAL LAW 3-0-3

A detailed review of penology and institutional corrections. A historical and contemporary perspective on jails and prisons. Rehabilitation and incarceration in both the adult and juvenile systems. A critical analysis of legislation and appellate decisions in correctional law for pretrial detainees and convicted and sentenced prisoners. **Prerequisite: Junior standing or permission of instructor**

LE 423 CRIMINAL JUSTICE AGENCY ADMINISTRATION 3-0-3

A detailed examination of the unique blend of criminal justice and business/public administration required in the administration of law enforcement, judicial and corrections agencies. A pragmatic analysis of public funding and utilization of local, state, and federal grants.

Prerequisite: Junior standing or permission of instructor

LE 453 TOPICS IN CRIMINAL JUSTICE 3-0-3

Selected topics in the area of criminal justice. **(May be taken multiple times.)**

Prerequisite: Junior standing or permission of instructor

LE 473 LAW ENFORCEMENT INTERNSHIP I (3 HRS)

Professional internship placement in a criminal justice agency in the students' areas of concentration. Students will participate in agency activity under the supervision of an agency professional. **Prerequisite: Junior or senior standing and department approval**

LE 483 LAW ENFORCEMENT INTERNSHIP II (3 HRS.)

Students with a double concentration or double major may enroll in a second professional internship placement. **Prerequisite: Double concentration in criminal justice or double major, junior/senior standing, and department approval**

LE 493 FORENSIC/CORRECTIONAL INTERNSHIP (3 HRS.)

Field experience in diagnostic correctional settings or facilities.

Prerequisite: Junior standing or permission of instructor

LE 400X INDEPENDENT STUDIES IN CRIMINAL JUSTICE VARIES (1-4 HRS.)

Original research and/or a review of current, critical research on an approved topic within the student's field of concentration.

Prerequisite: Junior or senior standing and department approval (course may be repeated)

LE 4015 BASIC POLICE TRAINING COURSE (15 HRS.)

Attendance and completion of the Basic Police Training Course at the Indiana Law Enforcement Academy.

Prerequisite: Junior or senior standing and department approval

LEADERSHIP**LDR 203 LEADERSHIP STRENGTHS AND SKILLS (3 HRS.)**

This course focuses on a strengths-based approach to leadership and leadership development as well as the skills necessary for facilitating positive change in groups, organizations, and communities. Active learning opportunities to understand and practice essential skills such as continual learning, powerful communication, problem solving, managing process, goal achievement, conflict resolution, win-win negotiating, and empowering stewardship are woven throughout the course. Effective leadership practice through emphasis on strengths development is the goal of this class.

LDR 303 CONTEMPORARY LEADERSHIP THEORY AND PRACTICE (3 HRS.)

This course examines the major theories, principles, and concepts related to the art and practice of leadership. Multiple contexts of leadership will be analyzed, including self-leadership, one-on-one leadership, team leadership and organizational leadership. Readings, case studies, and activities promote the development of a deeper understanding of the historical, political, social, cultural, psychological and organizational contexts in which leadership occurs. Information presented in the course includes methods of social scientific inquiry through which students assess their individual leadership perspectives and competencies and develop a personal leadership philosophy.

LDR 403 CREATIVITY, INNOVATION, AND INFLUENCE (3 HRS.)

This course empowers leaders to envision and develop new ideas from inception through implementation. Readings and activities engage students in defining and building creativity, critical thinking, and collaboration skills they can use to facilitate innovation in individuals, groups, organizations, and communities.

LDR 433 LEADERSHIP PRACTICUM (3 HRS.)

This course deepens students' capacity for leadership, in addition to concluding the leadership minor by linking leadership practice to leadership theory. Students assume leadership responsibilities with a Trine University or community organization, program, or project in order to gain direct leadership experience and further the mission and goals of the selected organization. Students will set goals, practice and develop skills, reflect on experiences, evaluate actions, discuss lessons learned, and complete assignments. A well-written synthesis paper and a high-quality portfolio presentation are crafted to integrate students' learning about leadership and to provide a post-graduation plan for life-long leadership development. Current and active involvement in a leadership position is required for students in this class.

MATHEMATICS**MA 0304 INDIVIDUALIZED ALGEBRA 4-0-0**

(Same as MA 034, for non-traditional students.) This is a non-credit, preparatory class.

MA 034 ELEMENTARY ALGEBRA 4-0-0

Topics include: basic Algebra, signed numbers, polynomial rational expressions, factoring, linear equations, graphs, linear systems. This is a non-credit, preparatory class.

MA 0404 INDIVIDUALIZED INTERMEDIATE ALGEBRA 4-0-0

(Same as MA 044, for non-traditional students.) This is a non-credit, preparatory class.

Prerequisite: Equivalent of high school Algebra I

MA 044 INTERMEDIATE ALGEBRA 4-0-0

Topics include: rational algebraic expressions, exponents, radicals, linear systems, functional notation, graphs. This is a non-credit, preparatory class.

Prerequisite: Adequate SAT/ACT Mathematics score.

MA 103 BUSINESS ALGEBRA 3-0-3

This course emphasizes the business applications of the following: rational algebraic expressions, quadratic equations, linear systems, synthetic division, determinants, exponents, radicals, and logarithms. **Prerequisite: Adequate SAT/ACT Mathematics score or approval from mathematics department chair.**

MA 113 COLLEGE ALGEBRA 3-0-3

Topics include: rational algebraic expressions, quadratic equations, non-linear systems, partial fractions, binomial expansion, synthetic division, determinants, exponents, radicals, logarithms.

Prerequisite: Adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 123 TRIGONOMETRY 3-0-3

Topics include: Trigonometric functions, identities, inverses, unit circle, solutions of triangles, trigonometric equations, complex numbers, radian measure, angular velocity.

Prerequisite: Adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 124 PRE CALCULUS 4-0-4

Topics include: review of algebraic expressions, linear systems, partial fractions, synthetic division, matrices, slope, fractional exponents, exponential and logarithmic relations, Trigonometric functions, identities, inverses, vectors, polar coordinates, conic sections, summation notation, and elementary series.

Prerequisite: Three years of high school mathematics and adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 134 CALCULUS I 4-0-4

Topics include: limits, continuity, differentiation, applications, definition of the integral, and fundamental theorem of integral calculus. Uses symbolic algebra software.

Prerequisite: Three years of high school mathematics, including trigonometry, and adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 153 FINITE MATHEMATICS 3-0-3

Topics include: set operations, introduction to logic, mathematics of finance, introduction to probability and statistics. Not open to engineering/science majors.

Prerequisite: Two years of high school mathematics

MA 164 CALCULUS II 4-0-4

Topics include: applications of integration, differentiation, and integration of transcendental functions and methods of integration, L'Hopital's rule, conic sections, parametric equations, polar coordinates, infinite series. Uses symbolic algebra software.

Prerequisite: "C" or better for MA 134 or equivalent

MA 173 APPLIED MATHEMATICS 3-0-3

Topics include: Mathematics of finance, graphical solution of linear programming problems, introduction to differential and integral calculus with applications.

Prerequisite: MA 103 or MA 113

MA 184 MATHEMATICS FOR ELEMENTARY TEACHERS I 4-0-4

Topics include: numeration systems, set theoretic development of whole number system, decimals, percent's, ratios, elementary number theory, elementary algebra, problem solving techniques. Designed specifically for elementary and middle school curricula emphasizing NCTM standards.

MA 194 MATHEMATICS FOR ELEMENTARY TEACHERS II 4-0-4

Topics include: linear, angular, area, and volume measure. Metric system, congruence, and similarity in geometric figures, probability, and statistics. Designed specifically for elementary and middle school curricula emphasizing NCTM standards.

Prerequisite: MA 184

MA 203 DISCRETE MATHEMATICS FOR INFORMATION SCIENCES 3-0-3

An introduction to methods of analytical, abstract and critical thinking, deductive reasoning, and logical and mathematical tools used in information sciences. The topics include propositional and predicate logic, natural deduction proof system, sets, functions and relations, proof methods in mathematics, mathematical induction and finite state machines.

Prerequisites: MA 103 or MA 113

MA 213 CALCULUS III 3-0-3

Topics include: Calculus of several variables, algebra and calculus of vectors, partial differentiation, directional derivative, multiple integrals, applications. Uses symbolic algebra software.

