

UNIVERSITY OF HOUSTON-CLEAR LAKE

2014-2015 UNDERGRADUATE ADDENDUM

Veteran Services

Pages 57-58

It is the mission of the Office of Veteran Services staff to help veterans and their dependents flourish in their higher education pursuits. We will act as a liaison between the veteran, the school and the Department of Veteran Affairs in order to ensure these goals are reached with success. The Office of Veteran Services is located in the Student Services Building, in Room 3.201. Students who have been approved for education benefits by the Veterans Affairs Regional Office should contact this to establish their benefits at UHCL. Students receiving GI Bill benefits must comply with the universities deadlines for registering and payment of courses.

To be certified for VA educational benefits veterans must be accepted for admission at UHCL and submit the required documents. For a complete list of documents required, please contact the Office of Veteran Services.

Veterans must notify the Office of Veteran Services of any change in course load throughout each semester.

Rate of Pursuit:

Undergraduate

TERM	FULL TIME	¾ TIME	½ TIME
Fall and Spring Semester	12 hours	9 hours	6 hours
8 or 9 week summer session	6 hours	5 hours	3-4 hours
4 or 5 week summer session	4 hours	3 hours	1 hour
BAH Totals:	(100%)	(80%)	(0%)

Satisfactory Academic Progress for VA Benefits

Satisfactory academic progress for veterans receiving VA educational benefits is defined by VA. Undergraduates must maintain a cumulative GPA of 2.000.

Veterans failing to achieve the required cumulative GPA will be placed on probation for one semester. At the end of the probationary semester, veterans who:

- Have not achieved the required semester GPA will be reported to VA as making unsatisfactory academic progress.
- Have achieved the required semester GPA but not the required cumulative GPA will continue to be on probation.

Hazlewood Act

The Hazlewood Act passed by the Texas legislature provides for a waiver of tuition and certain fees for Texas veterans. A veteran may qualify for benefits under the Hazlewood Act if he or she:

- Was a Texas resident at the time of entry into the armed forces of the United States.
- Served at least 181 consecutive days of active military duty (calculated as the sum of items in 12(c) and 12(d) on Member 4 copy of the DD214) not including training days.
- Received an honorable discharge, a general discharge under honorable conditions, or an honorable release from active duty.
- Has resided in Texas for at least 12 months or otherwise meets the state requirements for being considered a resident of Texas at the time of enrollment at UHCL.
- Has attempted fewer than 150 credit hours of college courses since fall 1995 using the Hazlewood exemption.
- Is not in default on any educational loans made or guaranteed by the State of Texas.
- Completes a required statewide application for Hazlewood exemption from Texas Higher Education Coordinating Board before the census date of each semester.

- Meet the GPA requirement of the institution's satisfactory academic progress policy in a degree or certificate program as determined by the institution's financial aid policy. (Effective fall 2014)

Hazlewood benefits are not transferred from one state university to another. Veterans must reapply and provide UHCL with all necessary documents, including a completed Hazlewood Application (available at www.uhcl.edu/finaid under Veteran Affairs), a DD-214 (Honorable discharge, Home of Record, and six months of service must appear on DD-214) and a letter from VA stating all VA Benefits have been exhausted (unless the veteran has been out of the military for more than 10 years).

The Legacy Act allow veterans eligible for the Hazlewood Act to transfer unused Hazlewood hours to an eligible child. Eligible children are the biological child, stepchild, or adoptive child of a veteran that are:

- Claimed on the veteran's federal income tax return (Alternatively, the veteran can be listed as a parent on the student's birth certificate.)
- A resident of Texas
- Making satisfactory progress toward degree completion
- 25 years of age or younger, unless the child provides documentation from a physician indicating he or she suffered from a severe illness or other debilitating condition which prevented the child from using the exemption before the age of 25.

Students interested in using this benefit should contact the Office of Veteran Services for application instructions.

State VA programs change frequently. Please contact the Office of Veteran Services for any program updates.

Hazlewood Exemption Deadline

If the student provides his or her eligibility for the Hazlewood Exemption before the end date of each semester, then the institution must honor the waiver. But, all students must turn in a statewide Hazlewood application to their institution by the census date. However, all other supporting documentation can have extensions on them.

Special Fees

GRADUATION APPLICATION FEE

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Includes diploma but not cap/gown: \$80. For Professional Account students, the student application will be \$95. A late fee of \$20 is added if applying late.

General Program Requirements

FRESHMAN AND SOPHOMORE STUDENTS TAKING UPPER LEVEL COURSES

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Students with less than 48 hours of college credit at the 1000/2000 level cannot enroll in 3000/4000 level courses.

School of Business

EXAM AND QUIZ PROCTORING

Pages 115-116

General Degree Requirements for Business Degrees

Faculty using exams and quizzes that constitute a significant percentage of course grades require proctored exams and quizzes in online, face-to-face, and hybrid courses. ProctorU is used to proctor exams and quizzes in online courses at student expense. Course syllabi will contain information about the cost of ProctorU. Exams and quizzes will have a face-to-face proctoring option for students who do not want to use ProctorU for online exams and quizzes. When face-to-face proctoring occurs at UHCL for online courses, exams and quizzes will be proctored at prescribed times that do not conflict with times at which face-to-face and hybrid courses are scheduled.

School of Education

INTERDISCIPLINARY STUDIES B.S. WITH 4-8 GENERALIST CERTIFICATION-CHANGE

COURSE

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Pedagogy Requirements:

TCED 4333	Mathematics Methods for Grades 4-8
TCED 4331	Social Studies Methods for Grades 4-8
TCED 4332	Science Methods for Grades 4-8
TCED 4378	Pre-Service Internship I
TCED 4978	Pre-Service Internship II

GEOGRAPHY B.S. WITH 7-12 SOCIAL STUDIES CERTIFICATION

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NOTE: This degree requires 127 credit hours.

University Core (42 hours)

Communication (6 hours)

WRIT 1301	Composition I
WRIT 1302	Composition II

Mathematics (3 hours)

Choose ONE course from the following:

MATH 1314	College Algebra
	Or
MATH 1332	Mathematics for Liberal Arts

Life and Physical Science (6 hours)

Choose TWO courses from the core approved list. Accompanying lab must be taken in the same semester.

Language, Philosophy, and Culture (3 hours)

Choose ONE course from the core approved list.

Creative Arts (3 hours)

Choose ONE course from the core approved list.

U.S. History (6 hours)

HIST 1301	United States History I
HIST 1302	United States History II

Government/Political Science (6 hours)

POLS 2305	Federal Government
POLS 2306	Texas Government

Social Behavioral Sciences (3 hours)

Choose ONE course from the following:

ECON 2301	Principles of Macroeconomics
ECON 2302	Principles of Microeconomics

Component Area Option (6 hours)

COMM 1315 Public Speaking

PSYC 1100	Learning Frameworks
	Two 1-hour Life or Physical Science Labs - required co-requisites for the chosen science courses.

School of Human Sciences and Humanities (6 hours)

48 hours of upper-level credit must be "C" or better.

Any 30000/4000-level course chosen from ARTS, COMM, HIST, HUMN, LITR, PHIL, WRIT

Core Requirement (3 hours)

WRIT 3307	Advanced Writing
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Advanced Writing - Grade of "B-" or better is required.

School of Education Requirements (18 hours)

Core Requirement

EDUC 4310	Theories of Educational Psychology
INST 3313	Survey of Instructional Technologies
SILC 4315	Theories of American Pluralism
SPED 2301	Introduction to Special Populations
SPED 4300	Survey of Exceptionalities
TCED 1301	Exploring Teaching as a Profession

Teacher Education Program (TEP) Admission Requirements

- Completion of 60 semester credit hours.
- Completion of prerequisite coursework (EDUC 4310 Theories of Educational Psychology, INST 3313 Survey of Instructional Technologies, & SILC 4315 Theories of American Pluralism).
- Completion of Public Speaking requirement.
- Completion of Basic Skills in Reading, Mathematics, and Writing.
- 2.750 GPA overall or in the last 60 semester credit hours.
- Completion of 12 semester credit hours in the subject-specific content area for target teacher certification.
- Application for admission to the Teacher Education Program (TEP).

Major Requirements (46 hours)

Courses

GEOG 1301	Modern Physical Geography
GEOG 1303	World Regional Geography
GEOG 4300	Geography of the United States and Canada
GEOG 4301	Urban Geography
GEOG 4302	Geography of Latin America
GEOG 4303	Geography of Texas
GEOG 4312	Human Geography
GEOG 4314	Geographic Concepts and Skills
GEOG 4317	International Political Economy
GEOG 4321	Fundamentals of Geographic Information Systems
HIST 3339	Texas and the Borderlands
	Two History Electives
LLS 4351	Reading in Content Subjects
TCED 4100	Senior Seminar EC-12
TCED 4306	Creating Positive Learning Environments in 7-12

- GPA of 2.500 or higher required in GEOG and HIST coursework.

Pedagogy Requirements (15 hours)

TCED 4361	Methods in Secondary Social Studies
TCED 4378	Pre-Service Internship I
TCED 4978	Pre-Service Internship II

- Enrollment in the courses listed above requires admission to the TEP.
- 3.000 GPA required in Pedagogy coursework.
- TCED 4378 Pre-Service Internship I must be taken in the long semester immediately preceding the final semester.
- TCED 4978 Pre-Service Internship II must be taken in the final semester.

Teacher Certification Requirements

- Passing scores on the appropriate state assessments (Texas Examinations of Educator Standards [TExES]) are required for recommendation for teacher certification.
 - 7-12 Social Studies TExES #232
 - EC-12 Pedagogy and Professional Responsibilities TExES #160
- All courses outside the University Core must be "C-" or better.

REMOVE PRE-REQUISITE FOR ECED 4322

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ECED 4322 - Cultural Awareness for Young Children

Focus on impact of diversity on development of young children. The influence of culture and social class on children's socialization and cognition will be discussed. Research and theories to support the development of minority children will be emphasized.

REMOVE PRE-REQUISITE FOR SPED 2301

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SPED 2301 - Introduction to Special Populations

This course provides an overview of schools and classrooms from the perspectives of language, gender, socioeconomic status, ethnic and academics.

School of Human Sciences and Humanities

REGISTERED NURSE-BACHELOR OF SCIENCE NURSING B.S.N.

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The RN-BSN program is customized for registered nurses who want to earn a bachelor's degree in nursing. The program provides an opportunity for a registered nurse (RN) to pursue a Bachelor of Science in Nursing (BSN) degree in one to two years depending upon full-time/part-time status. The degree features a primarily didactic program and experiential learning experiences. Moreover, the program allows registered nurses to enhance their managerial and leadership skills and advance as nurse managers in various healthcare provider and payer organizations. A BSN is a prerequisite for admission to graduate nursing programs in research, consulting, and teaching. The BSN can open doors not only for those seeking academic progression but also for those seeking careers in nursing education.

The BSN program is designed to expand the knowledge and skills beyond the clinical aspects of nursing that are generally acquired while preparing for the Associate of Applied Science in Nursing (AASN) diploma and the RN licensure examinations. As such, it focuses on expanding the horizons of graduates by giving them a much more extensive background in evidence-based practice, patient safety, legal issues, ethical standards, and technology integration as well as healthcare systems and policies. The BSN will also allow students to receive crucial training in key areas such as communication, leadership, critical thinking, and clinical reasoning: students will therefore gain much-needed knowledge to deal effectively with the complex and changing future of healthcare delivery. In doing so, students will be provided with opportunities to use evidence-based practice to analyze a variety of issues in professional nursing practice that are essential for providing effective leadership in nursing care across the healthcare continuum.

The UHCL BSN program will be offered in two distinct format “tracks.” There will be a full-time track for RN-BSN students who are capable of taking a full semester load (12-15 course credit hours). There will also be a part-time track (6-9 credit hours) for those nurses who are working and cannot commit to the 12-15 credit hours per semester needed to be full-time students. It is expected that students pursuing the full-time track will be able to complete the RN-BSN in 4-5 semesters (summers included). Students pursuing the part-time track will be able to complete the RN-BSN in 6-8 semesters (summers included). It is anticipated that the majority of the Nursing courses will be offered at the Pearland campus during weekdays in the morning, afternoon, and/or early evening time frames.

Applications for acceptance into the BSN program will open generally in the middle to late spring semester. Students accepted for the fall class will be notified starting in mid-June. Students accepted for the spring class will be notified starting in mid-November. Application details are on the Health Science and Humanities (HSH) web page. The typical cohort size is 30 students.

University Core (42 hours)

Communication (6 hours)

WRIT 1301	Composition I
WRIT 1302	Composition II

Mathematics (3 hours)

MATH 1314	College Algebra
	Or
MATH 1332	Mathematics for Liberal Arts
	Or
MATH 1342	Elementary Statistical Methods

Language, Philosophy, and Culture (3 hours)

Choose ONE course from the core approved list.

Creative Arts (3 hours)

Choose ONE course from the core approved list.

U.S. History (6 hours)

HIST 1301	United States History I
HIST 1302	United States History II

Government/Political Science (6 hours)

POLS 2305	Federal Government
POLS 2306	Texas Government

Public Speaking (3 hours)

COMM 1315	Public Speaking
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Life and Physical Sciences (6 hours)

BIOL 2301	Anatomy & Physiology I
BIOL 2302	Anatomy & Physiology II

Social and Behavioral Sciences (3 hours)

PSYC 2301	Introduction to Psychology
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Additional Coursework (3 hours)

PSYC 1100	Learning Frameworks
BIOL 2101	Laboratory for Anatomy and Physiology I
BIOL 2102	Laboratory for Anatomy and Physiology II

School of Human Sciences and Humanities requirement

30 hours of resident, upper-level credit must be “C” or better.