Prerequisite: "C" or better in MA 164 or equivalent

MA 233 DIFFERENTIAL EQUATIONS 3-0-3

Topics include: methods of solution for first and higher order differential equations, systems of ordinary differential equations, Laplace transforms, series solutions.

Prerequisite: MA 213

MA 253 STATISTICS 3-0-3

Topics include: laws of probability, frequency distributions, sampling, expectation and variance, normal and sampling distributions, hypothesis testing, least squares, point, and interval estimates of parameters. Not open to engineering/ science majors.

Prerequisites: MA 103 or MA 113

MA 303 COLLEGE GEOMETRY 3-0-3

Topics include: axiomatic development of Euclidean geometry, constructions, geometric transformations, introduction to non-Euclidean geometry. **Prerequisite: MA 164**

MA 312 HISTORICAL ASPECTS OF MATHEMATICS 2-0-2

Topics include: chronologically explore significant results in mathematics. Perspective from different cultures considered. Selected topics vary from numeration systems to algebra, geometry, probability, and calculus. **Prerequisite: MA 213**

MA 313 LINEAR ALGEBRA 3-0-3

Topics include: vectors spaces, determinants, subspaces, bases, transformations, and mappings. Theory and applications of matrix algebra. **Prerequisite: MA 213**

MA 323 OPERATIONS RESEARCH 3-0-3

Topics include: computer solution of mathematical models for decision making. Linear, dynamic and integer programming, critical path scheduling, queuing theory, game theory, resource allocation. **Prerequisites: INF 143 or CS 1113; MA 253 or MA 393**

MA 333 NUMBER THEORY 3-0-3

Topics include: divisibility, prime numbers, Euclid's algorithm, linear congruences, quadratic residues. Numerical functions, factorization, Fibonacci numbers, Diophantine equations, applications, puzzles. **Prerequisite: MA 164**

MA 343 SETS AND LOGIC 3-0-3

Topics include: sets, set operations, methods of proof, induction, truth tables, relations, symbolic logic, real number system considerations, elementary combinatorics. **Prerequisite: MA 164**

MA 353 VECTOR ANALYSIS 3-0-3

Topics include: algebra and calculus of vectors, dot and cross products, Green's and Stokes' Theorems, gradient, divergence, and curl of a vector field. **Prerequisite: MA 213**

MA 363 ADVANCED DIFFERENTIAL EQUATIONS 3-0-3

Topics include: Bessel and Legendre equations, eigenvalue problems, Sturm-Liouville theory, existence and uniqueness theorems for linear and nonlinear equations, stability considerations.

Prerequisite: MA 233

MA 373 ABSTRACT ALGEBRA 3-0-3

A study of fundamental algebraic structures emphasizing groups, rings, integral domains and fields. Homomorphism and isomorphism perspectives. **Prerequisite: MA 313**

MA 383 COMPUTER SOLUTIONS TO DIFFERENTIAL EQUATIONS 3-0-3

Numerical techniques for solving both ordinary and partial differential equations. Initial value and boundary valued conditions (Uses Computer.)

Prerequisite: MA 233 and high level programming language

MA 393 PROBABILITY AND STATISTICS 3-0-3

Topics include: finite probability, distributions, data analysis, sampling and sampling distributions, hypothesis tests, regression and correlation analysis, analysis of variance, design of experiments.

Prerequisite: MA 213

MA 403 ADVANCED CALCULUS 3-0-3

A modern topological approach to real analysis. Selected concepts include bounded, open, closed sets, connectedness, completeness and compactness, functions, sequences, limits, continuity, series, differentiation, and integration.

Prerequisite: MA 213 and junior/senior standing

MA 423 COMPLEX VARIABLES 3-0-3

Topics include: complex numbers and functions, analytic functions, Cauchy-Riemann equations, conformal mapping. Cauchy theory, Taylor and Laurent series, calculus of residues, Dirichlet and Neumann problems, Poisson integral formula, and analytic continuation.

Prerequisite: MA 233 and Junior/Senior standing

MA 443 NUMERICAL ANALYSIS 3-0-3

Topics include: numerical solution of algebraic and transcendental equations, numerical differentiation and integration, linear systems, eigenvalues, curve fitting and two dimensional problems. (Uses computer.)

Prerequisite: MA 213

MA 473 GRAPH THEORY AND COMBINATORICS 3-0-3

An introduction to discrete and combinatorial mathematics. Construction and analysis of mathematical models using combinatorics, graph theory and other discrete methods with application in a wide variety of areas.

Prerequisite: MA 213

MA 400X SPECIAL PROBLEMS IN MATHEMATICS (VARIES, 1-3 HRS.)

Selected topics may include, but not limited to, advanced differential equations, modern algebra, boundary-values problems, probability and statistics, topology, transform calculus. Arranged with permission of department chair.

Prerequisite: Senior standing (See Chair for independent study policy)

MECHANICAL & AEROSPACE ENGINEERING

MAE 203 MECHANICAL ENGINEERING ANALYSIS 3-0-3

An introduction to analytical and numerical methods of solving mechanical engineering problems. Programming in MATLAB. An introduction to various topics of mechanical engineering. Lecture focuses on the interrelationship between mathematics, natural sciences, and engineering design.

Prerequisite: MA 134, Corequisite: EGR 143

MAE 243 MANUFACTURING PROCESSES AND EQUIPMENT 2-2-3

An examination of commonly used engineering materials and the manufacturing processes and machines used in processing these materials. Demonstrations of: sand molding, metal casting, metal removal processes (turning, milling, drilling, grinding), and deformation processes. Introduction to CNC machining.

Prerequisites: ES 233, Corequisite ES 243

MAE 303 MECHANICS OF MACHINERY 3-0-3

Topics include: study of the kinematics and dynamics of mechanisms. Fundamentals of displacement, velocity, and acceleration analysis of rigid bodies as a basis for the study of mechanisms. Motion analysis of linkages, cams, and gearing. Static and inertia force in machines. Balancing of rotating and reciprocating masses. **Prerequisite: ES 223**

MAE 323 THERMODYNAMICS II 3-0-3

Gas power systems: air-standard cycles, gas turbines. Refrigeration and heat pump systems. Non-reacting ideal gas mixtures and psychrometrics. Reacting mixtures and combustion. Compressible flow. **Prerequisite: ES 313**

MAE 333 FLUID MECHANICS II 3-0-3

Topics include: surface resistance, wall shear stress, and boundary layer flow, internal flow, laminar, and turbulent flow in conduits, external flow, drag, and lift, compressible flow, normal shock waves, isentropic flow through nozzles and diffusers. Introduction to turbomachinery. (Through Spring 2013)

Prerequisites: ES 223, ES 313, ES 323, MA 233

MAE 343 MANUFACTURING PROCESSES AND EQUIPMENT 2-2-3

An examination of commonly used engineering materials and the manufacturing processes and machines used in processing these materials. Demonstrations of: sand molding, metal casting, metal removal processes (turning, milling, drilling, grinding), and deformation processes. Introduction to CNC machining. **Prerequisites: ES 233, ES243**

MAE 353 MACHINE COMPONENT DESIGN 3-0-3

Topics include: stress analysis of machine parts, combined stresses, working stress, stress concentration, theory of failure for both static and fatigue loadings, design of machine elements.

Prerequisites: ES 233, ES 243

MAE 363 INTRODUCTION TO MECHATRONICS 2-2-3

A multidisciplinary, hands-on, project-oriented course studying the use of electronics and microprocessors to control mechanical devices. Students complete a design project in mechatronics. Projects may include building an analog to digital converter, using a transistor H-bridge for motor control, construction of digital logic circuits, use of proximity sensors, and creating music using a microprocessor.

Prerequisite: ES 253 or ECE 223

MAE 363H HONORS INTRO. TO MECHATRONICS 2-2-3

A self-paced, project-oriented course studying the use of electronics and microprocessors to control mechanical devices. Introductory projects include material such as building an analog to digital converter, using a transistor H-bridge for motor control, construction of digital logic circuits, use of proximity sensors, and creating music using a microprocessor. Students are also required to complete a major robotics design project and are encouraged to enter a national competition. **Prerequisite: ES 253 or ECE 223**

MAE 373 COMPUTER-AIDED MACHINE DESIGN 1.5-3-3

Use of computer applications software as a part of the engineering design process. Introduction to the finite element method for stress analysis. Software packages, such as nonlinear solvers, finite element analysis, solid modeling, and kinematic simulation, will be introduced. Design work using these tools will be a major component of the course.