Nursing Core Requirements (33 hours)

BIOL 2321	Microbiology for Science Majors
BIOL 2121	Laboratory for Microbiology for Science Majors
PSYC 2314	Lifespan and Growth Development
RNSG Courses	26 hours of course work from Associate Degree in Nursing program

Major Requirements (30 hours)

Courses (one of the courses below must be writing-intensive)

NURS 3311	History and Theories of Nursing
NURS 3313	Community Health Nursing
NURS 3314	Trends and Issues in Nursing Practices
NURS 3323	Community Health Nursing Project
NURS 4311	Role Transition
NURS 4312	Legal and Ethical Issues
NURS 4313	Nursing Research
NURS 4314	Advanced Leadership and Management
NURS 4324	Advanced Leadership and Management Practicum
	PSYC 4370 Behavioral Statistics

Electives (15 hours)

15 additional hours can be used to fulfill UHCL residency requirements and/or lacking University Core Curriculum courses.

Choose among the listed 3000-/4000-level classes below.

BIOL 4346	Pathophysiology
HADM 3311	Foundations of Healthcare Administration Leadership
HLTH 4303	Nutrition and Weight Management
HLTH 3315	Health Promotion Programs
PSYC 3315	Psychological Thinking
PSYC 3332	Family Psychology
PSYC 4337	Violence Against Women
SOCI 4304	Professional Issues in Human Services
SOCI 4308	Introduction to Women’s Studies
SOCI 4356	The Aging Experience
WRIT 3312	Written Communications in Business

LITERATURE BA WITH 7-12 ENGLISH LANGUAGE ARTS AND READING CERTIFICATION

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Major Requirement hours is 46 not 52.

GEOGRAPHY B.S.

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The Geography Program offers two undergraduate degrees, a Bachelor of Science and a Bachelor of Science with 7-12 Social Studies Certification.

All students complete a core within geography that provides a broad background in the discipline and prepares them for pursuing the Geography degree. The Bachelor of Science emphasizes proficiency in human geography and human/environment interactions and develops skills in geospatial technologies. Students are encouraged to develop with their advisor an individualized program of study within this degree. The Bachelor of Science with 7-12 Social Studies Certification prepares future social studies teachers. In addition to a core of geography courses, the degree plan requires education courses that lead to certification.

University Core (42 hours)

Communication (6 hours)

WRIT 1301 Composition I
WRIT 1302 Composition II

Mathematics (3 hours)

MATH 1314 College Algebra
Or
MATH 1332 Mathematics for Liberal Arts

Life and Physical Science (6 hours)

Choose TWO courses from the core approved list. Accompanying lab must be taken in the same semester.

Language Philosophy and Culture (3 hours)

Choose ONE course from the core approved list.

Creative Arts (3 hours)

Choose ONE course from the core approved list.

U.S. History (6 hours)

HIST 1301 United States History I
HIST 1302 United States History II

Government/Political Science (6 hours)

POLS 2305 Federal Government
POLS 2306 Texas Government

Social Behavioral Sciences (3 hours)

Choose ONE course from the core approved list.

Cannot choose GEOG 1303 World Regional Geography

Component Area Option (6 hours)

COMM 1315 Public Speaking
PSYC 1100 Learning Frameworks

Two 1-hour Life or Physical Science Labs - required co-requisites for the chosen science courses.

School of Human Sciences and Humanities (3 hours)

Core Requirement (3 hours)

WRIT 3307 Advanced Writing
Advanced Writing - Grade of "B-" or better is required.

Major Requirements (36 hours)

Any 3000/4000-level course chosen from ARTS, COMM, HIST, HUMN, LITR, PHIL, or WRIT

Sociology Course

SOCI 4384 Statistics

Geography Courses

GEOG 1301	Modern Physical Geography
GEOG 1303	World Regional Geography
GEOG 4300	Geography of the United States and Canada
GEOG 4301	Urban Geography
GEOG 4302	Geography of Latin America
GEOG 4303	Geography of Texas
GEOG 4312	Human Geography
GEOG 4317	International Political Economy
GEOG 4321	Fundamentals of Geographic Information Systems
GEOG 4323	Advanced Geographic Information Systems

Electives (39 hours)

Hours chosen in consultation with faculty advisor.

GEOGRAPHY B.S. WITH 7-12 SOCIAL STUDIES CERTIFICATION

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NOTE: This degree requires 127 credit hours.

University Core (42 hours)

Communication (6 hours)

WRIT 1301	Composition I
WRIT 1302	Composition II

Mathematics (3 hours)

Choose ONE course from the following:

MATH 1314	College Algebra
	Or
MATH 1332	Mathematics for Liberal Arts

Life and Physical Science (6 hours)

Choose TWO courses from the core approved list. Accompanying lab must be taken in the same semester.

Language, Philosophy, and Culture (3 hours)

Choose ONE course from the core approved list.

Creative Arts (3 hours)

Choose ONE course from the core approved list.

U.S. History (6 hours)

HIST 1301	United States History I
HIST 1302	United States History II

Government/Political Science (6 hours)

POLS 2305	Federal Government
POLS 2306	Texas Government

Social Behavioral Sciences (3 hours)

Choose ONE course from the following:

ECON 2301	Principles of Macroeconomics
ECON 2302	Principles of Microeconomics

Component Area Option (6 hours)

COMM 1315 Public Speaking

PSYC 1100	Learning Frameworks
	Two 1-hour Life or Physical Science Labs - required co-requisites for the chosen science courses.

School of Human Sciences and Humanities (6 hours)

48 hours of upper-level credit must be "C" or better.

Any 3000/4000-level course chosen from ARTS, COMM, HIST, HUMN, LITR, PHIL, WRIT

Core Requirement (3 hours)

WRIT 3307	Advanced Writing
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Advanced Writing - Grade of "B-" or better is required.

School of Education Requirements (18 hours)

Core Requirement

EDUC 4310	Theories of Educational Psychology
INST 3313	Survey of Instructional Technologies
SILC 4315	Theories of American Pluralism
SPED 2301	Introduction to Special Populations
SPED 4300	Survey of Exceptionalities
TCED 1301	Exploring Teaching as a Profession

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- Completion of Public Speaking requirement.
- Completion of Basic Skills in Reading, Mathematics, and Writing.
- 2.750 GPA overall or in the last 60 semester credit hours.
- Completion of 12 semester credit hours in the subject-specific content area for target teacher certification.
- Application for admission to the Teacher Education Program (TEP).

Major Requirements (46 hours)

Courses

GEOG 1301	Modern Physical Geography
GEOG 1303	World Regional Geography
GEOG 4300	Geography of the United States and Canada
GEOG 4301	Urban Geography
GEOG 4302	Geography of Latin America
GEOG 4303	Geography of Texas
GEOG 4312	Human Geography
GEOG 4314	Geographic Concepts and Skills
GEOG 4317	International Political Economy
GEOG 4321	Fundamentals of Geographic Information Systems
HIST 3339	Texas and the Borderlands
	Two History Electives
LLLS 4351	Reading in Content Subjects
TCED 4100	Senior Seminar EC-12
TCED 4306	Creating Positive Learning Environments in 7-12

- GPA of 2.500 or higher required in GEOG and HIST coursework.

Pedagogy Requirements (15 hours)

TCED 4361	Methods in Secondary Social Studies
TCED 4378	Pre-Service Internship I
TCED 4978	Pre-Service Internship II

- Enrollment in the courses listed above requires admission to the TEP.
- 3.000 GPA required in Pedagogy coursework.
- TCED 4378 Pre-Service Internship I must be taken in the long semester immediately preceding the final semester.
- TCED 4978 Pre-Service Internship II must be taken in the final semester.

Teacher Certification Requirements

- Passing scores on the appropriate state assessments (Texas Examinations of Educator Standards [TExES]) are required for recommendation for teacher certification.
 - 7-12 Social Studies TExES #232
 - EC-12 Pedagogy and Professional Responsibilities TExES #160
- All courses outside the University Core must be "C-" or better.

PUBLIC SERVICE LEADERSHIP B.S.

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Overview Requirement PSYC 3311, "Careers and Writing in Psychology," is replaced with PSYC 3331, "Personality."

School of Science and Computer Engineering

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ASTR - Astronomy and Space Science

ASTR 1103 - Laboratory for Stars and Galaxies

Laboratory experiments and activities in stellar and galactic astronomy.

Corequisite: ASTR 1303

ASTR 1104 - Lab for Solar System

Laboratory experiments and activities in observational and solar system astronomy.

Corequisite: ASTR 1304

ASTR 1303 - Stars and Galaxies

Part of a two semester survey course in astronomy intended for both science and non-science majors. Properties of the sun and stars, stellar spectra, stellar formation, life and death of stars, formation of the elements, black holes, galaxies, expansion of the universe and cosmology.

Corequisite: ASTR 1103

ASTR 1304 - Solar System

Part of a two semester survey course in astronomy intended for both science and non-science majors. History of astronomy, Copernican revolution, astronomical observation, physics of planetary motion, comparative study of planet surfaces and atmospheres, moons, asteroids, comets, planetary system formation and exoplanets.

Corequisite: ASTR 1104

ASTR 1373 - Life in the Universe

Non-technical account of origin of the universe, origin and evolution of life and possibilities for finding life on other planets, including the Search for Extra-Terrestrial Intelligence. Cannot be counted as physical science elective for purposes of teacher certification or as an elective for science majors.

ASTR 3311 - Modern Astronomy

Introduction to the history and development of astronomy; telescope optics; laws of planetary motion; planetary structures, atmospheres and surfaces; the sun; elements of astrophysics; stellar structure and evolution; galactic structure and evolution; cosmology. Some telescope observation sessions as "seeing" permits. Not available for graduate credit in Physical Sciences.

ASTR 4311 - Universal Origins

Origin of the universe, the Earth and life.

Prerequisite: General Chemistry, and University or College Physics.

ASTR 4312 - Principles of Astrobiophysics

Overview of the search for life in the universe, including origin and evolution of habitable planets in the solar system and beyond.

Prerequisite: General Chemistry, and University or College Physics.

ASTR 4391 - Selected Topics in Space Science

Identified by specific title each time course is offered.

BIOL - Biology

BIOL 1106 - Lab for Biology for Science Majors I

Laboratory exercises in basic biochemistry, cell biology, cell metabolism and energetics, photosynthesis, genetics, evolution, taxonomy, bacteria and viruses.

Corequisite: BIOL 1306

BIOL 1107 - Lab for Biology for Science Majors II

Laboratory exercises relating to fungi, protists, plants, plant function, animals, animal physiology and ecology.

Prerequisite: BIOL 1106

Corequisite: BIOL 1307

BIOL 1306 - Biology for Science Majors I

A general biology course including basic biochemistry, cell biology, cell metabolism and energetics, photosynthesis, genetics, evolution, taxonomy, bacteria and viruses.

Corequisite: BIOL 1106

BIOL 1307 - Biology for Science Majors II

A continuation of Biology for Science Majors I with emphasis on fungi, protists, plants, plant function, animals, animal physiology and ecology.

Corequisite: BIOL 1107

BIOL 2101 - Laboratory for Anatomy and Physiology I

This lab course studies the chemical and cellular levels of organization. The study of the structure and function of the integumentary, skeletal, muscular, nervous and endocrine systems. Not for Biology or Health Profession majors.

Corequisite: BIOL 2301

BIOL 2102 - Lab for Anatomy and Physiology II

This lab course studies the structure and function of the cardiovascular, respiratory, digestive, urinary and reproductive systems. Basic principles of human genetics are included. Not for Biology or Health Profession majors.

Corequisite: BIOL 2302

BIOL 2121 - Laboratory for Microbiology for Science Majors

Laboratory exercises using culture of microorganisms grown on selected media.

Prerequisite: BIOL 1306, BIOL 1307 or equivalent.

Corequisite: BIOL 2321

BIOL 2301 - Anatomy & Physiology I

The study of chemical and cellular levels of organization focuses on the structure and function of the integumentary, skeletal, muscular, nervous and endocrine systems. Not for Biology or Health Profession majors.

Corequisite: BIOL 2101

BIOL 2302 - Anatomy & Physiology II

The structure and function of the cardiovascular, respiratory, digestive, urinary and reproductive systems are emphasized. Basic principles of human genetics are included. Not for Biology or Health Profession majors.

Prerequisite: BIOL 2301

Corequisite: BIOL 2102

BIOL 2321 - Microbiology for Science Majors

Study of the morphology, physiology and taxonomy of representative groups of pathogenic and non-pathogenic microorganisms.

Prerequisite: BIOL 1306, BIOL 1307 or equivalent.

Corequisite: BIOL 2121

BIOL 2428 - Vertebrate Zoology

Lecture and laboratory exercises on the structure, development, physiology and natural history of the vertebrate animals with emphasis on comparative evolution.

Prerequisite: BIOL 1306, BIOL 1307 or equivalent.

BIOL 3113 - Laboratory for Plant Anatomy

Two laboratory hours each week.

Corequisite: BIOL 3313

BIOL 3141 - Molecular Genetics Laboratory

Laboratory investigations using molecular genetics to demonstrate principles of transmission and population genetics.

Corequisite: BIOL 3341.

BIOL 3173 - Human Anatomy Laboratory

The structure of the human body will be studied using anatomical models, preserved tissue specimens and computer programs.

Corequisite: BIOL 3373.

BIOL 3303 - The Environment

An introduction to ecosystems, populations and human impacts on the environment. Not for biology or environmental science majors.

BIOL 3306 - Development of the Sciences

Concepts, techniques, practices and philosophy of science, Illustrated with historical and contemporary examples. Biology majors may use only as an unrestricted elective.

BIOL 3307 - Cell Biology

An introduction to fundamental principles of cell structure and function.

Prerequisite: General biology, general chemistry.

BIOL 3311 - Marine Biology

Study of marine organisms and their environment. One or more weekend or weekday field trips and limited laboratory exercises are required.

Prerequisite: General biology.

BIOL 3313 - Plant Anatomy

Structures, tissues and cells of vegetative and reproductive organs of land plants related to concepts of growth, differentiation and organization function and evolutionary history.

Prerequisite: General biology.

Corequisite: BIOL 3113

BIOL 3316 - Introduction to Herpetology

This course is designed to give the student a basic understanding of the science of Herpetology including an overview of the characteristics of reptiles and amphibians; with special emphasis on snakes. Classes will include training on collection, handling and identification of local species with some off campus field trips to local areas and zoos.

Prerequisite: General biology. General chemistry

BIOL 3333 - Environmental Biology

The impacts of pollution, anthropogenic activities and other stresses on ecosystem structure and function. Course designed for science majors.

BIOL 3334 - Pathogenic and Public Health Microbiology

Focuses on the causality of infectious diseases, modes of dissemination, laboratory diagnosis and prevention and control.

Prerequisite: General biology.

BIOL 3335 - Epidemiology

A study of the causes and clinical methods of controlling disease in large populations.

BIOL 3336 - Neuropsychology Practicum

Laboratory investigation of brain/ behavior relationships in the rat. Readings from primary research literature, lab experiments and research reports.

Prerequisite: Permission of instructor.

BIOL 3341 - Molecular Genetics

Study of the molecular basis of genetics, including transmission genetics and population genetics.

Prerequisite: General biology, general chemistry.

Corequisite: BIOL 3141

BIOL 3373 - Human Anatomy

Fundamentals of human anatomy emphasizing an organ systems approach to the study of the human body. Lecture and demonstration.

Corequisite: BIOL 3173

BIOL 4101 - Laboratory Methods in Life Sciences

Three laboratory hours per week.

Corequisite: BIOL 4301.

BIOL 4113 - Laboratory for Biology of Fishes

Laboratory course on identification, anatomy, morphology and ecology of fish. Weekend or weekday field trips and collections required.

Corequisite: BIOL 4313.

BIOL 4114 - Laboratory for Freshwater Biology

Laboratory study of freshwater organisms and multiple weekends and/or weekday field trips to study sites off campus.

Corequisite: BIOL 4314.

BIOL 4189 - Independent Study in Biology

Prerequisite: Approval of instructor, chair and associate dean.

BIOL 4211 - Laboratory for Ecology

Four laboratory hours per week. Conduct experiments on population growth, competition and predation to test theoretical models; construct life tables.

Prerequisite: BIOL 4311 or corequisite

BIOL 4225 - Environmental Toxicology Laboratory

Theory and practice in aquatic toxicity testing using EPA standard methods.

Prerequisite: BIOL 4325 or equivalent.

BIOL 4241 - Laboratory for Physiology

Laboratory exercises demonstrating physiological processes.

Prerequisite: BIOL 4344 or 4345.

BIOL 4242 - Laboratory for Biochemistry

One hour of lecture and three hours of laboratory per week.

Prerequisite: BIOL 4341 or corequisite

BIOL 4252 - Molecular Biology Laboratory

Laboratory methods and techniques in molecular biology. Four laboratory hours per week.

Prerequisite: BIOL 4351 or corequisite

BIOL 4253 - Laboratory for Biotechnology

Current methods used in biotechnological industry and research as applied to medical, biological, agricultural and environmental aspects. Students will learn modern techniques used in genetic engineering, DNA sequencing, gene cloning, etc.

Prerequisite: BIOL 4242, BIOL 4342.

BIOL 4254 - Laboratory for Eukaryotic Gene Expression

Laboratory course designed to provide practical training in current gene expression studies including the isolation, quantification and handling of RNA, cDNA synthesis, RT-PCR and quantitative PCR. Microarrays and RNAi techniques will be discussed.

Prerequisite: BIOL 4351.

BIOL 4278 - Seminar in Biology

Study of objectives, methods and culture of biological science. Literature surveys, presentations and research papers are required.

BIOL 4289 - Independent Study in Biology

Prerequisite: Approval of instructor, chair and associate dean.

BIOL 4291 - Laboratory Topics in Biology

Identified by specific title each time laboratory is offered.

BIOL 4301 - Methods in Life Science

Recent developments in plant and animal physiology, ecology and environmental science; emphasis on teaching biology from a contemporary standpoint.

Prerequisite: General biology

Corequisite: BIOL 4101.

BIOL 4302 - Survey of Disease

Detailed study of diseases affecting humans.

Prerequisite: General biology and general chemistry.

BIOL 4305 - Ecology of the Amazon

Study of the physical, chemical and ecological aspects of the Amazon flooded forest. Students completing course qualify for discounted optional ecology study trip to the Amazon flooded forest areas of Brazil.

BIOL 4311 - Ecology

Theoretical study of organisms, populations and communities related to their environments.

Prerequisite: General Biology

BIOL 4313 - Biology of Fishes

Systematic study of freshwater and marine fishes, including evolution, ecology, life history and economics of important species.

Prerequisite: General Biology

Corequisite: BIOL 4113

BIOL 4314 - Freshwater Biology

Study of the physical, chemical and biology nature of freshwater lakes, ponds, rivers and streams.

Prerequisite: BIOL 4311

Corequisite: BIOL 4114

BIOL 4315 - Biology Practicum

Practical experience at an off-campus facility, such as aquarium, rainforest park, wetlands center or Galveston Bay Agency. Requires pre-acceptance interview, minimum of 10 hours of work per week and approval of instructor.

BIOL 4323 - Field Biology

Field methods for analysis of ecological systems. Field work and laboratory are required.

Prerequisite: General Biology

BIOL 4325 - Environmental Toxicology

Physiological and systemic interactions of environmental pollutants with plants and animals.

Prerequisite: Twelve hours in biology and chemistry.

BIOL 4327 - Plant Identification

Taxonomic study of herbaceous and woody plants of SE Texas.

BIOL 4332 - Histology

A microscopic study of animal tissues including the theories of fixation and staining of clinical samples.

Prerequisite: BIOL 3307 or BIOL 4347.

BIOL 4334 - Environmental Microbiology

A study of activity and mechanisms of microbial contribution to global ecosystems, with emphasis on geochemical cycling, bioremediation, wastewater treatment and environmental biotechnology.

Prerequisite: General biology.

BIOL 4335 - Forensic Biology

Theory and techniques used in biological investigations of crimes, including toxicological, genetic and DNA analysis.

Prerequisite: BIOL 3341, BIOL 4341

BIOL 4341 - Biochemistry I

Study of cellular biochemical components and metabolism.

Prerequisite: Organic chemistry.

BIOL 4342 - Biochemistry II

Regulation and control of intermediary metabolism. Introduction to biochemical genetics.

Prerequisite: BIOL 4341 or equivalent.

BIOL 4343 - Plant Physiology

Metabolic and physiological processes involved in plant growth.

Prerequisite: General Biology

BIOL 4344 - Comparative Animal Physiology

Study of organ functions in major invertebrate and vertebrate phyla.

Prerequisite: General biology

BIOL 4345 - Human Physiology

This course will introduce basic and advanced principles of human physiology. The study of physiology will be presented using an integrated systems approach. Lectures on topics ranging from physiology of the nervous system to human reproduction will be presented.

Prerequisite: General biology, general chemistry.

BIOL 4346 - Pathophysiology

This course will study the abnormal physiology characteristic of diseases in humans. A physiological systems approach will be taken.

Prerequisite: BIOL 4345 or equivalent.

BIOL 4347 - Cellular Physiology

Cell structure and function; emphasis on cytological, biochemical, genetical and developmental perspectives.

Prerequisite: Biochemistry.

BIOL 4348 - Developmental Biology

Embryology, tissue differentiation, cell determination and pattern formation at both descriptive and molecular level. Emphasis on animal systems with additional examples from plants and protists.

Prerequisite: BIOL 3341 and BIOL 4347 or BIOL 3307.

BIOL 4349 - Plant Development

Study of the developmental processes involved in seed germination, tissue differentiation, vegetative growth and transitioning to reproduction.

Prerequisite: General biology. General chemistry

BIOL 4351 - Molecular Biology

General principles of molecular biology with an emphasis on gene functions in eukaryotic systems, disease at the genetic level and evolution of the gene.

Prerequisite: Genetics or Biochemistry or equivalent.

BIOL 4354 - Introduction to Bioinformatics

Introduction to bioinformatics, experimental sources of biological data, databases and servers operating systems (including Windows and Unix) and internet tools.

BIOL 4355 - Tissue Culture

Students will learn how to manipulate cells in culture and develop laboratory skills in DNA transfection, gene expression, Luciferase assays and western blots.

Prerequisite: BIOL 4242 or equivalent.

BIOL 4361 - Immunology

Basic theory of humoral and cellular immune mechanisms.

Prerequisite: BIOL 3341, BIOL 4341.

BIOL 4371 - Cancer Biology

Cancer, genetics and heredity: prevention, detection and treatment of cancer.

Prerequisite: BIOL 3341 or BIOL 4351 or equivalent.

BIOL 4389 - Independent Study in Biology

Prerequisite: Approval of instructor, chair and associate dean.

BIOL 4391 - Selected Topics in the Biological Sciences

Identified by specific title each time course is offered.

BIOL 4399 - Independent Study in Biology

CENG - Computer Engineering

CENG 3112 - Lab for Digital Circuits

Laboratory experiments using digital logic and small scale integrated circuits.

Corequisite: CENG 3312.

CENG 3113 - Lab for Linear Circuits

Laboratory experiments demonstrating AC/DC circuits. Experiments using lumped constants and integrated circuits will be stressed.

Corequisite: CENG 3313.

CENG 3114 - Lab for Advanced Linear Circuits

Experiments emphasizing the design and analysis of linear lumped-constant circuits.

Corequisite: CENG 3314.

CENG 3115 - Lab for Introduction Digital Signal Processing

Laboratory experiments in Digital Signal Processing.

Corequisite: CENG 3315.

CENG 3131 - Lab for Telecommunications and Networks

Laboratory experiments in digital and data communications.

Corequisite: CENG 3331.

CENG 3151 - Lab for Computer Architecture

Laboratory experiments for Computer Architecture Design and Interfacing.

Prerequisite: CENG 3312, CENG 3112

Corequisite: CENG 3351

CENG 3264 - Engineering Design and Project Management

Introduction to engineering concepts including problem solving, the design process, engineering tools and topics in ethics. Laboratory instruction.

CENG 3312 - Digital Circuits

Applications of point set theory and Boolean Algebra to the analysis and design of asynchronous and synchronous digital circuits.

Corequisite: CENG 3112.

CENG 3313 - Linear Circuits

Basic electrical concepts; network theorems; circuit laws; resistance, capacitance, inductance, operational amplifiers, response of RC, RL and RLC circuits to initial conditions and constant forcing functions. Steady-state and transient analysis. Introduction to S-domain circuit analysis. Integration of computer applications using SPICE and MATLAB.

Prerequisite: 6 hours Calculus, University Physics II

Corequisite: CENG 3113

CENG 3314 - Advanced Linear Circuits

Polyphase AC circuit analysis and design, network and passive and active analog filter design using MATLAB and SPICE, time and frequency domain analysis utilizing Fourier series and Fourier analysis techniques.

Prerequisite: CENG 3113, CENG 3313

Corequisite: CENG 3114

CENG 3315 - Introduction to Digital Signal Processing

Sinusoids, spectrum representation, sampling and aliasing, FIR and IIR digital filters. Laboratory instruction.

Prerequisite: CSCI 1320, MATH 2413, MATH 2414

Corequisite: CENG 3115

CENG 3331 - Introduction to Telecommunications and Networks

Introduction to data communications, error detecting/correcting codes, multiplexing, circuit and packet switching and local area networks.

Prerequisite: CENG 3312

Corequisite: CENG 3131

CENG 3351 - Computer Architecture

Control logic, addressing, registers, instructions, memory units, arithmetic elements, interrupts and input-output structures.

Prerequisite: CENG 3312

Corequisite: CENG 3151

CENG 3371 - Microcontroller Programming

Microcontroller, assembly language programming and embedded system applications.

Prerequisite: CSCI 1320 or equivalent.

CENG 4113 - Lab for Microprocessor Interfacing

Laboratory experiments interfacing the Intel microcomputer to peripherals, memory, and other devices.

Corequisite: CENG 4313

CENG 4189 - Independent Study in Computer Engineering

Prerequisite: Approval of instructor, chair and associate dean.

CENG 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description.)

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

CENG 4265 - Senior Project

Project course requiring each student to complete a project approved by the instructor. The student must submit a written final report and give an oral presentation to faculty and students. Laboratory instruction.

Prerequisite: Final year before graduation or permission of instructor.