Prerequisites: EGR 143, ES 243, and MAE 313

MAE 383 METALLURGICAL THERMODYNAMICS 3-0-3

Thermodynamic fundamentals and their application to metallurgical processes such as melting, phase transformations, and melt composition control. First and Second Laws in an open system. Property relationships and Maxwell's relations. Physical and chemical equilibrium. Thermodynamic basis of phase diagrams, and metallurgical solution activities. Introduction to statistical thermodynamics. Applications to melt chemistry control and heat treatment processes. **Prerequisites: ES 233 and ES 313**

MAE 393 METALLURGICAL TRANSPORT PROCESSES 3-0-3

Topics include: thermal, fluid, and diffusional transport in metallurgical processes, such as cupola melting, AOD vessel operation, electric, and reverberatory furnace chemistry control, steel making, and recovery of secondary aluminum and copper. Application of mathematical models from fluid mechanics, heat transfer, and mass transport to the fluid, thermal, and diffusional aspects of metallurgical processes.

Prerequisite: ES 323 or MAE 3033

MAE 3033 FLUID DYNAMICS FOR MECHANICAL ENGINEERING 3-0-3

Fundamentals of fluid mechanics. Properties, characteristics, parameters, and governing equations of fluid flow in laminar and turbulent regimes.

Prerequisites: ES 223, ES 313, MA 233, and MAE 203

MAE 413 THERMO-FLUID COMPONENT DESIGN 3-0-3

Introduction to components for energy transfer including ducts, valves, pumps, fans, compressors, heat exchangers, and burners. Design of piping systems and fluid networks. Analysis of pumps and design of systems including pumps. Design of duct systems. Analysis of fans, blowers, compressors, and design of systems which use them.

Prerequisites: ES 343

MAE 423 HEATING, VENTILATING, AND AIR CONDITIONING 3-0-3

Topics include: design of heating, ventilating, and air conditioning (HVAC) systems for buildings. Heat conduction in buildings. Convection and infiltration. Radiation and solar insolation loads. Psychrometry and thermal comfort. Heating and cooling load calculations. Particular attention will be paid to the HVAC needs of industrial firms and commercial installations.

Prerequisites: ES 333 or MAE 3033, MAE 323

MAE 443 ENGINEERING METALLURGY 2-2-3

Physical metallurgy of practical engineering alloys as it relates to processing and mechanical properties. Ferrous alloys and selected non-ferrous alloys are covered. Property measurements and other characterization techniques and their meanings. Phase diagrams, heat treatment and structure-property processing relationships in practical steels, cast irons, and aluminum alloys. Laboratory measurement of properties and microstructure: tensile strength, optical metallography, impact toughness, statistical nature of strength, plastic strain anisotropy in sheet metal. **Prerequisite: ES 233**

MAE 453 MECHANICAL VIBRATION 3-0-3

Introduction to vibration theory and analysis. Undamped, damped, free and forced vibration of single degree-of-freedom mechanical systems. Transient vibration and response to nonperiodic excitation. Vibration of two degree-of-freedom systems without damping. Vibration isolation and vibration absorbers. **Prerequisites: MA 233, MAE 303**

MAE 463 MEASUREMENT LABORATORY 1-4-3

Principles of dimensional measurement and the measurement of deflection, stress, strain, and vibration. Transducer theory and signal conditioning. Use of computer data acquisition and signal analysis. Analysis of experimental error and construction of test plans. Laboratory work leading to an experimental project. **Prerequisites: ES 253, MA 393, MAE 353**

MAE 473 APPLIED AERODYNAMICS 3-0-3

Properties of the atmosphere. Aerodynamic coefficients and their dependence on Reynolds number and Mach number. Aerodynamics of airfoils, wings, and complete aircraft. Performance analysis of aerospace vehicles in atmospheric flight: range, endurance, climb, descent, takeoff, and landing.

Prerequisites: ES 223, MAE 333 or MAE 3033 and MAE 323

MAE 483 VEHICLE STRUCTURES 3-0-3

Introduction to the design of minimum weight structures. Design of members in tension, bending, or torsion. Design of compression members. The concept of shear flow and its use in analyzing monocoque and semi-monocoque structures. **Prerequisites: MAE 353**

MAE 493 AERODYNAMICS LABORATORY 1-4-3

Introduction to subsonic and supersonic wind tunnel testing. Wind tunnel characteristics and data acquisition systems. Measurements of lift, drag, moments, with corresponding data reduction and aerodynamic coefficients. Turbulence factor, Reynolds and Strouhal number calculations. Airfoil, aircraft, and vehicle investigations. Supersonic measurements, including total and static pressures, Mach number, and shock angles. Engineering laboratory reports are required for each investigation. Team wind tunnel project and report is required.

Prerequisite: MAE 473

MAE 400X SPECIAL PROBLEMS IN MECHANICAL ENGINEERING VARIES (1-6 HRS)

Independent study of special topics of particular interest in mechanical engineering. Course may be taken more than once with a maximum of six credit hours.

Prerequisite: Permission of Department Chair

MAE 4023 SYSTEM DYNAMICS AND CONTROLS 2-2-3

Analysis of dynamic systems using free body diagrams, equation of motion, differential equations, and transfer functions. Introduction to Laplace transforms and solving for time history of dynamic systems. Experimental verification of analytical solutions. Analysis of hydraulic, thermal, and electrical systems. Analysis of first, second, and higher order systems, and analysis of effect of proportional, integral and derivative controls.

Experimental verification of PID control analysis, time permitting. **Prerequisites: ES 223, MA 233**

MAE 4053 MECHANICAL ENGINEERING DESIGN I 2-2-3

Introduction to design methodology and practice. Product specifications. Concept generation and selection. Product design. Design for manufacturing. Economics of product development. Prototyping. Teams of students work on a design project in the area of mechanical engineering. Design project work will continue in MAE 4063.

Prerequisites: MAE 303, MAE 353, MAE 373, ES 313

MAE 4063 MECHANICAL ENGINEERING DESIGN II 1-4-3

Conclusion of mechanical engineering design project. Preparation of a formal written design report and oral presentation of the design. Course must be taken the semester immediately following MAE 4053. **Prerequisite: MAE 4053**

MAE 4123 POWER GENERATION 3-0-3

Topics include: design of a power plant to meet specified energy demand. Selection and/or synthesis of principal components and pollution control equipment. Performance optimization, instrumentation, and control. **Prerequisite: MAE 323**

MAE 4133 INTERNAL COMBUSTION ENGINES 3-0-3

Introduction to internal combustion engines. A study of gas cycles and combustion thermodynamics. Analysis of overall engine performance characteristics, heat and mass transfer, friction, and emissions. **Prerequisite: MAE 323, MAE 333 or MAE 3033, ES 343**

MAE 4143 PHYSICAL METALLURGY 2-2-3

Course explores the underlying structure-property relationships of metals. Topics include: thermodynamics and kinetics of phase transformations, diffusion, dislocation behavior, strengthening mechanisms, fracture mechanisms, crystallography, creep, and fatigue behavior. Laboratory work in fractography, scanning electron microscopy, fracture, tensile properties, and metallography. **Prerequisite: MAE 443 or grade of "C" or better in ES 233**

MAE 4173 GAS TURBINES 3-0-3

Topics include: basic theory of gas turbine engines. Study of the aerothermodynamics of propulsion, component characteristics, overall engine performance, and introduction to engine design.

Prerequisites: MAE 333 or MAE 3033 and MAE 323

MAE 4183 AIRCRAFT STABILITY AND CONTROL 3-0-3

The linearized equations of motion for atmospheric flight are developed. Longitudinal and lateral motions of the airplane are studied with particular emphasis on the phugoid, short-period, dutch-roll, and spiral motions. Static stability and control requirements for airplane design are considered. **Prerequisite: MA 233, MAE 473**

MAE 4193 METAL CASTING 2-2-3

This course covers the casting process from the perspective of engineering design. Tooling design for casting processes, melt quality control, heat transfer and fluid mechanics applications in casting, dynamics of mold interaction with the cast metal. Commercial software applications are included in solidification modeling and melt chemistry control.

Prerequisite: MAE 343 or consent of instructor

MAE 500X SPECIAL TOPICS

Topic(s) to be jointly selected by the student(s) and the instructor. May be retaken for credit if the topic is substantially different.

Prerequisite: Graduate standing or consent of department chair.

MAE 5213 ADVANCED HEAT TRANSFER 3-0-3

Analytical and numerical methods in steady and unsteady conduction and convection. Convection with phase change. Use of commercial software for numerical analysis of heat transfer problems. As time permits, radiation heat transfer and mass transfer.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5223 INTRODUCTION TO COMPUTATIONAL FLUID MECHANICS 3-0-3

Fluid kinematics, integral analysis of the conservation equations. Differential analysis of fluid flow. Approximate solution of the Navier-Stokes equations. Introduction to computational fluid dynamics (CFD). Laminar CFD calculations. Turbulent CFD calculations. CFD with heat transfer.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5433 MECHANISM SYNTHESIS 3-0-3

Analytical synthesis of planar linkages for function, path and motion generation. Dynamic analysis of joint forces in planar mechanisms. Synthesis of rigid and compliant cam and follower systems.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5473 SYSTEM DYNAMICS AND CONTROL 3-0-3

The development of linear models in terms of state-variable equations, input-output differential equations, and transfer functions. The introduction of both time-domain solutions and Laplace transforms. The development of time constants, damping ratios, transfer functions, poles and zeros, mode functions, and frequency-response functions. The application of feedback modeling and design tools including root-locus diagrams, Bode plots, and PID control.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5543 ADVANCED MACHINE DESIGN 3-0-3

Design of machine elements with an emphasis on uncertainty. Statistical descriptions of material properties. Limits and fits, dimensions and tolerances, and the propagation of error. Effect of uncertainty in theories of failure for both static and fatigue loading. Design for reliability. Application to selected machine elements.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5583 DESIGN OF EXPERIMENTS 3-0-3

Design and statistical analysis of engineering experiments with a focus on process optimization and robust product design. Single factor and multi-factor experimental design and analysis. Taguchi methods are discussed including the application of signal-to-noise ratio, and orthogonal arrays.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5663 MATERIALS FAILURE ANALYSIS 3-0-3

A study of the mechanisms of materials failure, failure analysis techniques, and non-destructive testing methods. Emphasis is placed on the analysis and interpretation of case studies. Fracture mechanics, fatigue, environmental influences, and manufacturing influences on failure are all addressed. Practical laboratory work with the scanning electron microscope and with optical microscopes serves to illustrate and reinforce key concepts in fractography.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5753 COMPUTER INTEGRATED MANUFACTURING 3-0-3

Computer-assisted process planning and estimating. Concepts of computer control and feedback mechanisms. Design considerations for machine tools, machining cells, robotics, and flexible manufacturing systems.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 600X MECHANICAL ENGINEERING GRADUATE PROJECT (VARIES 1-6 HRS.)

A design or capstone project, with industrial or real-world application, producing all necessary and appropriate documentation, and if applicable, models, and prototypes. The project should entail a minimum of 3 hours of work per week per credit hour. Students should choose the number of credits each semester based on the amount of time they expect to spend on the project. **Prerequisite: Graduate standing in Mechanical Engineering or consent of department chair.**

MANAGEMENT

MGT 313 HUMAN RESOURCES MANAGEMENT 3-0-3

This course includes a discussion of policies, objectives, principles and organizational structure as they pertain to personnel work. The major activities of a personnel department such as recruiting, selecting, training, and employee relations are examined along with the impact of government laws and regulations on these activities.

Prerequisite: Junior standing or permission of instructor

MGT 333 SUPERVISION 3-0-3

This course is intended for people who are, or plan to be, first line supervisors. Its purpose is to present basic principles that will assist in developing the talent needed to direct other people. Skill building cases and incidents are part of the course content. **Prerequisite: MGT 363**

MGT 343 HUMAN RESOURCE DEVELOPMENT 3-0-3

This course is a study of processes, methods, theories, and current practices in training and staff development in business and organizational settings. The course focuses on practices that facilitate learning and change to achieve organizational objectives.

Prerequisite: Junior standing or permission of instructor

MGT 353 DESIGNING OPERATIONS 3-0-3

This course examines the central concepts of designing operations in both manufacturing and service enterprises. Topics include process strategy, location and layout strategy, job design, quality management, planning, productivity, and the design of goods and services.

Prerequisites: MA 173 or permission of instructor

MGT 363 ORGANIZATIONAL BEHAVIOR 3-0-3

This course examines the manager's role in dealing with behavior at all organizational levels. It emphasizes the need for interpersonal and group skills. Applications of behavioral science concepts and findings to organizational situations are included. Topics include motivation, communications, leadership, conflict, and change.

Prerequisites: COM 213, PSY 113, or permission of instructor

MGT 413 MANAGEMENT OF QUALITY 3-0-3

This course examines principles of quality management and continuous improvement in manufacturing and services enterprises. The focus is on using key quality tools, including statistical process control, pareto charts, flow charts, cause-effect diagrams, etc.

Prerequisite: MGT 353, MA 253, or permission of instructor

MGT 443 MANAGING OPERATIONS 3-0-3

This course examines contemporary operations management principles and practices. Topics include project management, inventory management, aggregate planning, supply chain management, materials requirement planning, lean manufacturing, and just-in-time principles.

Prerequisite: MGT 353 and MA 253 or permission of instructor

MGT 453 STRATEGIC MANAGEMENT 3-0-3

This course requires a knowledge of all functional areas of business. It integrates these areas through analysis of case histories and related readings. Class discussion, presentations and written reports are used extensively. This course is the capstone business course and should be taken the last semester before graduation.

Prerequisite: Completion of all business core courses or permission of the dean of the Ketner School of Business

MGT 463 SMALL BUSINESS MANAGEMENT 3-0-3

This course examines the preparatory steps necessary to launch a small business enterprise, as well as manage the everyday complexities of cash flow, marketing, staffing, pricing, purchasing, and advertising. Its purpose is to present the many competencies needed to operate a small business successfully in the competitive environment of the

21st century. Case analysis and personal interviews are the primary integral components of the course content.

Prerequisites: AC 213, MK 303, FIN 303, MGT 353, MGT 363

MGT 523 COMMUNICATIONS, LEADERSHIP AND ETHICS 3-0-3

This course examines leadership, influence, and power across a variety of disciplines with a strong emphasis on ethics. Historical, literary, and contemporary examples of successful leadership provide a framework for examining the theories and practice of leadership and power. This course requires substantial advanced critical thinking and writing.

Prerequisite: Graduate standing

MGT 543 OPERATIONS STRATEGY AND MANAGEMENT 3-0-3

This course examines the central role of operations in both manufacturing and service enterprises. Topics include quality management, design of goods and services, layout, scheduling, project management, inventory management, supply chain management, and purchasing activities within the firm.

Prerequisite: Graduate standing

MARKETING

MK 303 MARKETING 3-0-3

The marketing activities necessary to provide goods and services to target customers are examined, as well as the role marketing plays in the social and economic system. The marketing variables of product, promotion, placement, and price are considered in the context of strategic planning, implementation, and control.

Prerequisite: Junior standing or permission of instructor

MK 313 RETAIL MANAGEMENT 3-0-3

This is the study of the role of retailing in the domestic and international marketing process. A functional approach is taken in the study of retailing topics of placement, promotion, pricing, inventory control. Also examined are the consumer purchasing behavior and lifestyle profiles to understand growth of nontraditional channels.

Prerequisite: Junior standing or permission of instructor

MK 323 INTEGRATED MARKETING COMMUNICATIONS 3-0-3

The integrated approach to marketing communications is emphasized. Advertising, sales promotion, database/direct marketing, public relations, sponsorship/event marketing, support media, trade promotions, internet marketing, personal selling, and their coordination through a common brand and theme are investigated.

Prerequisite: Junior standing or permission of the instructor

MK 343 INTERNATIONAL MARKETING 3-0-3

This course provides a detailed examination into the principles and practices of international marketing as it applies to today's global economy. In-depth studies and analysis will be made of trade and commercial policies and practices, as well as international product adaptation, promotion, distribution, and pricing strategies. The

student will examine the international marketing manager's role in the development of an export marketing program.