CENG 4266 - Senior Project

Project course requiring each student to complete a project approved by the instructor. The student must submit a written final report and give an oral presentation to faculty and students. Laboratory instruction.

CENG 4311 - Telecommunications Networking Devices

Modems, multiplexers, data communications network analysis, bridges, routers, client/server concepts and NOS software.

Prerequisite: CENG 3331.

CENG 4313 - Microprocessor Interfacing

Techniques for interfacing microcomputers to peripherals, memory and other devices.

Prerequisite: CENG 3351, prerequisite or corequisite: CSCI 3331

Corequisite: CENG 4113

CENG 4315 - Digital Signal Processing Applications

Fundamental concepts in Digital Signal Processing applications with algorithmic implementations using Texas Instruments, DSPs and XILINX Field Programmable Gate Arrays.

Prerequisite: CENG 3115, CENG 3315

CENG 4321 - Telecommunications Switching Systems

Introduction to switching systems, digital switching, ISDN and ATM networking. Laboratory instruction.

Prerequisite: CENG 3331 or equivalent.

CENG 4331 - Analysis and Design of Linear Systems

Continuous and discrete time systems. Fourier, Laplace and z-transforms and transfer functions. Introduction to digital signal processing and digital filter design using conventional and convolutional techniques, applications from communications and control theory. Computer solutions using MATLAB.

Prerequisite: Basic circuit analysis.

CENG 4341 - Computer System Reliability and Safety

Computer reliability and safety models and metrics, redundancy and recovery techniques, fault tree analysis.

Prerequisite: MATH 4344 or equivalent, SWEN 4342.

CENG 4354 - Digital System Design

Combinational and sequential circuit design of digital systems using a hardware description language. Laboratory instruction.

Prerequisite: CENG 3312 or equivalent.

CENG 4362 - Digital Control Design

Analysis and design of digital control systems with applications critical systems.

Prerequisite: CENG 4331.

CENG 4365 - Senior Project

Project course requiring each student to complete a project approved by the instructor. The student must submit a written final report and give an oral presentation to faculty and students. Laboratory instruction.

Prerequisite: Final year before graduation or permission of instructor.

CENG 4389 - Independent Study in Computer Engineering

Prerequisite: Approval of instructor, chair and associate dean.

CENG 4391 - Selected Topics in Computer Engineering

Identified by specific title each time course is offered.

CHEM - Chemistry

CHEM 1105 - Laboratory for Introductory Chemistry I

Laboratory for introductory chemistry that may include topics in inorganic, organic, biochemistry, food/physiological chemistry, forensic and environmental/ consumer chemistry.

Corequisite: CHEM 1305

CHEM 1111 - Laboratory for General Chemistry I

Basic laboratory experiments supporting theoretical principles presented in CHEM 1311; introduction of the scientific method, experimental design, data collection and analysis and preparation of laboratory reports.

Corequisite: CHEM 1311

CHEM 1112 - Laboratory for General Chemistry II

Basic laboratory experiments supporting theoretical principles presented in CHEM 1312; introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis and preparation of laboratory reports.

Corequisite: CHEM 1312

CHEM 1204 - Chemical Calculations

The study of the mathematical applications used in chemistry, designed for science and engineering students.

CHEM 1275 - Survey of Forensic Chemistry

This course will survey current methods in Forensic Science (especially chemistry) by examining real cases.

CHEM 1305 - Introductory Chemistry I

A survey course introducing chemistry, including topics in inorganic, organic, biochemistry, food/physiological chemistry, forensic and environmental/ consumer chemistry. Designed for non-science majors.

Corequisite: CHEM 1105

CHEM 1311 - General Chemistry I

Fundamental principles of Chemistry for majors in sciences, health sciences and engineering; topics include inorganic, organic, biochemistry, chemical reactions, states of matter and properties, chemical bonding, structure and descriptive chemistry.

Corequisite: CHEM 1111

CHEM 1312 - General Chemistry II

Chemical equilibrium; phase diagrams and spectrometry; acid-base concepts; thermodynamics; kinetics; electrochemistry; nuclear chemistry; an introduction to organic chemistry and descriptive inorganic chemistry.

Prerequisite: CHEM 1311

Corequisite: CHEM 1112

CHEM 1372 - Diet and Nutrition Chemistry

This is a survey course designed for non-science and allied health students. It includes the effects of nutrients on health and the role of diet in prevention or treatment of chronic diseases.

CHEM 2101 - Laboratory for Analytical Chemistry I

This course provides hands-on training on analysis, sampling, statistical treatment and basic skills in analytical chemistry.

Prerequisite: CHEM 1311, CHEM 1312

Corequisite: CHEM 2301

CHEM 2102 - Laboratory for Analytical Chemistry II

This course provides hands-on experience in modern instrumental techniques in analytical chemistry. Includes UV-vis absorption, IR vibrational spectroscopy, gas chromatography (GC), high performance liquid chromatography (HPLC) and NMR etc.

Prerequisite: CHEM 1311, CHEM 1312

Corequisite: CHEM 2302

CHEM 2123 - Laboratory for Organic Chemistry I

Basic techniques and procedures in isolation, purification and characterization of organic compounds and simple reactions used in the organic chemistry lab.

Prerequisite: CHEM 1311, CHEM 1312

Corequisite: CHEM 2323

CHEM 2125 - Laboratory for Organic Chemistry II

Extension of CHEM 2123; building from basic procedures and lab techniques to a more advanced level.

Prerequisite: CHEM 1311, CHEM 2123

Corequisite: CHEM 2325

CHEM 2301 - Analytical Chemistry I

An introduction to the theory of analytical chemistry; different approaches to analysis, sampling, statistical treatment and basic principles in analytical chemistry.

Prerequisite: CHEM 1311, CHEM 1312

Corequisite: CHEM 2101

CHEM 2302 - Analytical Chemistry II

An introduction to instrumental techniques, providing an introductory survey of modern instrumental techniques in analytical chemistry. Includes electrochemical, spectroscopic and chromatographic methods for the determination of atomic and molecular species. Specific topics in spectroscopy to be considered are UV-vis absorption, IR vibrational spectroscopy. Topics in chromatography include gas chromatography (GC), high performance liquid chromatography (HPLC).

Prerequisite: CHEM 1311, CHEM 1312

Corequisite: CHEM 2101

CHEM 2323 - Organic Chemistry I

Study of properties and behavior of hydrocarbon compounds and their derivatives. Designed for students in science or pre-professional programs.

Prerequisite: CHEM 1311, CHEM 1312

Corequisite: CHEM 2123

CHEM 2325 - Organic Chemistry II

Continuation of properties and behavior of hydrocarbon compounds and their derivatives. Designed for students in science or pre-professional programs.

Prerequisite: CHEM 1311, CHEM 2323

Corequisite: CHEM 2125

CHEM 3300 - Chemistry for Non-Science Majors

This course is for students who wish to gain a descriptive understanding of Chemistry applicable to everyday living. Not for BIOL, CHEM, ENSC or Physical Sciences majors.

CHEM 3301 - Life in the Universe

Origin of the Universe, origin and evolution of life and the possibilities for finding life on other planets, including the search for extra-terrestrial intelligence.

CHEM 3320 - Survey of Physical Chemistry

Appropriate for students pursuing the BA in Chemistry or a BS in Environmental Science. An overview of physical chemistry, thermodynamics, molecular structure, spectroscopy.

Prerequisite: General Chemistry I, II, Calculus I, College Physics I, II.

CHEM 3333 - Environmental Chemistry

Chemical processes and reactions related to chemical pollution problems and their control in the atmosphere, soils and waters.

Prerequisite: General chemistry.

CHEM 4189 - Independent Study in Chemistry

Prerequisite: Approval of instructor, chair and associate dean.

CHEM 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report is required at the end of the semester. (Specific requirements are noted in the Cooperative Education catalog description.)

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

CHEM 4222 - Laboratory for Physical Chemistry

Laboratory principles and practice in physical chemistry. Six laboratory hours each week.

Prerequisite: CHEM 4321 or corequisite

CHEM 4235 - Advanced Lab for Inorganic Chemistry

Laboratory principles and basic manipulation skills used during the preparation and characterization of inorganic compounds.

Prerequisite: General chemistry, organic chemistry.

CHEM 4242 - Laboratory for Biochemistry

Laboratory principles and practices in cellular biochemistry. One hour of lecture and 3 hours of laboratory per week.

Prerequisite: CHEM 4341 or corequisite

CHEM 4251 - Laboratory for Environmental Analysis

Experimental methods for sampling and analysis of environmental samples using modern instruments. Hands-on laboratory and field experiments. One hour of lecture and 3 hours of laboratory per week.

Prerequisite: CHEM 3333 or corequisite

CHEM 4279 - Undergraduate Research

Prerequisite: Approval of a faculty member under whose direction the research will be carried out, the chemistry program chair and the dean.

CHEM 4310 - Advanced Chemical Calculations

Prepares chemistry and biology students for math in Physical Chemistry and Biochemistry, using examples geared to these subjects.

Prerequisite: General chemistry I & II, Calculus I & II, University or College Physics I & II.

CHEM 4311 - Chemical Origins

Origin of the universe and the chemical elements, pre-biotic chemistry and the origin of life.

Prerequisite: General Chemistry and University or College Physics.

CHEM 4312 - Principles of Astrobiology

Overview of the search for life in the universe, including chemical signatures of life on other planets.

Prerequisite: General Chemistry and University or College Physics.

CHEM 4315 - Handedness in Science

Suitable for chemists, physicist and biologist (especially pre-med). Handedness (chirality) in chemistry, biology, pharmaceuticals and medicine. Origin of chirality: Is it a feature of fundamental physics? Use of chirality to detect life on other planets.

Prerequisite: General Chemistry and University or College Physics.

CHEM 4321 - Physical Chemistry I

Physical Chemistry (PC) I is not a prerequisite for Physical Chemistry II. PCI covers thermodynamics and kinetics. PCII covers quantum mechanics and spectroscopy. CHEM 4321 and CHEM 4322 may be taken in any order

Prerequisite: General Chemistry I, II, Calculus I, II and calculus-based Physics I, II and CHEM 4310.

CHEM 4322 - Physical Chemistry II

Physical Chemistry (PC) I is not a prerequisite for Physical Chemistry II. PCI covers thermodynamics and kinetics. PCII covers quantum mechanics and spectroscopy. CHEM 4321 and CHEM 4322 may be taken in any order.

Prerequisite: General Chemistry I, II, Calculus I, II and calculus-based Physics I, II and CHEM 4310.

CHEM 4327 - Introduction to Petroleum Chemistry

Introduction of the manufacture, composition, chemical/physical properties of petroleum products (gas and oil). Emphasis on process-related chemistry in each unit operation type.

Prerequisite: CHEM 2323

CHEM 4328 - Introduction to Medicinal Chemistry

Overview of key biological and biochemical concepts and the general tactics and strategies involved in developing an effective drug.

Prerequisite: CHEM 2323, CHEM 2325

CHEM 4335 - Inorganic Chemistry

Concepts and systems of inorganic chemistry; atomic structure, molecular structure and bonding, ionic crystals, solid state defects and coordination compounds.

Prerequisite: General chemistry and Organic chemistry

CHEM 4341 - Biochemistry I

Study of cellular biochemical components and metabolism.

Prerequisite: Organic chemistry, CHEM 4310 strongly recommended.

CHEM 4342 - Biochemistry II

Regulation and control of intermediary metabolism. Introduction to biochemical genetics.

Prerequisite: CHEM 4341.

CHEM 4352 - Water Chemistry and Water Pollution

Study of chemical equilibria in natural waters, water quality parameters, water sampling, important water pollutants and their fate.

Prerequisite: General chemistry, Organic Chemistry I.

CHEM 4355 - Environmental Sampling and Monitoring

Principles and techniques of environmental sampling for air, water, soil and hazardous wastes. EPA standard methods for environmental analysis using biological, chemical and instrumental techniques.

Prerequisite: STAT 3308.

CHEM 4356 - Soil & Groundwater Remediation

Chemical, biological, geological principles and applications of various remediation techniques commonly used to clean up contaminated soils and groundwater.

Prerequisite: CHEM 3333.

Corequisite: BIOL 4313.

CHEM 4357 - Introduction to Biofuel

This course is an overview of biofuel production with fundamental concepts in biofuel production, renewable feed stocks, thermochemical and biochemical conversions of biomass to biofuel, environmental impacts, economics and life-cycle analysis; value-added processing of biofuel residues and selected case studies.

CHEM 4358 - Industrial Chemistry: Process and Environment

This course will survey a variety of industrially-important processes which are based on naturally occurring or petroleum derived organic materials. As an additional component of the course, the relevance and impact of various regulations of the Environmental Protection Agency will be explored.

CHEM 4359 - Drug Design and Synthesis

This course presents the strategy underpinning the design and synthesis of pharmaceutical molecules used to diagnose and treat diseases and illnesses. It focuses on the design of drug molecules, with emphasis on the shape and structure. The course explores the array of chemical reactions and strategies for the synthesis of a range of drugs. Case studies are also included.

CHEM 4360 - Bio-organic and Medicinal Chemistry

Survey of the fields of biological chemistry in which organic chemistry plays a significant role. Topics such as enzymatic and enzyme-like catalysis, protein/enzyme structure-function relationships, enzyme cofactor chemistry and biochemistry, nucleic acid chemistry and biochemistry, bioconjugates, bioprobes and molecular recognition will be discussed.