Prerequisites: BA 343, MK 303 or permission of the instructor

MK 363 BUYER BEHAVIOR 3-0-3

Studies in this course include consumer and organizational buying behavior, as well as determinants of this behavior. Consumer characteristics, including attitudes and behaviors, processing of information, as well as consumer cultural, psychological and communication theories are also studied. Course also examines industrial perspectives; the unique aspects of organizational markets and how they differ from individual consumer behavior.

Prerequisite: Junior standing or permission of instructor (same as PSY 363)

MK 423 PERSONAL SELLING 3-0-3

This course examines the impact of personal selling in today's competitive marketplace. Topics examined are motivation, account selection, compensation, seller's role in the economy, and personality variables.

Prerequisite: Junior standing or permission of the instructor

MK 433 MARKETING MANAGEMENT 3-0-3

This is the study of the planning, implementation, and outcomes of a firm's marketing program. Content will focus on identification, analysis, and reviews of internal/external factors associated with marketing policies and programs. **Prerequisite: MK 303**

MK 463 MARKETING RESEARCH 3-0-3

This is the study of techniques and approaches associated with researching marketing topics. It includes consumer research, market analysis, product research, advertising research, and sales analysis.

Prerequisites: MK 303 or permission of the instructor

MK 473 E-MARKETING 3-0-3

Electronic technologies are applied to the functions of marketing which are product, price, placement, and promotion. E-marketing transforms traditional business using new models that add customer value and increase profitability. The outcome of the course will be the creation of an E-marketing plan.

Prerequisites: Junior standing or permission of the instructor

MK 483 SENIOR SEMINAR IN MARKETING 3-0-3

This is an integrative capstone course which brings together all the functional areas of marketing. The focus is on decision-making and problems in marketing strategy. Students will study marketing considerations and responses to changes in the customer, legal, trade, technological and regulatory environments. This course includes the preparation and organization of a comprehensive marketing plan.

Prerequisite: Senior Marketing Major or Minor in Marketing having completed most of the required marketing courses

MK 493 SPECIAL TOPICS IN MARKETING 3-0-3

Offered to treat specific or current marketing issues in depth.

Prerequisite: Junior standing or permission of the instructor

MK 503 STRATEGIC MARKETING MANAGEMENT 3-0-3

This course examines the collective marketing activities (pricing, promotion, placement, product) as they relate to the target market. The strategic planning process and how it relates to the overall profitability of the marketing department and a corporate structure will be studied.

Prerequisite: Graduate standing

MUSIC

MUS 100 RECITAL HOUR I 1-0-0

A course for music majors to be taken concurrent with Applied Instruction to critically listen to performances by peers and guest artists.

MUS 101 SIGHT SINGING/EAR TRAINING I 1-0-1

A study and application of sight singing techniques, dictation, chord recognition, error detection, and related activities.

Corequisite: MUS 113

MUS 111 PIANO LAB 0-1-1

Designed to provide students with little or no piano background fundamentals of keyboard and musicianship on the piano.

MUS 111 PIANO LAB 0-1-1

Designed to provide students with little or no piano background fundamentals of keyboard and musicianship on the piano.

MUS 113 MUSIC THEORY I 3-0-3

A study of basic music theory concepts including notation of pitch, rhythm and meter, scales, keys and key signatures, intervals, triads and seventh chords.

MUS 123 MUSIC HISTORY AND LITERATURE I 3-0-3

The study of composers, styles and literature and their influence on music in western culture from the Medieval period through the Baroque period.

MUS 213 MUSIC THEORY II 3-0-3

The study of music theory and concepts including advanced four part writing, analysis, score study, and listening.

Prerequisite: MUS 113

MUS 223 MUSIC HISTORY AND LITERATURE II 3-0-3

The study of composers, styles and literature and their influence on music in western culture from the Classic period through the Contemporary.

MUS 253 TECHNIQUES OF CONDUCTING 3-0-3

The principals of baton technique. The student will develop a fluent and expressive beat style and rhythmic and aural facilities essential to successful instrumental and choral direction.

MUS 272 MUSIC APPRECIATION 2-0-2

An introduction to the heritage of music culture of the Western world, including musical styles of the past and styles and forms of contemporary music literature. Previous music training not a prerequisite.

MUS 1011 APPLIED STUDIES 0-1-1

Designed to provide the students with private instruction on his or her principal instrument, voice or secondary instrument. The student will develop greater facility and technique along with enhanced musicianship and a better understanding of performing at a high level of competency.

MUS 1110 PERCUSSION ENSEMBLE 0-1-0

Percussion Ensemble is for musicians who are interested in improving their skills in percussion performances and performing in an ensemble designed specifically for percussion instruments. This ensemble is open to all students regardless of experience in percussion performance.

MUS 1111 PERCUSSION ENSEMBLE 0-1-1

Percussion Ensemble is for musicians who are interested in improving their skills in percussion performances and performing in an ensemble designed specifically for percussion instruments. This ensemble is open to all students regardless of experience in percussion performance.

MUS 1120 BRASS ENSEMBLE 0-1-0

Brass Ensemble is open to all students and community members who play brasswind instruments. The ensemble will perform a variety of music and can accommodate diverse brass instrumentation. **Prerequisite: Players must have prior playing experience on their instrument and at least moderate music reading skills. Players of small brass instruments must provide their own instrument in good working order. Larger instruments may be available from the University.**

MUS 1121 BRASS ENSEMBLE 0-1-1

Brass Ensemble is open to all students and community members who play brasswind instruments. The ensemble will perform a variety of music and can accommodate diverse brass instrumentation. **Prerequisite: Players must have prior playing experience on their instrument and at least moderate music reading skills. Players of small brass instruments must provide their own instrument in good working order. Larger instruments may be available from the University.**

MUS 1130 CHORAL CONCOURSE 0-1-0

The Choral Concourse is a large, mixed, vocal ensemble that will meet one evening a week and consist of Trine University students and community members. This ensemble will perform a variety of music and provide students and community members a secular vocal ensemble that rehearses in the evening.

Prerequisite: General knowledge of reading music and singing ability.

MUS 1131 CHORAL CONCOURSE 0-1-1

The Choral Concourse is a large, mixed, vocal ensemble that will meet one evening a week and consist of Trine University students and community members. This ensemble will perform a variety of music and provide students and community members a secular vocal ensemble that rehearses in the evening,

Prerequisite: General knowledge of reading music and singing ability.

MUS 1140 CHAMBER ORCHESTRA 0-1-0

The Chamber Orchestra is a performance ensemble designed for in-depth study, preparation and performance of all types of chamber orchestra literature. The Chamber Orchestra will play a mixture of string orchestra and full orchestra music. The ensemble performs at concerts and special events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1141 CHAMBER ORCHESTRA 0-1-1

The Chamber Orchestra is a performance ensemble designed for in-depth study, preparation and performance of all types of chamber orchestra literature. The Chamber Orchestra will play a mixture of string orchestra and full orchestra music. The ensemble performs at concerts and special events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1150 MARCHING BAND 0-1-0

The Marching Band is a performing ensemble designed to bring excitement and enthusiasm to Thunder football games and other special events and to offer the students of Trine University the opportunity to perform in a collegiate marching band with all of its spectacle and showmanship.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1151 MARCHING BAND 0-1-1

The Marching Band is a performing ensemble designed to bring excitement and enthusiasm to Thunder football games and other special events and to offer the students of Trine University the opportunity to perform in a collegiate marching band with all of its spectacle and showmanship.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1160 WIND ENSEMBLE/PEP BAND 0-1-0

Wind Ensemble/Pep Band is a performance ensemble designed for in-depth study, preparation and performance of all types of standard band literature. The ensemble performs at concerts and athletic events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1161 WIND ENSEMBLE/PEP BAND 0-1-1

Wind Ensemble/Pep Band is a performance ensemble designed for in-depth study, preparation and performance of all types of standard band literature. The ensemble performs at concerts and athletic events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1170 UNIVERSITY CHOIR 0-1-0

University Choir is a performance ensemble which offers students the opportunity to sing the finest choral music. Open to all university students.

Prerequisite: General knowledge of reading music and singing ability.

MUS 1171 UNIVERSITY CHOIR 0-1-1

University Choir is a performance ensemble which offers students the opportunity to sing the finest choral music. Open to all university students

Prerequisite: General knowledge of reading music and singing ability.

MUS 1180 JAZZ BAND 0-1-0

Jazz Band is a performance ensemble, designed for in-depth study, preparation and performance of all types of jazz band literature from swing to Latin, rock, fusion, etc. The ensemble performs at concerts and special events. Open to all university students. (May be taken multiple times.)

MUS 1181 JAZZ BAND 0-1-1

Jazz Band is a performance ensemble, designed for in-depth study, preparation and performance of all types of jazz band literature from swing to Latin, rock, fusion, etc. The ensemble performs at concerts and special events. Open to all university students. (May be taken multiple times.)

MUS 1190 JAZZ/SHOW CHOIR 0-3-0

The Jazz/Show Choir is a small audition vocal ensemble for experienced vocal musicians with good skills in sight reading, part reading, movement, and vocal production. As the name indicates, this ensemble performs music in the jazz and show genre.

Prerequisite: Students must audition with class instructor and other music faculty

MUS 1191 JAZZ/SHOW CHOIR 0-3-1

The Jazz/Show Choir is a small audition vocal ensemble for experienced vocal musicians with good skills in sight reading, part reading, movement, and vocal production. As the name indicates, this ensemble performs music in the jazz and show genre.

Prerequisite: Students must audition with class instructor and other music faculty

MUS 1200 MUSICAL THEATER/OPERA ENSEMBLE 0-3-0

This auditioned ensemble allows the singer to not only improve musical skills but also to develop sound stage movement and performance. This small ensemble uses mainstream musicals and operas as the primary source of literature and performs key scenes from the works.

MUS 1201 MUSICAL THEATER/OPERA ENSEMBLE 0-3-1

This auditioned ensemble allows the singer to not only improve musical skills but also to develop sound stage movement and performance. This small ensemble uses mainstream musicals and operas as the primary source of literature and performs key scenes from the works.

PHYSICS**PH 104 PHYSICAL SCIENCE 3-2-4**

A development of basic concepts and theories in the physical sciences and physics. Conceptual view of mechanics, thermodynamics, sound waves, electricity, magnetism, and optics.

PH 154 COLLEGE PHYSICS I 3-2-4

An algebra-based introduction to the concept and application of Newton's Law, linear and rotational motion, work, energy, and momentum, solids and fluids, heat, vibrations, waves and sounds. Experimental investigation of selected topics.

Prerequisites: MA 113, MA 123

PH 164 COLLEGE PHYSICS II 3-2-4

An algebra-based introduction to the concept and application of Coulomb's Law, capacitance, DC electric circuits, magnetism, electromagnetic induction, optics and optical instruments, and relativity and quantum physics. Experimental investigation of selected topics.

Prerequisites: PH 154

PH 224 UNIVERSITY PHYSICS I 3-2-4

Underlying principles of measurement, vectors, translatory, rotary, uniform, circular, and harmonic motion, work, power, energy, and physical properties of liquids, solids, gases, and statics. Also the fundamentals of heat: thermometry, expansion of liquids, solids and gases, calorimetry, heat transfer, elementary thermodynamics, and fluids. Experimental investigation of selected topics. **Prerequisite: MA 134**

PH 224H HONORS UNIVERSITY PHYSICS I 3-2-4

Topics covered include measurement, kinematics and dynamics of translational motion, kinematics and dynamics of rotational motion, momentum, work, mechanical energy, power, statics, properties of solids, and thermodynamics. Emphasis is on collaborative learning and inquiry as opposed to traditional lecture. Assignments include additional analysis, research methods. Students complete a research project. Experimental investigation of selected topics.

Prerequisites: MA 134 and admission to the Honors Program or permission of the instructor.

PH 234 UNIVERSITY PHYSICS II 3-2-4

Study of vibrations and wave motion: different types of simple harmonic motion, sound. Also the fundamentals of electric fields, Gauss's Law, electric potential, capacitance,

magnetism, direct, and alternating currents and circuits. Electromagnetic wave propagation and optics. Experimental investigation of selected topics.

Prerequisites: MA 164, PH 224

PH 234H HONORS UNIVERSITY PHYSICS II 3-2-4

Topics covered include oscillatory motion, wave motion, electrostatics, DC and AC circuits, magnetostatics, electromagnetism, and optics. Emphasis is on collaborative learning and inquiry as opposed to traditional lecture. Assignments include additional analysis, research methods. Students complete a research project. Experimental investigation of selected topics.

Prerequisites: PH 224, MA 164 and admission to the Honors Program or permission of the instructor.

PH 303 INTRODUCTION TO MODERN PHYSICS 3-0-3

Introduction to contemporary atomic and nuclear physics: special theory of relativity, particle properties of waves, wave properties of particles, atomic structure, first ideas of quantum mechanics.

Prerequisites: MA 233, PH 234

PH 323 ELECTROMAGNETISM 3-0-3

A study of electrostatics, special techniques for calculating potentials, electrostatic fields in matter, magnetostatic fields in matter, and Maxwell's equations.

Prerequisites: MA 233, PH 224, PH 234

PH 333 MECHANICS 3-0-3

The topics will be chosen based on the students' backgrounds from the following: fundamental laws of mechanics of particles and rigid body including vibrations and Lagrangian mechanics.

Prerequisites: MA 233, PH 234

PH 343 MATHEMATICAL METHODS IN PHYSICS 3-0-3

Emphasis on physics applications from the following topics: partial differential equations of mathematical physics. Orthogonal functions. Fourier series.

Prerequisites: MA 233, PH 234

PH 400X SPECIAL TOPICS IN PHYSICS VARIES (1-6 HRS.)

Selected fields of physics chosen for their mathematical, philosophical or technological interest. May be repeated with the approval of the Department Chair for a maximum of 6 credit hours.

Prerequisite: Permission of Department Chair

PHILOSOPHY

PHL 203 INTRODUCTION TO PHILOSOPHY 3-0-3

A study of the perennial problems of philosophy, such as the nature of knowledge, the role of the self, the existence of God, and the function of science. The contributions of the great thinkers of history to these problems are presented so that the student may find aid in forming his or her own philosophy.

PHL 251 ANCIENT GREECE FROM THE PERSIAN THROUGH PELOPONNESIAN WARS 1-0-1

An examination of the culture of Athens and Sparta during the 5th century B.C., concentrating on the Persian and Peloponnesian wars and their lasting effects on Western Civilization. (Same as HIS 251)

PHL 313 ETHICS 3-0-3

A study of ethical language, methods of justifying ethical decisions, and types of ethical value systems, with emphasis on practical applications in terms of personal and social morality.

Prerequisite: Junior standing or permission of instructor

PHL 323 PHILOSOPHY OF RELIGION 3-0-3

An inquiry into the nature of religious experience, activity and belief. An examination of the concepts of God, freedom, and immortality as well as the relationship of religious knowledge to artistic and scientific knowledge. **Prerequisite: Junior standing or permission of instructor**

PHL 333 ART, TECHNOLOGY AND SOCIETY 3-0-3

An interdisciplinary effort to place modern technology within a social, cultural, and historical context. **Prerequisite: ENG 113 or ENG 133 (Same as SOC 333)**

PHL 343 LOGIC 3-0-3

An examination of the function of language and the nature of meanings. Valid and invalid reasoning, deductive and inductive methods. Particular emphasis will be given to the application of formal techniques to the evaluation of arguments in everyday settings. The course is argument and language oriented. **Prerequisite: Junior standing or permission of instructor**

PLASTICS ENGINEERING TECHNOLOGY

PET 223 POLYMER STRUCTURES, PROPERTIES AND APPLICATIONS 3-0-3

A study of the structure and properties of plastics materials. Mechanical properties are emphasized, electrical properties, thermal properties, and environmental interactions are addressed as they apply to the design of products for the plastics industry.