Prerequisite: CHEM 2323, CHEM 2325

CHEM 4363 - Forensic Chemistry

Provides students training in drug chemistry, chemistry of addiction, arson investigation, chemistry of explosives, poisons, estimating the time of death.

Prerequisite: General chemistry

CHEM 4367 - Instrumental Analysis

Principles and practices of modern analytical instrumentations. Emphasis on hands-on experience in chemical analysis using UV-VIS, IC, ICP, GC, GC-MS, LC-MS, HPLC and NMR. Lecture, laboratory instruction and supervised project on unknown chemicals.

Prerequisite: General chemistry and Organic chemistry

CHEM 4368 - Advanced Organic Chemistry

Advanced mechanistic study of the relationship between structure and reactivity in organic chemistry.

Prerequisite: CHEM 2323, CHEM 2325 or equivalent.

CHEM 4369 - Food Chemistry and Human Nutrition

Designed for science students. Understanding the nature of food constituents including proteins, lipids, carbohydrates, vitamins, minerals and molecular functions of the food constituents, food safety and how nutrients affect pathogenesis and health. Critically review information, claims and fads as pertaining to nutrition and health.

Prerequisite: General chemistry or biology course.

CHEM 4370 - Industrial Chemistry: Process and Environment

Survey of industrially-important processes which are based on naturally-occurring or petroleum-derived organic materials. A component of the course involves Environmental Protection, such as the Clean Air and the Toxic Substances Control.

Prerequisite: Organic Chemistry.

CHEM 4371 - Advanced Spectroscopic Analysis

Designed for students seeking advanced analytical studies through practical spectra analysis.

Prerequisite: Organic chemistry.

CHEM 4372 - Chemistry Seminar

The selection, study and formal presentation of topics from the chemical literature.

Prerequisite: Approval of instructor.

CHEM 4373 - Quantitative Chemical Analysis

Designed for students seeking advanced analytical studies through Quantitative Chemical Analysis.

Prerequisite: General chemistry and Organic Chemistry

CHEM 4374 - Surface Chemical Processing

The course topics cover relevant surface chemical phenomena as encountered in environmental and chemical/industrial applications. The course material will discuss the fundamental surface chemical processes and the role of surface/interface properties in scientific and industrial applications as well as the principles of conventional and advanced surface analytical techniques.

Prerequisite: CHEM 1311

CHEM 4375 - Petroleum Geology

This course studies the topics of the "petroleum system", origin and migration of hydrocarbons, reservoirs, traps and seals, sedimentary basins and some of the most commonly used methods in exploration and development.

CHEM 4389 - Independent Study in Chemistry

Prerequisite: Approval of instructor, chair and associate dean.

CHEM 4391 - Selected Topics in Chemistry

Identified by specific title each time course is offered.

CINF - Computer Information Systems

CINF 1370 - Introduction to Computer Information Systems

A general overview of the computing field and its typical applications, information systems concepts and terminologies. Topics include hardware, software and telecommunication fundamentals, the internet, systems development methods and career opportunities. Hands-on experience using application software.

CINF 3311 - Programming With Visual Basic

Programming with Visual Basic with emphasis on object-oriented programming and the users of integrated development environments. Data types, control structures, functions, subroutines, files, classes and controls. Development using the .Net framework. Laboratory instruction.

CINF 3321 - Information Systems Theory and Practice

Introduction to the theory and practice of information systems. Development, application and management of IS. Hardware and software issues for IS. Ethical, social and security related issues of IS. IS environments. Laboratory instruction.

Prerequisite: A high level programming language.

CINF 3331 - Business Data Communications

Introduction to business data communications. WANs, LANs and Internet concepts. A survey of data communications with emphasis on the impact of digital technology on the operation, management and economics of computer information systems.

CINF 3391 - Topics in Computer Information Systems

Identified by specific title each time course is offered. Laboratory instruction.

CINF 4189 - Independent Study in Computer Information Systems

Prerequisite: Approval of instructor, chair and associate dean.

CINF 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description.)

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

CINF 4289 - Independent Study in Computer Information Systems

Prerequisite: Approval of instructor, chair and associate dean.

CINF 4308 - Topics in Computer Information Systems-Non-Majors

Identified by specific title each time course is offered. Not to be taken by majors in computing program. Laboratory instruction.

CINF 4320 - Web Application Development

Survey of languages, tools and techniques for Web Application Development, HTML, XHTML, CSS, JavaScript, Dynamic HTML, Server-side web development using .Net Framework with ASP.Net and C#, Perl CGI programming with Perl, XML. Laboratory instruction.

Prerequisite: CSCI 1320, CSCI 1370, CSCI 2315.

CINF 4323 - Computer Security

Introduction to encryption, decryption and cryptographical protocols; security components; security policies and mechanisms in computer applications, computer systems and networks; legal/ethical issues in computer security. Laboratory instructions.

Prerequisite: CSCI 3331, CSCI 3352.

CINF 4324 - Modern System Analysis and Design

Key concepts and principles of systems analysis; Techniques and tools of the systems analysis methodology; Current issues of systems analysis and business process reengineering.

Prerequisite: CINF 3321.

CINF 4334 - Electronic Commerce

Key concepts and principles of e-commerce; importance of e-commerce in the global economy; technological elements of the infrastructure of e-commerce; business and social factors associated with the success or failure of e-commerce; critical thinking to strategize and plan technology based solutions to achieve business goals.

Prerequisite: CINF 4320 or approval of instructor.

CINF 4364 - Computer Systems Administration

Administration of computers and their operating systems, both as stand-alone and in network topologies. UNIX is used as an example. Laboratory instruction.

Prerequisite: CSCI 2315.

CINF 4379 - Internship in Computer Information Systems

Supervised work experience in an approved industrial firm or government agency. Written and oral report required.

Prerequisite: 15 hours of upper-level credit; approval by advisor and associate dean.

CINF 4381 - Computer Forensics

Introduction to the topics of computer crime and computer forensics. Students will learn different aspects of computer crime and ways in which to protect, uncover and understand digital evidence. Students will gain experience using hardware and software tools to perform rudimentary investigations. Laboratory instruction.

CINF 4388 - Senior Project in Computer Information Systems

May be taken only during the final semester before graduation. Registration is restricted to students with an approved Candidate Plan of Study. Students develop a significant computer application for a realistic project in CIS that emphasizes the entire software lifecycle. Professional behavior, ethics and teamwork will be developed. Students prepare written reports and give oral presentations. Laboratory instruction.

Prerequisite: CSCI 4333 and SWEN 4342.

CINF 4389 - Independent Study in Computer Information Systems

Prerequisite: Approval of instructor, chair and associate dean.

CINF 4391 - Advanced Topics in Computer Information Systems

Identified by specific title each time course is offered. Laboratory instruction.

CSCI - Computer Science

CSCI 1318 - Pascal Programming I

Programming with the Pascal programming language with emphasis on structural programming techniques. A study of Pascal including control structures, functions and procedures, arrays, records, I/P, sequential files and relative files. Software development including analysis, design, coding, implementation, testing and documentation. Laboratory instruction.

CSCI 1320 - C Programming

Programming techniques with the C programming language, emphasis on modular design, data abstraction and encapsulation using ANSI C. Use of all features of C including arrays, pointers, structures, prototypes, separate compilation and the C-preprocessor. Development of generic functions and study of portability issues.

CSCI 1370 - Software Development with Java

Software development with the Java programming language and the Java class libraries. Design of applets and standalone Java applications. Laboratory instruction.

Prerequisite: CSCI 1320

CSCI 1470 - Computer Science I

Basic computing concepts including binary and hexadecimal number systems, data types, problem solving using flowcharts and pseudocode, conditional and looping structures, arrays and lists, files, test plans and subprograms.

CSCI 1471 - Computer Science II

Object-oriented programming concepts including data abstraction, classes, inheritance, polymorphism, exception handling and UML.

Prerequisite: CSCI 1470

CSCI 2315 - Data Structures

Further applications of programming techniques. Topics may include file access methods, data structures and modular programming, program testing and documentation.

Prerequisite: CSCI 1370 or CSCI 1471

CSCI 3303 - Fundamentals of Programming

An introduction to the concepts of data structures for non-computing majors, including records, tables, linked lists, stacks and queues. Abstract data types, recursion, searching, sorting and an introduction to binary trees. Not to be taken by computing and engineering majors. Laboratory instruction.

Prerequisite: A programming language.

CSCI 3311 - Programming With Visual Basic

Programming with Visual Basic with emphasis on object-oriented programming and the uses of integrated development environments. Data types, control structures, functions and subroutines, files, classes, controls. Development using the .NET framework. Laboratory instruction.

CSCI 3321 - Numerical Methods

Taylor series and error analysis, interpolation, solution of linear and non-linear equations, least squares, integration of functions and differential equations. Programming assignments. Laboratory instruction.

Prerequisite: Calculus, linear algebra, ordinary differential equations and programming in C, Pascal, Ada or Java.

CSCI 3323 - Object-Oriented Design and Programming

Basic elements of object-oriented technology including classes, their attributes, methods and relations to other classes, objects, classification and inheritance, encapsulation, polymorphism, object-oriented analysis, design and programming assignments in C++ language under UNIX. Laboratory instruction.

Prerequisite: Programming in C or Java.

CSCI 3331 - Computer Organization and Assembly Language

Basic elements of computer hardware and software, data representations, instruction formats and addressing modes, assembly language instructions, programming techniques in assembly language, macro assemblers, link-loaders, functions of operating systems and input/output programming and peripherals. Laboratory instruction.

Prerequisite: Programming in C.

CSCI 3342 - Ada Programming Language

Introduction to the Ada programming language. Emphasis on the systematic design of software in the Ada environment. Laboratory instruction.

CSCI 3352 - Advanced Data Structures and Algorithms

Binary trees, trees, graph theory, finite state automata, external storage devices, sequential and direct file organizations, file processing techniques, hashing, B-trees, external sorting, P and NP problems, algorithmic analysis. Laboratory instruction.

Prerequisite: MATH 2305 and CSCI 2315 or equivalent.

CSCI 3362 - Artificial Intelligence Programming Languages

An introduction to AI programming languages. Programming assignments in LISP and PROLOG. Laboratory instruction.

Prerequisite: CSCI 2315.

CSCI 3391 - Selected Topics in Computing

Identified by specific title each time course is offered.

CSCI 4189 - Independent Study in Computer Science

Prerequisite: Approval of instructor, chair and associate dean.

CSCI 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description.)

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

CSCI 4289 - Independent Study in Computer Science

Prerequisite: Approval of instructor, chair and associate dean.

CSCI 4303 - Concepts of Database Systems

An introduction to the concepts of database systems for non-computing majors, including modeling and implementation of database systems, data models, relational models, database languages, relational algebra, SQL, normalization theory and Web database connectivity. Not to be taken by computing and engineering majors. Laboratory instruction.

Prerequisite: CSCI 3303.

CSCI 4307 - Computing Essentials

Modern computing software tools and information technologies taught in a practical, hands-on manner. Topics covered: word processing, databases, spreadsheets, presentation software, computer programming, the Internet and development of home pages using HTML and other tools. Emphasis is on the development and application of computer skills to the student's program area. Laboratory instruction. Not for credit for computing science majors.

CSCI 4308 - Topics in Computer Science - Non Majors

Identified by topics each time the course is offered. Not to be taken for credit by majors in computing programs. Laboratory instruction.

CSCI 4312 - Network Protocols

Data communications systems software concepts; computer network architecture; ISO model. Laboratory instruction.

Prerequisite: CSCI 3331 and CENG 3331.

CSCI 4314 - Advanced Software Design with Java

Advanced software design with the Java programming language, including multi-threaded applications, exception handling, network programming, Java Beans, security issues and advanced AWT usage. Laboratory instruction.

Prerequisite: CSCI 1370 or equivalent.

CSCI 4315 - Advanced Software Development With .Net Framework and C#

In depth study of the managed environment provided by .NET Framework and its use in developing advanced windows applications utilizing OOP concepts and techniques. Includes GUI issues, event and exception handling, multi-threading, networking, collections, file and database access as well as an introduction to ASP.NET, Web Forms and Web Services.

Prerequisite: CSCI 2315 and CSCI 3323 or CSCI 1370 or equivalent.

CSCI 4320 - Web Application Development

Survey of languages, tools and techniques for Web application development, HTML, XHTML, CSS, JavaScript, dynamic HTML, Server-side web development using .Net Framework with ASP.NET and C#, Perl, CGI programming with Perl, XML. Laboratory instruction.

Prerequisite: CSCI 1320, CSCI 1370, CSCI 2315.

CSCI 4323 - Computer Security

Introduction to encryption, decryption and cryptographical protocols; security components; security policies and mechanisms in computer applications, computer systems and networks; legal/ethical issues in computer security. Laboratory instruction.

Prerequisite: CSCI 3331 and CSCI 3352.

CSCI 4333 - Design of Database Systems

Design of database systems, data description and manipulation languages, data models, entity-relationship model, relational model, 3NF, relational algebra, normalization theory, DBMS, Internet, database design, data flow diagrams, and implementation of database systems. Laboratory instruction.

Prerequisite: CSCI 2315.

CSCI 4350 - Computer Graphics and Interface Design

Two-dimensional graphics algorithms, point and coordinate transformations, animation on graphics terminals and systems. Laboratory instruction using Solaris X-Windows-environment.

Prerequisite: Calculus I, Linear Algebra.