Prerequisite: ETD 123 or ES 233

PET 224 PLASTICS PROCESSING AND TESTING 1-4-3

This course introduces the procedures used in evaluating plastics materials, test samples, and molded parts and the standard testing methods used for evaluation of plastics materials, in particular ASTM and ISO. Interpretation of testing results with respect to raw

materials selection, processing parameters, and part design considerations as well as the basic quality control and quality assurance techniques related to plastic testing will also be covered. **Co-requisite: PET 223 or equivalent polymer science course.**

PET 323 PLASTICS PRODUCT DESIGN 2-2-3

This course introduces the concepts of part design beginning with defining the customer and end-use requirements and moving through the entire design cycle and product application. The following areas are focused on: Material selection, prototyping and solid modeling, product drawing, review of basic design rules, form, fit and function in product application, part quality, relationship of tool design to part design, advanced tooling concepts, part costing and design to cost, end-use factors, and mechanical design with plastics will also be covered. **Prerequisite: PET 223 or equivalent polymer science course; ETD 173 or EGR 143**

PET 333 PLASTICS MOLD ENGINEERING AND DESIGN 2-2-3

This course introduces the concepts of mold design and details involved in the creation of single and multiple cavity plastic injection molds and products using solid modeling software. Analysis of mold cavity fill, gate location(s)-size, runner size, and balance will be evaluated with computer aided mold fill programs. Instruction on the theory, application and practices of: plastic materials, forming and molding methods/machines, mold: bases, venting, cooling, ejectors, materials, heat treatments, fabrication, and finishing practices will also be covered. **Prerequisite: PET 223 or equivalent polymer science course; ETD 173 or EGR 143**

PRE-LEGAL STUDIES

PL 4003 LEGAL CAPSTONE EXPERIENCE (3 HRS.)

The legal capstone experience will provide the opportunity to utilize the skills and knowledge the student has attained in their previous coursework in a concerted effort to prepare for and gain law school admission. **Prerequisite: Junior standing or permission of instructor**

PSYCHOLOGY

PSY 113 PRINCIPLES OF PSYCHOLOGY 3-0-3

Introduction to the scientific study of human and animal behavior. Course covers all of the major areas within psychology, including development, learning, intelligence, personality, attitudes, altered states of consciousness, abnormal behavior, and psychotherapy.

PSY 113H HONORS PRINCIPLES OF PSYCHOLOGY 3-0-3

Introduction to the scientific study of human and animal behavior. Course covers all of the major areas within psychology, including development, learning, intelligence, personality,

attitudes, altered states of consciousness, abnormal behavior, and psychotherapy. The course will involve more in-depth analysis of selected topics as well as more classroom activities than usually covered.

Prerequisite: Admission into the Honors Program or permission of the instructor

PSY 303 RESEARCH METHODS IN PSYCHOLOGY 3-0-3

An introduction to research methods employed in psychology, with special emphasis on experimental design. Topics include between and within-subjects designs, quasi-experimental designs, as well as research ethics and procedures for controlling extraneous variables.

Prerequisite: PSY 113

PSY 313 TOPICS IN PSYCHOLOGY 3-0-3

Survey, in detail, of one of the major areas of study within psychology. The course changes each semester with the specific topic of study announced in the class schedule.

Prerequisite: PSY 113

PSY 323 ABNORMAL PSYCHOLOGY 3-0-3

Survey of abnormal psychology, including such topics as clinical assessment, anxiety disorders, schizophrenia, personality disorders, age-related problems, depression, sexual dysfunctions, psychotherapy, and related legal and ethical questions arising within clinical psychology.

Prerequisite: PSY 113

PSY 333 PSYCHOLOGY OF PERSONALITY 3-0-3

An introductory survey of problems, methods, and theories; personality development and motivation, with emphasis on the normal contemporary theories of adjustment and idiodynamics.

Prerequisite: PSY 113

PSY 343 SOCIAL PSYCHOLOGY 3-0-3

An introduction to the measurement and principles of human interaction and group behavior including attitude change, prejudice, attraction, love, altruism, aggression, conformity, group dynamics, crowding, and other current social issues.

Prerequisite: PSY 113 (Same as SOC 343)

PSY 353 CHILD AND ADOLESCENT PSYCHOLOGY 3-0-3

An investigation into the development stages within the life of a human being, from birth through adolescence, with emphasis on the origin of personality and factors related to intellectual growth.

Prerequisite: PSY 113

PSY 363 BUYER BEHAVIOR 3-0-3

Studies in this course include consumer and organizational buying behavior, as well as determinants of this behavior. Consumer characteristics, including attitudes and behaviors, processing of information, as well as consumer cultural, psychological and

communication theories are also studied. Course also examines industrial perspectives; the unique aspects of organizational markets and how they differ from individual consumer behavior.

Prerequisite: Junior standing or permission of instructor (same as MK 363)

PSY 373 POLITICAL PSYCHOLOGY 3-0-3

An examination of the role of group dynamics and personality variables in contemporary political issues, including leadership and power, political attitudes, current social movements, conflict resolution, coalition formation, cross-cultural comparisons of political attitudes, and other issues.

Prerequisites: GOV 113 or PSY 113 (Same as GOV 373)

PSY 383 FORENSIC PSYCHOLOGY 3-0-3

A pragmatic review of the psychological and sociological theories and practices which seek to evaluate and analyze deviant human behavior and environments which precipitate criminal conduct. An introduction into the profiling and prediction of criminals and criminal behavior.

Prerequisite: PSY 113

PSY 393 SPORT PSYCHOLOGY 3-0-3

Study of the underlying mechanisms that coordinate individuals' thoughts, feelings and behavior, and how these processes are impacted by the sport setting. Psychological factors to be discussed include motivation and aggression. **Prerequisite: PSY 113 (same as SM 393)**

PSY 403 HUMAN SEXUALITY 3-0-3

A survey of the historical, cultural, and psychological origins of sex differences as they relate to sex role identity, stereotyping, and related behavior. **Prerequisite: PSY 113**

PSY 413 THE PSYCHOLOGY OF ADDICTION 3-0-3

A study of the psychological and sociological factors relating to the problems of addiction. Special attention will be given to the effects which alcohol and other drugs have upon fetuses, children, adults, families, and communities. **Prerequisite: PSY 113**

PSY 423 COUNSELING THEORIES AND PRACTICES 3-0-3

A thorough review of contemporary approaches to counseling. This course examines the major current theories and practices in psychotherapy in detail.

Prerequisite: PSY 323

PSY 443 ADVANCED FORENSIC PSYCHOLOGY 3-0-3

An in-depth study of the etiology of criminal behavior. A critical analysis of mentally disordered, psychopathic, and sexually disordered offenders. Students acquire profiling and prediction skills.

Prerequisites: PSY 383, junior or senior standing and Department Chair approval

PSY 453 CLINICAL INTERNSHIP I (3 HRS.)

Field experience in psychology related occupations such as local mental health centers, work with local counselors, or school psychologists. May be taken concurrently with PSY 463.

Prerequisites: Psychology major, senior standing and permission of the instructor

PSY 463 CLINICAL INTERNSHIP II (3 HRS.)

A continuation of PSY 453. May be taken concurrently with PSY 453.

Prerequisite: Psychology major, senior standing and permission of the instructor

PSY 473 PSYCHOLOGY CAPSTONE DEMONSTRATION (3HRS.)

This capstone will provide students the opportunities to integrate and synthesize previous course work in psychology. **Prerequisite: All required coursework in Psychology core**

PSY 400X INDEPENDENT STUDIES IN PSYCHOLOGY VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research, or supervised field work. Maximum four hours credit.

Prerequisite: Permission of Department Chair

SCIENCE

SCI 400X INDEPENDENT STUDIES IN SCIENCE VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research, or supervise field work.

Prerequisite: Permission of the Department Chair

SCI 412 SENIOR RESEARCH SEMINAR 1-3-2

Project selection, initial preparation, and preliminary data collection for a major science research project that integrates several scientific disciplines, methods of analysis, the reporting of conclusions and communication skills. Course continues in SC 422.

Prerequisite: Permission of the Department Chair

SCI 422 SENIOR RESEARCH PROJECT 0-6-2

An integrated research project that incorporates the basic and advanced sciences, mathematics and communication skills. This course must be taken the semester immediately following SC 412.

Prerequisite: SC 412 and senior standing

SCI 43X SCIENCE INTERNSHIP VARIES (2-4 HRS.)

An extended professional work experience in an area related to the student's major. The work experience consists of at least 80 hours of documented work hours (which is equal to 2 hours of credit). **Prerequisite: Permission of Department Chair**

SPORT MANAGEMENT

SM 133 CONTEMPORARY ISSUES IN SPORT 3-0-3

Discussion of the problems and issues facing sport managers today. Analysis of the relationship between sport and culture. Topics may include commercialization, amateurism and socialization in sport.