CSCI 4351 - Advanced Programming in UNIX

Program development in a multiprocessing environment, including; process and file system data structures, process control, synchronization and communication between concurrent processes, shared memory, threads and signals. Advanced input/output mechanisms such as asynchronous I/O and memory mapped I/O. Library functions including system function and database library routines. Laboratory instruction.

Prerequisite: CSCI 1320 or equivalent and CSCI 2315.

CSCI 4354 - Operating Systems

Analysis and design of basic operating systems concepts, including multiprocessing, interprocess communication and synchronization, scheduling, file systems, memory management, input/output and deadlock. Examples drawn from real operating systems including UNIX and Windows NT. Laboratory instruction.

Prerequisite: CSCI 2315, CSCI 3331, CENG 3351 or equivalents and senior standing.

CSCI 4362 - Computer Game Programming: Theory and Practice

Applying a fourth generation game engine and language on designing and developing 2D and 3D real-time multimedia simulations and games for education, training, robotics and entertainment. Laboratory instruction.

Prerequisite: Previous programming experience in a high level language.

CSCI 4364 - Computer Systems Administration

Administration of computers and their operating systems, both as stand-alone and in network topologies. UNIX is used as an example. Laboratory instruction.

Prerequisite: CSCI 2315.

CSCI 4379 - Internship in Computer Science

Supervised work experience in an approved industrial firm or government agency. Written and oral report required.

Prerequisite: 15 hours of upper-level credit; approval by advisor and associate dean.

CSCI 4381 - Computer Forensics

Introduction to the topics of computer crime and computer forensics. Students will learn different aspects of computer crime and ways in which to protect, uncover and understand digital evidence. Students will gain experience using hardware and software tools to perform rudimentary investigations. Laboratory instruction.

CSCI 4388 - Senior Project in Computer Science

May be taken only during the final semester before graduation. Registration is restricted to students with an approved Candidate Plan of Study. Students develop a significant computer application for a realistic project. Emphasis will be on practical experience on all phases of constructing a computer solution. Professional behavior, ethics and teamwork will be developed throughout the project. Students prepare written reports and give oral presentations. Laboratory instruction.

Prerequisite: CSCI 3352 and SWEN 4342.

CSCI 4389 - Independent Study in Computer Science

Prerequisite: Approval of instructor, chair and associate dean.

CSCI 4391 - Selected Topics in Computer Science

Identified by specific title each time course is offered.

ENSC - Environmental Science

ENSC 1101 - Laboratory for Environmental Science I

Laboratory exercises include water, soil and air testing, field sampling and observations. Optional and required field trips.

Corequisite: ENSC 1301

ENSC 1102 - Laboratory for Environmental Science II

Laboratory exercises in environmental quality assessment techniques, field sampling techniques and related studies of local environments. Optional and required field trips.

Corequisite: ENSC 1302

ENSC 1301 - Environmental Science I

An introduction to chemical and biological principles relating to ecology, natural resources including animals, plants, water, soil and air.

Corequisite: ENSC 1101

ENSC 1302 - Environmental Science II

Interdisciplinary study of natural and social sciences and how they apply to the environment, including environmental quality and risk assessment.

Corequisite: ENSC 1102

ENSC 4189 - Independent Study in Environmental Science

Prerequisite: Approval of instructor, chair and associate dean.

ENSC 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description.)

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

ENSC 4289 - Independent Study in Environmental Science

Prerequisite: Approval of instructor, chair and associate dean.

ENSC 4362 - Environmental Science Seminar

Students will survey the literature, give presentations and prepare research papers in environmental science. Satisfies the environmental science program core requirement.

ENSC 4379 - Internship in Environmental Science

Supervised work experience in an approved industrial firm or governmental agency. Written and oral reports required.

Prerequisite: 15 hours of upper-level credit; approval of faculty adviser and associate dean.

ENSC 4389 - Independent Study in Environmental Science

Prerequisite: Approval of instructor, chair and associate dean.

ENSC 4391 - Topics in Environmental Science

Identified by specific title each time course is offered.

GEOL - Geology

GEOL 1103 - Laboratory for Physical Geology

Hands-on identification of common rocks and minerals; geological processes associated with different environments.

Corequisite: GEOL 1303

GEOL 1104 - Laboratory for Historical Geology

Topics include identification of rocks and fossils, map interpretation and field study of regional ecological history.

Corequisite: GEOL 1304

GEOL 1303 - Physical Geology

An introduction to physical geology. A study of minerals, rocks, earth's structures and the geological processes that modify the earth's surface.

Corequisite: GEOL 1103

GEOL 1304 - Historical Geology

A study of the geologic history of the earth. Topics include the geologic processes and principles that have shaped our planet including plate tectonics, geological age dating and preservation of fossil and ancient depositional environments.

Corequisite: GEOL 1104

GEOL 2107 - Laboratory for Geological Field Methods

Mapping techniques using Global Positioning Satellite (GPS) equipment, GIS software, traditional surveying methods, geologic map production and aerial photography interpretation.

Corequisite: GEOL 2307

GEOL 2307 - Geological Field Methods

Collection of field data, interpretation and construction of geologic and topographic maps and examination of petrologic systems.

Corequisite: GEOL 2107

GEOL 2309 - Mineralogy and Petrology I

An introduction to minerals and rocks; with an emphasis on their physical properties, including composition, classification, identification, occurrences and uses.

GEOL 2311 - Mineralogy and Petrology II

Application of modern laboratory methods to the study of minerals and rocks. Methods include optical and scanning electron microscopy, analysis of bulk materials and microanalysis of minerals.

GEOL 3304 - Fundamentals of Planetary Geology

Study of the origins and evolution of Earth, Mercury, Venus, Mars and the Moon. Physical processes essential to understanding geology are stressed. Laboratory exercises included. Suitable for non-majors.

GEOL 3305 - Fundamentals of Earth Science

Study of basic physical and chemical processes that form the ocean-atmospheric system. Natural and anthropogenic factors that affect global climate change are also studied. Suitable for non-majors.

GEOL 3307 - Geographical Information Systems

This course covers the fundamentals of GIS including GIS terminology and architecture, GIS data structures, cartographic principles, data sources and methods of data acquisition including remote sensing, data manipulation and conversion, query techniques and spatial analysis.

GEOL 3317 - Mineralogy and Petrology

Formation, identification and geologic and economic significance of minerals and igneous, metamorphic and sedimentary rocks. Laboratory exercises included.

Prerequisite: GEOL 3304 or equivalent and inorganic chemistry.

GEOL 3333 - Environmental Geology

Relationships between human activities and the geological environment. Includes study of natural hazards, natural resources and waste disposal in the geologic environment. Suitable for non-majors.

GEOL 3361 - Photogeology

Application of aerial photography including shuttle, to the geologic environment.

Prerequisite: GEOL 3304, GEOL 4222 and GEOL 4324.

GEOL 4101 - Laboratory for Earth Science

Laboratory exercises which investigate the principles of geology, oceanography, meteorology and astronomy.

Prerequisite: GEOL 3305, GEOL 4222, GEOL 4324

GEOL 4189 - Independent Study in Geology

Prerequisite: Approval of instructor, chair and associate dean

GEOL 4222 - Laboratory for Geomorphology

Laboratory exercises focusing on the identification and evolution of landforms along with concepts of geologic and topographic mapping.

Corequisite: GEOL 4324.

GEOL 4311 - Geology of Texas

Geological evolution of Texas including physiographic provinces, landforms and subsurface structure.

Prerequisite: GEOL 3304 or equivalent.

GEOL 4323 - Soils in the Environment

Study of the environmental aspects of soils including expansive soils, clay minerals, soil contamination and subsurface pathways for pollutants. Laboratory and fieldwork included.

Prerequisite: Chemistry.

GEOL 4324 - Geomorphology

Origin and evolution of landforms; geomorphic cycles, physiographic provinces, application of maps, aerial photographs and quantitative methods to geomorphology. Laboratory exercises included.

Prerequisite: GEOL 3304 or equivalent.

Corequisite: GEOL 4222

GEOL 4325 - Sedimentation and Stratigraphy

Origins, depositional environments and internal structures of sedimentary rocks. Principles of stratigraphy and bio-stratigraphy, evolution of modern stratigraphic nomenclature. Fields trips required.

Prerequisite: GEOL 3304 or equivalent.

GEOL 4326 - Oceanography

The course emphasizes the application of geologic principles to the study of the marine environment and associated physical, chemical and biological processes. Topics covered include coastal processes, ocean resources, ocean management and human interaction with oceans.

Prerequisite: GEOL 3305 or equivalent.

GEOL 4327 - Natural Disasters

This course studies the topics of mass wasting, flooding, earthquakes, hurricanes and others, and evaluates various natural disaster data and statistics. It provides a forum to discuss, describe and improve our understanding of human interactions with the physical environment.

GEOL 4335 - Applied GIS

This course emphasizes the use of spatial analysis capabilities in Geographical Information Systems (GIS) in a range of applications. Topics covered include vector, raster and surface analysis, classification methods, interpolation techniques, watershed analysis and 3D visualization.

Prerequisite: GEOL 3307 or equivalent.

GEOL 4351 - Hydrogeology

Comprehensive study of hydraulic characteristics of soil, rocks, aquifers, rivers and lakes with application to environmental and water resource planning concerns. Topics covered include hydrological cycles, aquifer testing, contaminant transports in various geological media, water resources management and others. Laboratory exercises included.

Prerequisite: GEOL 3305 or equivalent.

GEOL 4356 - Soil and Groundwater Remediation

Chemical, biological, geological principles and applications of various remediation techniques used to clean up contaminated soils and groundwater.

Prerequisite: CHEM 3333.

Cross-Listed as: CHEM 4356

GEOL 4375 - Petroleum Geology

This course studies the topics of the "petroleum system", origin and migration of hydrocarbons, reservoirs, traps and seals, sedimentary basins and some of the most commonly used methods in exploration and development.

Prerequisite: GEOL 3305 or equivalent

GEOL 4389 - Independent Study in Geology

Prerequisite: Approval of instructor, chair and associate dean

GEOL 4391 - Selected Topics in Geology

Identified by specific title each time course is offered.

INDH - Industrial Hygiene and Safety**INDH 3304 - Safety, Health and Liability in Schools**

Safety and health principles and practice as applied to schools. Includes hazard recognition and control in field, laboratory and classroom environments, emergency response, regulations, guidelines and teacher liability. Science majors may use only as an unrestricted elective.

INDH 3311 - Industrial Health and Hygiene

General review of industrial health. Basic principles of industrial hygiene investigation. Physical and chemical hazards in the industrial workplace. Workplace environmental control.

INDH 3313 - Laboratory Safety

Basic principles of industrial safety as applied to laboratory operations. Review and control of hazards associated with the industrial, academic, and research laboratories will be discussed. Laboratory safety concepts and safety program development will be presented.

INDH 3332 - Principles of Professional Safety

Includes how to organize and administer effective safety programs. Looks at future trends for business and industry and what changes the safety professional must keep abreast of in economic, environmental, regulatory and technical advances affecting their field.

INDH 3333 - Environmental Safety and Health

Principles and concepts of environmental health and safety including essential information related to the recognition, evaluation and control of occupational and environmental hazards.

INDH 3340 - Techniques of Safety Engineering and Analysis

Practical application of basic engineering skills in the identification, evaluation and control of industrial hazards. Emphasis is on effective solution to safety design and operational problems and application of the Safety Precedence Sequence in the selection of hazard control measures.

INDH 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description.)

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

INDH 4311 - Noise and Hearing Conservation

Anatomy and physiology of the human ear; sound propagation and the mechanism of hearing loss; federal and state noise regulations; noise measurement and analysis; establishing a hearing conservation and noise control program in industry.

INDH 4313 - Industrial Ventilation

General principles of ventilation, dilution ventilation, comfort ventilation; heat-cold stress control, hood design, air contaminant control; testing ventilation systems and industrial ventilation guidelines.

INDH 4314 - Personal Protective Equipment

Basic design and use of commonly used protective equipment in industry with emphasis on respiratory protection principles including approaches to training and instruction for proper usage.

INDH 4315 - Industrial Radiological Health

Non-calculus based presentation of the principles of ionizing radiation and non-ionizing intended to provide basic competency in radiation protection through an understanding of the nature, uses, health effects, measurement and control of radiation.

INDH 4316 - System Safety & Accident Investigation

The course handles applications of system safety techniques in the industrial work environment and accident investigation theory and practice. Review of loss control management concepts, risk management, S & H training acceptance of risk, identification and initiation of corrective actions, pre-accident planning, emergency response, collection of evidence, analysis of information, investigation, organization, management and report writing.

INDH 4321 - Ergonomics, Human Factors and Workspace Design

Ergonomics. Use of biological and engineering principles to design a safe and efficient workplace environment including biomechanics, anthropometry, heat and cold stress, vibration, pressure, illumination, work station and tool design and the presentation of visual, auditory and other sensory forms of information.

INDH 4322 - Industrial Hygiene Sampling and Analysis

Sampling and analysis for common occupational hazards including principles of calibration, laboratory and field management techniques. Laboratory included.

INDH 4323 - Hazardous Materials and Emergency Management

This course studies hazardous material storage, handling, effects and use as well as the most effective ways to respond to hurricanes, terrorist attacks and/or hazmat spills. It provides information to students as to how to deal with officials, how to establish command & control, coordinate communications, evacuate people and perform clean up. The course also includes emergency management, preparedness, local, state and federal government emergency management; as well as disaster relief organizations.

INDH 4324 - Fire Safety Engineering

This course studies fire science, causes, prevention, inspection, etc. This includes purpose; definition; fire prevention activities, extinguishment, detection, hazards, fire behavior, fire causes, types of construction including structural features, flame spread, occupancy and fire load; inspection techniques,; conducting inspections.

INDH 4333 - Construction and General Industry Safety

This covers safety and health principles in the construction and general industries as well as OSHA policies, procedures and standards. Special emphasis is placed on those areas that are most hazardous in construction and general industry.

INDH 4341 - Advanced Studies in Industrial Hygiene and Safety

Approval of faculty advisor and associate dean. The selection, study and formal presentation of topics in Industrial Hygiene and Safety based on advanced field, laboratory, library research study, supervised work experience in an approved industrial firm or government agency or educational work assignments. Written and oral reports required.

Prerequisite: 15 hours of upper-level credit.

INDH 4379 - Internship in Industrial Hygiene and Safety

Supervised work experience in an approved industrial firm or government agency. Written and oral reports required.

Prerequisite: 15 hours of upper-level credit; Approval of faculty advisor and associate dean.

INDH 4389 - Independent Study in Industrial Hygiene and Safety

Prerequisite: Approval of instructor, chair and associate dean.

INDH 4391 - Selected Topics in Industrial Hygiene and Safety

Identified by specific title each time course is offered.

ITEC - Information Technology**ITEC 3312 - Introduction to Scripting**

Introduction to scripting languages, including VBScript. Practical script programming for IT tasks, including systems administration, data manipulation, decision support and macro development Laboratory instruction.

Prerequisite: CSCI 3303.

ITEC 3335 - Database Development

Introduces database theory, design and implementation. Topics covered will include business data modeling using the entity-relationship (ER) model, logical database design using the relational data model and database querying using structured query language (SQL). Database management systems are studied with database design issues in the context of solving business problems. Laboratory instruction.

ITEC 3365 - Network Fundamentals

Introduces the architecture, structure, functions, components and models of the Internet. Describes and details the use of OSI and TCP layered models to examine the nature and roles of protocols and services at the applications, network, data link and physical layers. The course also covers the principles and structure of IP addressing and the fundamentals of Ethernet concepts and operations. Hands-on lab to build simple LAN topologies by applying basic principles of networking. Laboratory instruction.

ITEC 3381 - Forensics Fundamentals

Sources of computer forensics evidence, search and seizure processing, data storage methods, primary partitions and extended partitions, file allocation tables, deleted file recovery methods, accessing drives with write blocking technology, imaging drives, validating image file integrity and basic evidence analysis. Laboratory instruction.

ITEC 4189 - Independent Study in Information Technology

Prerequisite: Approval of instructor, chair and associate dean.

ITEC 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description).

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

ITEC 4313 - Emerging Information Technology

An introduction to the key trends, assessment and usage of emerging information technology in terms of technical architecture, infrastructure and application. Laboratory instruction.

ITEC 4335 - Database Administration

This course focuses on providing in-depth coverage of DBA tasks including creating database environments, data modeling, normalization, design, performance, data integrity, compliance, governance, security, backup/recovery, disaster planning, data and storage management, data movement/distribution, data warehousing, connectivity, metadata concepts, tools and other related concepts fundamental to administration of databases. Extensive hands-on experience in team projects for developing, optimizing and maintaining databases and other DBA task will be covered as well. Laboratory instruction.

Prerequisite: ITEC 3335.

ITEC 4342 - Information Technology Project Management

The course will discuss the various life-cycles and corresponding phases. Project Management issues including estimation, risk-assessment, configuration, monitoring and control will be discussed. Other topics including quality, integration and reporting will be addressed.

ITEC 4365 - Network Administration

This course will examine fundamental Linux and TCP/IP networking concepts, learn to use remote administration services and tools, configure routers, DHCP and other network protocols and learn basic network troubleshooting tools and techniques.

Prerequisite: ITEC 3365

ITEC 4366 - IT Security & Disaster Recovery

This course covers general concepts of information systems security. Topics include: Physical threats, Risk analysis, Security policies and mechanisms, Database management systems security, Network security concepts; Networks threats such as spoofing, eavesdropping, denial of service attacks and Network security techniques such as Firewalls, Virtual private network and intrusion detection. Other topics include Policy formation, Issues of laws and regulations, Authentication technologies, contingency and business resumption planning and various prevention measures and techniques for responding to security breaches.

ITEC 4379 - Internship in Information Technology

Supervised work experience each week in an approved Information Technology field.

Prerequisite: Approval of faculty chair and associate dean required.

ITEC 4381 - Computer Forensics

Introduction to the topics of computer crime and computer forensics. Students will learn different aspects of computer crime and ways in which to protect, uncover and understand digital evidence. Students will gain experience using hardware and software tools to perform rudimentary investigations. Laboratory instruction.

Prerequisite: ITEC 3381.

ITEC 4382 - Registry & Internet Forensics

Understanding the registry structure, creating preliminary reports, searching for evidence in the NTuser.dat, SAM, SYSTEM, SOFTWARE and SECURITY artifacts. Laboratory instruction.

Prerequisite: ITEC 4381

ITEC 4388 - Senior Project in Information Technology

May be taken only during the final semester before graduation. Registration is restricted to students with an approved Candidate Plan of Study. Students design and implement a solution to a realistic IT project. Emphasis will be on practical experience, professional behavior, ethics and teamwork. Students prepare written reports and give oral presentations.

ITEC 4389 - Independent Study in Information Technology

Prerequisite: Approval of instructor, chair and associate dean.

MATH - Mathematics

MATH 1314 - College Algebra

Study of quadratics; polynomial, rational, logarithmic and exponential functions; systems of equations; progressions; sequences and series and matrices and determinants.

Prerequisite: Appropriate score on placement exam or an Intermediate Algebra course with a grade of C- or better.

MATH 1324 - Finite Math

Topics from college algebra (linear equations, quadratic equations, functions and graphs, inequalities), mathematics of finance (simple and compound interest, annuities), linear programming, matrices, systems of linear equations, applications to management, economics and business.

Prerequisite: MATH 1314

MATH 1325 - Business Calculus

Limits and continuity, derivatives, graphing and optimization, exponential and logarithmic functions, anti-derivatives, integration, applications to management, economics and business.

Prerequisite: MATH 1324

MATH 1332 - Mathematics for Liberal Arts

Topics include introductory treatments of sets, logic, number systems, number theory, relations, functions, probability and statistics. Appropriate applications are included.

Prerequisite: Appropriate score on placement exam.

MATH 1342 - Elementary Statistical Methods

Collection, analysis, presentation and interpretation of data; probability, sampling, correlation and regression, analysis of variance and the use of statistical software.

MATH 1350 - Fundamentals of Math I

Concepts of sets, functions, numeration systems, number theory and properties of the natural numbers, integers, rational and real number systems with an emphasis on problem solving critical thinking. Open only to teacher certification students.

Prerequisite: MATH 1314 with a C- or better (or equivalent).

MATH 1351 - Fundamentals of Math II

Concepts of geometry, probability and statistics; as well as applications of the algebraic properties of real numbers to concepts of measurement with an emphasis on problem solving and critical thinking. This course is designed specifically for students who seek middle grade (4-8) teacher certification. Open only to teacher certification students.

Prerequisite: MATH 1350

MATH 2305 - Discrete Mathematics

Introductory mathematical logic, mathematical induction, relations and functions, basic counting techniques, graphs and trees and applications to computing devices. Designed for students majoring in the computer related disciplines.

Prerequisite: MATH 1325 or MATH 2413

MATH 2315 - Calculus III

Vectors and vector valued functions, functions of multiple variables, partial derivatives, multiple integrals, volume and surface area and vector calculus.

MATH 2318 - Linear Algebra

Systems of linear equations; vector spaces, linear transformations, determinants, matrices, eigenvalues and eigenvectors; applications to coding and difference equations.

Prerequisite: MATH 2412 or MATH 2413

MATH 2320 - Differential Equations

Solutions of ordinary differential equations of the first and second order, Laplace transforms, power series techniques, systems of equations, stability, numerical methods, geometric and physical applications.

Prerequisite: MATH 2414

MATH 2412 - Pre-Calculus Mathematics

In-depth combined study of algebra, trigonometry and other topics for calculus readiness.

Prerequisite: MATH 1314

MATH 2413 - Calculus I

Limits and continuity; the Fundamental Theorem of Calculus; definition of the derivative of a function and techniques of differentiation; applications of the derivative to maximizing or minimizing a function; the chain rule, mean value theorem and rate of change problems; curve sketching; definite and indefinite integration of algebraic, trigonometric and transcendental functions with an application to calculation of areas.

Prerequisite: MATH 2412

MATH 2414 - Calculus II

Differentiation and integration of transcendental functions; parametric equations and polar coordinates; techniques of integration; sequences and series; improper integrals.

Prerequisite: MATH 2413

MATH 3304 - Algebra Through Technology

Using technology to investigate topics in elementary functions, simultaneous equations, polynomials and elementary topics in number theory.

Prerequisite: College algebra.

MATH 3305 - Euclidian and Non-Euclidian Geometry

Formal set theory, logical structure and measurement.

Prerequisite: College algebra.

MATH 3306 - Problem Solving

Problem solving through experiences and reasoning; ideas from areas such as pattern recognition, simulation and logical deduction.

Prerequisite: MATH 1351, MATH 3304, or equivalent or instructor permission

MATH 4189 - Independent Study in Mathematics

Prerequisite: Approval of instructor, chair and associate dean.

MATH 4300 - Introduction to Modern Algebra and Number Theory

An introduction to techniques of proof, problem solving and applications using topics from number theory, modern algebra and logic such as groups, rings, fields, congruence classes, modular arithmetic, symmetries, permutations and inductive and deductive argument forms.

Prerequisite: Calculus II.

MATH 4301 - History of the Mathematical Sciences

Temporal relationships of concepts by means of biographic studies; development of mathematical theory and applications from ancient to contemporary times.

MATH 4312 - Number Theory

Properties of divisibility. Prime numbers, congruence arithmetic, quadratic reciprocity and applications of these ideas, an overview of techniques of mathematical proof.

Prerequisite: Calculus and either MATH 3306 or MATH 2318.

MATH 4313 - Introduction to Topology

Topological techniques in analysis, metric spaces, continuous transformations, connectivity, separation, compactness; nets and filters, cardinal arithmetic.

Prerequisite: MATH 4331.

MATH 4315 - Numerical Analysis and its Applications

Introduction to methods and algorithms in numerical computation. The topics include techniques for finding the roots of equations and interpolation functions, numerical approximation of differentiation and integration, numerical solutions to ordinary differential equations, linear systems and nonlinear systems.

Prerequisite: MATH 2315, MATH 2318, MATH 2320 and C/C++ or equivalent.

MATH 4316 - Mathematic Software Applications

Explores current applications of computers in mathematics using Mathematica. Symbolic, numerical and graphical computing will be applied to various mathematical problems normally viewed as beyond the scope of the course in which they are first introduced. A variety of programming paradigms, such as procedural programming and function programming will be emphasized.

Prerequisite: MATH 2318, MATH 2320 and scientific programming language.

MATH 4321 - Predicate Logic

An introduction to predicate logic; elements of formal logic systems; set theory and propositional calculus, completeness theorems and the nature of proofs.

MATH 4322 - Introduction to Abstract Algebra

Study of algebraic structures: maps, operations, permutations and homomorphisms. Groups, rings, integral domains and fields; applications to symmetry; techniques of mathematical proof.

Prerequisite: MATH 2318, MATH 2413

MATH 4325 - Theory of Models and Applications

Simulation and analysis on continuous and discrete mathematical models in science. It also includes the study of nonlinear dynamics, chaos and fractals.

Prerequisite: MATH 2318 and MATH 2320 or equivalent.

MATH 4331 - Advanced Calculus

Set theory. Real number system. Sequences and series. Differentiation. The Riemann integral.

Prerequisite: MATH 2315 or equivalent.

MATH 4341 - Introduction to Analysis

Real numbers, sequences and series, differentiation and measure theory; Riemann, Stieltjes and Lebesgue integrals.

Prerequisite: MATH 4331 or equivalent.

MATH 4344 - Introduction to Probability

Sample space, probability function, combinatorics, discrete and continuous random variables, special probability distributions, moment generating function, multivariate distribution and central limit theorem.

Prerequisite: MATH 2414

MATH 4345 - Introduction to Statistics

Sampling distributions, point and interval estimation, hypothesis testing, regression and correlation, nonparametric statistics, analysis of variance.

Prerequisite: MATH 4344 or equivalent.

MATH 4346 - Probability for Actuarial Exam P1

This course is designed to prepare students for the first actuarial exam. This course consists of introducing, reviewing concepts and rules of probability and statistics and studying sample actuarial examinations and related material. Students are given sample problems from past actuarial examinations to study outside of class. The solution of these problems and related material are discussed in class.

Prerequisite: One semester probability course is preferred.

MATH 4363 - Functions of a Complex Variable

The theory of limits, differentiation and integration in the complex plane. Gauss' theorem and residue calculations.

Prerequisite: MATH 2315 or equivalent.

MATH 4389 - Independent Study in Mathematics

Prerequisite: Approval of instructor, chair and associate dean.

MATH 4391 - Selected Topics in Mathematics

Identified by specific title each time course is offered.

PHYS - Physics

PHYS 1101 - Laboratory for College Physics I

Laboratory to reinforce topics in College Physics I. Experiments on motion, Newton's laws, wave mechanics, heat and thermodynamics.