SM 223 HISTORY OF PHYSICAL EDUCATION AND SPORT 3-0-3

The significance of physical education and sport from the ancient Greeks through modern times. The development of physical education as a broad-based academic discipline and sport management as a natural outgrowth of the field.

SM 253 RISK MANAGEMENT 3-0-3

Consideration of the legal aspects involved with physical education and sport activities. Emphasis on negligence case law, liability issues and facility safety.

SM 313 PRINCIPLES OF SPORT AND RECREATION MANAGEMENT 3-0-3

A study of the management, marketing, financial and legal principles within a sports and recreation operation and the primary components and support structures of the industry. The purpose is to examine and gain an understanding of all facets of running a team or sporting organization. A significant research project will be due at the end of the course.

Prerequisite: Junior standing or permission of instructor

SM 323 LEADERSHIP IN SPORT AND RECREATION 3-0-3

Investigation of leadership theories and practical applications for managers in sport and recreation settings. Exploration of the interrelationship between leadership and group dynamics.

Prerequisite: Junior standing or permission of instructor

SM 393 SPORT PSYCHOLOGY 3-0-3

Study of the underlying mechanisms that coordinate individuals' thoughts, feelings and behavior, and how these processes are impacted by the sport setting. Psychological factors to be discussed include motivation and aggression. **Prerequisite: PSY 113 (same as PSY 393)**

SM 403 INTERNSHIP IN SPORT MANAGEMENT (3 HRS.)

Observation of and participation in a field-related experience under the direction of a field supervisor and a University supervisor. Must have the approval of the Department Chair

Prerequisite: Junior standing or permission of instructor

SM 404 CAPSTONE EXPERIENCE IN SPORT MANAGEMENT 4-2-4

The culminating final project of a Sport Management major. With the guidance of a professor the student will research a topic related to sport and the industry of sports and write a significant paper with cited references and statistics that examines the issue in great detail. Topics must be approved by the mentoring professor and the student must present his/her research in an open forum to selected faculty members for their examination. **Prerequisite: Junior standing or permission of instructor**

SM 412 BUSINESS PLANNING IN SPORT AND RECREATION 2-0-2

The creation of a business plan for a sport/recreation operation. **Prerequisite: LAW 203**

SM 413 ORGANIZATION & ADMINISTRATION OF PHYSICAL EDUCATION AND ATHLETICS 3-0-3

Theories establishing the procedures for facility, curriculum and faculty development in physical education and athletics are examined. **Prerequisite: Junior standing or permission of instructor**

SM 416 INTERNSHIP IN SPORT MANAGEMENT (6 HRS.)

Observation of and participation in a field-related experience under the direction of a field supervisor and a University supervisor. Must have the approval of the Department Chair
Prerequisite: Junior standing or permission of instructor

SM 453 FACILITY PLANNING 3-0-3

The purpose of this class is to examine all the variables an administrator must consider when building or remodeling a sport or fitness facility. Cost, construction, materials, legal issues, and handicap accessibility are a few of the topics to be discussed. Field trips to local sport facilities and arena's will be scheduled. The design of a new facility is one of the class projects. **Prerequisite: Junior standing or permission of instructor**

SOCIOLOGY

SOC 103 PRINCIPLES OF SOCIOLOGY 3-0-3

A presentation of the basic concepts and principles of sociology, designed to develop a system of thought about the nature of society and major special issues, such as ethnic patterns, social stratification, youth, educational, and religious institutions.

SOC 313 TOPICS IN SOCIOLOGY 3-0-3

Selected topics in sociological content such as criminology, minority groups, urbanization, and the like. Topics will vary from semester to semester.

Prerequisite: SOC 103

SOC 323 THE FAMILY 3-0-3

An analysis of problems and relationships in the family setting: divorce, mobility, generation differences, changing role of women and youth, delinquency, cross cultural patterns.

Prerequisite: PSY 113 or SOC 103

SOC 333 ART, SOCIETY AND TECHNOLOGY 3-0-3

An interdisciplinary effort to place modern technology within a social, cultural and historical context.

Prerequisite: ENG113 or ENG 133 (same as PHL 333)

SOC 343 SOCIAL PSYCHOLOGY 3-0-3

An introduction to the measurement and principles of human interaction and group behavior, including attitude change, prejudice, attraction, love, altruism, aggression, conformity, group dynamics, crowding, and other current social issues.

Prerequisite: PSY 113 (Same as PSY 343)

SPEECH**SP 103 INTRODUCTION TO THEATER 3-0-3**

Understanding the roles of playwrights, actors, directors, designers, and audiences within the "living art" of theater. Demonstrates the relationship between art and culture through the study of, participation in, and viewing of theater.

SP 203 EFFECTIVE SPEAKING 3-0-3

Application of communication principles to improve extemporaneous public speaking and listening skills. Considers principles of audience analysis and rhetorical invention, worthy and effective evidence and inductive reasoning, speaker and source credibility, organization and outlining, effective speaker-audience interaction, listening for comprehension, and critical listening. **Prerequisite: ENG 113 or ENG 133**

SPANISH**SPN 103 SPANISH CONVERSATION I 3-0-3**

An introduction to the Spanish language with an emphasis on functional conversation skills. Vocabulary development and pronunciation within communicative contexts are stressed. No previous study of Spanish is required.

SPN 113 SPANISH READING AND WRITING I 3-0-3

An introduction to the Spanish language with an emphasis on reading and writing in Spanish. Vocabulary development and the basics of Spanish structure are also covered. No previous study of Spanish is required.

SPN 123 SPANISH II 3-0-3

A continuation of Spanish 113, integrating listening, speaking, reading, and writing skills. Basic grammar and Latin American and Spanish cultures are covered.

Prerequisite: SPN 113 or by placement

SPN 203 SPANISH III 3-0-3

An intermediate Spanish class with an emphasis on reading and writing skills and grammar review. Students explore Hispanic culture through readings based on historical as well as current events. Conversational skills are also emphasized. **Prerequisite: SPN 123 or by placement**

SPN 213 SPANISH IV 3-0-3

A continuation of Spanish III, with an emphasis on increasing reading speed and comprehension as well as improving writing fluency and accuracy. The difficulty level of the reading selections increases in this course. **Prerequisite: SPN 203**

UNIVERSITY EXPERIENCE

UE 012 ACADEMIC FOUNDATIONS 2-1-0

This course helps students develop the proficiency needed to be successful in other college courses. The focus is on preparing students to do college level reading and writing and learning by building on each student's academic skills. This is a non-credit, preparatory class.

UE 101 UNIVERSITY EXPERIENCE 1-0-1

This course offers resources for success in learning for students new to Trine University. This course will assist students in becoming more proficient learners, understanding self and others, and learning personal life skills. This course will present information about Trine University offices and services to familiarize students with resources and procedures.

UE 201 Success Skills and Reflection 1-0-1

This course provides an opportunity to build and reflect on college success skills. It is required for students on academic probation.

UE 301 PEER MENTORING 1-0-1

This course trains a student to provide mentoring for second-year students at Trine University. **Prerequisite: Junior standing or permission of instructor**

WOMEN'S STUDIES

WS 103 INTRODUCTION TO WOMEN'S STUDIES 1-0-3

Introduction to Women's Studies offers an interdisciplinary exploration of the psycho-sociological construction of a woman's gender identity. It analyzes the historical progression of gender roles and feminist theory through a confluence of social, cultural, economic, political, geographic, and institutional pressures. The course examines how these components intersect in order to define what it is to be a woman in contemporary times.

Prerequisite: ENG 103 or ENG 104; Prerequisite or Corequisite: ENG 113 or ENG 133

CALENDAR

Fall 2013/Spring 2014

Fall Semester 2013

August 20	FALL CLASSES BEGIN
September 2	LABOR DAY
October 14 & 15	FALL BREAK
November 27-29	THANKSGIVING BREAK
December 6	LAST CLASS DAY
December 9-12	FINALS
December 14	ONLINE CLASSES END

Spring Semester 2014

January 7	CLASSES BEGIN
January 20	MARTIN LUTHER KING JR. DAY
March 3-7	SPRING BREAK
April 18	GOOD FRIDAY
April 25	LAST CLASS DAY
April 28-May 1	FINALS
May 3	COMMENCEMENT