Corequisite: PHYS 1301

PHYS 1102 - Laboratory for College Physics II

Laboratory to reinforce topics in College Physics II. Experiments conducted on electric fields, DC and AC circuits, magnetism, electromagnetic induction, light and optics.

Corequisite: PHYS 1302

PHYS 1301 - College Physics I

Algebra based introductory physics course. Fundamentals of mechanics, kinematics, Newton's laws, conservation of energy, momentum, rigid body motion, waves, sound, fluids, heat and thermodynamics.

Prerequisite: MATH 1314 and Trigonometry or MATH 2412

Corequisite: PHYS 1101

PHYS 1302 - College Physics II

Algebra based introductory physics course. Electric forces and fields, current, DC and AC circuits, magnetism, electromagnetic induction, electromagnetic waves, light and optics.

Prerequisite: PHYS 1101, PHYS 1301

Corequisite: PHYS 1102

PHYS 2125 - Laboratory for University Physics I

Introduction to data acquisition and analysis in physics. Instrumentation used to conduct experiments on motion, kinematics, wave mechanics, sound and heat. Topics also to include statistical methods, graphing, error analysis, computer techniques and reporting results.

Corequisite: PHYS 2325

PHYS 2126 - Laboratory for University Physics II

Instrumentation used to conduct experiments on electrical circuits and optics. Topics include Ohm's Law, series and parallel circuits, electrical power EMF, RLC Components, optical elements and visual phenomena.

Corequisite: PHYS 2326

PHYS 2325 - University Physics I

Calculus based introductory physics course. Fundamentals of linear and rotational kinematics and dynamics, Newton's laws, work, energy, conservation, gravitation, wave mechanics, sound, fluid mechanics, heat and thermodynamics.

Prerequisite: MATH 2413

Corequisite: PHYS 2125

PHYS 2326 - University Physics II

Calculus based introductory physics course. Electric forces and fields, Gauss' laws, DC and AC circuits, magnetic forces and fields, electromagnetic induction, Maxwell's equations, electromagnetic waves, geometric optics and introduction to modern physics.

Prerequisite: MATH 2414, PHYS 2325

Corequisite: PHYS 2126

PHYS 3103 - Laboratory for Modern Physics

This course provides students with the exposure to modern physics phenomena and a variety of experimental techniques which develops a broad background essential for the future understanding of and the performance of research in physics. It includes experimental testing of quantum mechanics and its applications to atomic physics and light.

Corequisite: PHYS 3303.

PHYS 3303 - Modern Physics

An introduction to topics in modern physics. Black-body radiation, quantum mechanics, atomic and molecular physics, solid state physics, special relativity, nuclear and particle physics.

Prerequisite: PHYS 2326 or equivalent

Corequisite: PHYS 3103

PHYS 4101 - Lab Methods in the Physical Sciences

Three laboratory hours per week.

Corequisite: PHYS 4301.

PHYS 4189 - Independent Study in Physics

Prerequisite: Approval of instructor, chair and associate dean.

PHYS 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description).

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

PHYS 4301 - Methods in the Physical Sciences

Recent developments in chemistry, geology and physics; emphasis on teaching the physical sciences from a contemporary viewpoint.

Corequisite: PHYS 4101.

PHYS 4311 - Mathematical Methods for Physics and Engineering I

Overview of the essential mathematics needed for advanced Physics courses including: Vector Analysis in flat and curved coordinates, Matrices, Group Theory, Infinite Series, Complex Variables and Differential Equations.

Prerequisite: MATH 2315

PHYS 4312 - Mathematical Methods for Physics and Engineering II

A continuation of Mathematical Methods for Physicists I including such topics as Special Functions, Legendre Polynomials, Bessel Functions, Fourier Series, Integral Transforms, Partial Differential Equations, Probability and Calculus of Variations.

Prerequisite: PHYS 4311 or equivalent.

PHYS 4321 - Intermediate Mechanics

This course is an advanced undergraduate study of the classical motion of particles according to Newton's Theory. In this course we study Rectilinear motion, Oscillations, Noninertial Reference Systems, Central Forces, Systems of Particles and Rigid Body Motion.

Prerequisite: PHYS 3303 or equivalent.

PHYS 4322 - Mechanics of Materials

This course is a foundation to many advanced techniques that allow engineers to design structures, predict failures and understand the physical properties of materials. It gives the student basic tools for stress, strain and strength analysis. Methods for determining the stresses, strains and deflections produced by applied loads are learned. Engineering design concepts are integrated.

PHYS 4331 - Intermediate Electromagnetism

A thorough introduction to electrostatics, magnetostatics and electrodynamics. Practical examples and some demonstration experiments will be used to connect the elegant mathematical theory of electromagnetism with physical intuition.

Prerequisite: PHYS 3303 or equivalent.

PHYS 4333 - Special Relativity

In this course we derive Einstein's theory of special relativity, Lorentz transformations and relativistic electrodynamics using tensor analysis and spacetime diagrams.

Prerequisite: PHYS 4331 or Instructor approval.

PHYS 4342 - Quantum Theory

Experimental basis of quantum theory. Postulates of quantum mechanics. Uncertainty principle. Operator methods and the wave equation, Time-independent Schrodinger equation, Wave-equation in three dimensions, Angular momentum and the Hydrogen atom.

Prerequisite: PHYS 3303 or equivalent.

PHYS 4351 - Thermodynamics & Statistical Mechanics

Temperature, heat and work, thermodynamic properties of gases, solids and solutions; homogeneous and heterogeneous equilibria; thermodynamics of electrochemical cells; statistical thermodynamics; calculation of thermodynamic properties; chemical kinetics.

Prerequisite: PHYS 3303 or equivalent.

PHYS 4352 - Fluids and Heat Transfer

The course introduces fluid mechanics and heat transfer. The fluid mechanics section includes the flow of gases and liquids through tubing and various kinds of process apparatus. The flow of bubbles in liquids and drops in gases will also be discussed along with the flow of gases and liquids through packed and fluidized particle beds. Bernoulli's equation will be used. The heat transfer section includes heat transfer by conduction, convection and radiation in liquids, gases and solids.

PHYS 4362 - Fundamentals of Astroparticle Physics

Topics include: Introduction to high energy physics, symmetries and conservation rules, neutrino astrophysics, particle cosmology and astrophysics.

Prerequisite: PHYS 3303 or equivalent.

PHYS 4372 - Research Seminar

A study of current physics, space science and engineering research projects conducted in the format of a seminar class.

PHYS 4379 - Internship in Physics

Supervised work experience in an approved industrial firm or government agency. Written and oral report required.

Prerequisite: 15 hours of upper-level credit; approval by adviser and associate dean.

PHYS 4389 - Independent Study in Physics

Prerequisite: Approval of instructor, chair and associate dean.

PHYS 4391 - Selected Topics in Physics

Identified by specific title each time course is offered.

SENG - Systems Engineering**SENG 4310 - Introduction to Systems Engineering**

Overview of the systems engineering discipline. Topics include the systems engineering process, fundamentals of engineering economy and an introduction to probability and expectation with systems engineering applications.

Prerequisite: MATH 2315

STAT - Statistics**STAT 3308 - Computational Statistics**

Descriptive statistics, basic probability concepts, normal distribution, parameter estimation, testing of hypothesis, correlation and regression, statistical computation using Excel.

Prerequisite: College algebra or equivalent. Not available for mathematics majors.

STAT 3334 - Probability and Statistics for Scientists and Engineers

Graphical representation of data, measures of centrality and variability, concepts and rules of probability, discrete probability distribution, normal distribution, sampling distributions, central limit theorem, parameter estimation, testing of hypothesis, two sample methods, analysis of variance, correlation and regression analysis.

Prerequisite: MATH 2413, MATH 2414; not available for mathematics majors.

STAT 4326 - Introduction to Survey Sampling

An introduction to the design of sample surveys and the analysis of survey data. This course emphasizes practical applications of survey methodology. Sample designs covered include simple random sampling, systematic sampling, stratified, cluster and multistage sampling. Analytical methods include sample size determination, ratio and regression estimation and imputation for missing data.

Prerequisite: Consent of Instructor

STAT 4328 - Data Management and Analysis Using SAS

An introduction to the statistical package SAS. The course will focus on data step programming and some selected base procedures. Topics include inputting and outputting data, processing and managing data, arrays, functions, custom outputs and some basic statistical procedures for analysis.

Prerequisite: MATH 2413

STAT 4344 - Introduction to Probability

Sample space, probability function, combinatorics, discrete and continuous random variables, special probability distributions, moment generating function, multivariate distributions and central limit theorem.

Prerequisite: MATH 2414

STAT 4345 - Introduction to Statistics

Sampling distributions, point and interval estimation, hypothesis testing, regression and correlation, nonparametric statistics, analysis of variance.

Prerequisite: Math 4344 or equivalent

STAT 4346 - Probability for Actuarial Exam P1

This course is designed to help students prepare for the first actuarial exam preparation. This course consists of introducing/reviewing concepts and rules of probability and statistics and studying sample actuarial examinations and related material. Students are given sample problems from past actuarial examinations to study outside of class. The solution of these problems and related material are discussed in class.

STAT 4348 - Introduction to Financial Math for Exam FM

This course is designed to help students prepare for the second actuarial exam preparation. This course consists of introducing the basics of sample interest and discount, compound interest and discount and simple annuities and studying sample actuarial examinations and related material. Students are given sample problems from past actuarial examinations to study outside of class. The solution of these problems and related material are discussed in class.

Prerequisite: MATH 2413

SWEN - Software Engineering**SWEN 3320 - Engineering Multimedia Software**

Course examines object-oriented design and development of multimedia software. At a high level, the course examines the physics, biology and psychology of visual and auditory perception and the implications of these processes for the characterization of multimedia software. At an intermediate level, it discusses the use of various patterns in the design of multimedia software. At a lower level, it discusses different ways of adding multimedia functionality to applications with visual and auditory examples (such as image processing, vector graphics, video, animation, audio processing and musical scores).

Prerequisite: CSCI 1370.

SWEN 3340 - Principles of Engineering Software

Study of software design models and methods, design patterns, frameworks, architecture design and component based design. Designing for qualities such as performance, safety, security, reusability, reliability, etc. is covered as well as principles of OO design and OO analysis using UML (Unified Modeling Language). Introduction to topics of aspect oriented design, model driven architectures and service oriented architectures.

Prerequisite: SWEN 3320.

SWEN 4195 - Cooperative Education Work Term

Educational paid work assignment by a student in the field of career interest and course of study. A technical report will be required at the end of the semester. (Specific requirements are noted in the Cooperative Education Catalog description).

Prerequisite: Approved Candidate Plan of Study, completed cooperative education file and approval of associate dean and Director of Cooperative Education.

SWEN 4314 - Interface Engineering

The user interface of a software product is a key factor which determines whether a software project succeeds or fails. This course assesses current UI design issues and explores innovative approaches to UI design in terms of cognitive engineering, human perception, attention and language. The intent is to develop new design methodologies, experimenting with new hardware devices, prototyping new software systems, exploring new paradigms for interaction and developing models and theories of interaction.

Prerequisite: CSCI 2315.

SWEN 4317 - Introduction to Game Design and Development

Principles of game design and development of software for computer gaming.

Prerequisite: CSCI 2315

SWEN 4318 - Virtual Worlds, Sims and Animation Scripting

This is a project based course that explores the design and development of Virtual Worlds and Sims using 3-D graphic software and animation scripting. Development work will include oral presentations, peer reviews and project documentation. Students will need their own laptop and may be required to purchase special software.

Prerequisite: A course in data structures, proficiency in programming.

SWEN 4320 - Introduction to Software Process and Project Management

Introduction to Software Process Models, process modeling and improvement; project planning, scheduling and project management.

Prerequisite: CSCI 2315.

SWEN 4330 - Software Development in Emerging Domains

Design and implementation of software in emerging new fields of interest. Topics will include software development in robotics and cell phone applications (apps).

Prerequisite: SWEN 3320, SWEN 3340.

SWEN 4342 - Software Engineering

Introduction to Software Engineering. Major phases of the software life cycle are introduced from requirements through maintenance.

Prerequisite: A course in programming in a high level language, Data Structures recommended.

SWEN 4343 - Current Tools and Innovative Technologies

Review of current software engineering tools used in various lifecycle phases in traditional and novel domains. Survey of current and future trends in software engineering including evidence-based software engineering. Course will involve team work on small projects and oral presentation and project report writing.

Prerequisite: A course in programming in a high level language and data structures.

SWEN 4345 - Introduction to Personal Software Process

Personal evaluation and practice of the software design process, assessments, modeling and improving techniques.

Prerequisite: CSCI 1320.

SWEN 4365 - Senior Project I

Student must be in last year of study before graduation. Students will research a project topic in a chosen area. Students will be exposed to the process of research by writing a proposal for their senior project based on this research and preliminary and high level designs submitted. Project proposals and design will go through a series of peer reviews with oral presentations and written reports required. Approved project proposals will be developed in Senior Project II.

Prerequisite: Approval of instructor.

SWEN 4366 - Senior Project II

Projects accepted and begun in Senior Project I are continued to completion in Senior Project II. Periodic presentation and peer reviews are required throughout the semester. A prototype implementation, a technical report and a public presentation are required at minimum at the end of semester.

Prerequisite: SWEN 4365 and approval of instructor.

SWEN 4391 - Research Topics in SWEN

Identified by specific title each time course is offered.