Engineering Science (ENSC)

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MINOR IN ENGINEERING SCIENCE

Students in divisions outside of the School of Engineering may earn a Minor in Engineering Science through completion of the following sequence of courses. This minor is unavailable to students in the School of Engineering.

I. Prerequisite LAS Courses

MATH 121	Calculus I	4
MATH 122	Calculus II	4
MATH 221	Calculus III	4
MATH 224	Introduction to Applied Mathematics	4
	and either	
CHEM 107/117 CHEM 108/118	General Chemistry I and II	4, 4
	or	
PHYS 131 PHYS 132	General Physics I and II	4, 4
		24

II. School of Engineering Courses

Required of all Engineering Science minors:

ENGR 100	Seminar	1
MCEN 229	Engineering Design	3
Elective	300 - 400 level elective in Engineering	3

Plus one course chosen from the following lists:

CPSC 103	Introduction to Computing via Pascal	3
CPSC 101	Software Design and Programming	4
MCEN 201	Computer Aided Engineering	3
BMEN 201	Experiments and Experimental Design	3
CVEN 207	Introduction to Environmental Studies	3

And three courses (9 credits) chosen from the following lists:

(appropriate for students who have taken PHYS 131 and PHYS 132)

ENGR 201	Electric Circuits I	3
ENGR 241	Statics	3
ENGR 242	Dynamics	3
ENGR 243	Mechanics of Materials	3

ENGR 344	Fluid Mechanics	3

(appropriate for students who have taken CHEM 107/117 and CHEM 108/118)

ENGR 201	Electric Circuits I	3
ENGR 213	Thermodynamics	3
ENGR 312	Materials Science and Engineering	3
MCEN 302	Heat Transfer	3

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COURSE DESCRIPTIONS

ENGR 100, ENGR 101 Introduction to Engineering and Computer Science (1) Seminar 1.
The objectives of ENGR 100 seminar are to familiarize each student with the profession and various fields of engineering and computer science, to assure that each student is confident in their choice of major, to inform each student of what will be expected of them before and after graduation, and to begin to build the skills necessary for success. The ENGR 101 seminars are designed to bring these objectives into sharp focus for each specific major program.

ENGR 201 Electric Circuits 1 (3) Lecture 3.
Prerequisites: MATH 122, PHYS 132 A fundamental course dealing with electric charge, current, voltage, power, energy, and passive and active circuit elements. Response of linear circuits to steady state and time dependent signals, differential equations, circuit laws, network analysis, frequency response, phasors, and transfer functions.

ENGR 213 Thermodynamics (3) Lecture 3.
Prerequisites: MATH 122, PHYS 131. The basic laws of thermodynamics are formulated for application to a representative series of engineering processes. The course covers thermodynamic concepts and definitions, properties of materials, work and heat, first and second laws of thermodynamics, entropy.

ENGR 241 Statics (3) Lecture 3.
Prerequisite: PHYS 131. Statics of particles and rigid bodies. Concepts of force, moments, free body diagrams, equilibrium and friction with engineering applications.

ENGR 242 Dynamics (3) Lecture 3.
Prerequisites: ENGR 241, MATH 122. Kinematics and kinetics of particles and rigid bodies. Energy and impulse momentum methods applied to particles and rigid bodies. Plane motion of rigid bodies and force analysis of linkages. Mechanical vibrations.

ENGR 243 Mechanics of Materials (3) Lecture 3.
Prerequisites: ENGR 241, MATH 122. Concepts of stress and strain. Generalized Hooke’s Law. Mohr’s circle. Formulations for axial, shear, bending, torsion, and combined stresses applied to tension members, pinned points, symmetric and unsymmetric beams, and shafts. Euler buckling criteria for columns.

ENGR 247 Mechanics: Statics and Dynamics (4).
Prerequisites: MATH 122, PHYS 131. This course covers primarily the statics portion of mechanics including forces and moments, equilibrium of force systems in two and three dimensions, multi-force members, friction, and the equilibrium anlysis of trusses, frames, and machines. Topics in dynamics include the kinematics and kinetics of particles and rigid bodies, work and energy, impulse and momentum.

ENGR 312 Materials Science and Engineering (3)
Lecture 3.
Prerequisites: CHEM 107, CHEM 108, PHYS 131, PHYS 132, MATH 221. The structure and properties of engineering materials are considered. Coverage includes basic atomic and microscopic structure, testing methods, phase relationships, and strengthening techniques. Emphasis is placed on common industrial materials. Thermodynamics and kinetics aspects of material science are discussed.

ENGR 344 Fluid Mechanics (3) Lecture 3.
Prerequisites: ENGR 241, MATH 224. Fundamental concepts and properties of fluids. Basic equations of fluid statics and dynamics in differential and integral form using both system and control volume viewpoints. Topics and applications include dimensional analysis and similitude; ideal, viscous and compressible flows; pipe and boundary layer flow.

ENGR 403, ENGR 404 Team Design
Projects I and II (2, 2).
Prerequisite: Senior standing. Techniques and experience in the solution of constrained and open-ended design problems. Lecture topics include all aspects of the design process, including goal setting, idea generation, prototyping, facrication, and product and evaluation. Also included are technical presentation, project planning and management. Included as needed are other topics such as standards, fastening and joining, motors and control, esthetics and finish. Each team will design and construct a device or system to assist an individual with a disability. These designs are presented in a public show during the second semester.

ENGR 451 Engineering Economics (2) Lecture 2.
Coverage includes principles for economic decision making, economic feasibility, applications to engineering projects. Topics include the time value of money, interest, present and future worth, cash flow, rate of return, cost-benefits analysis, depreciation, inflation, and taxation.

ENGR 490, ENGR 491 Research and Professional Practice I and II (2, 2).
This course introduces the tools, techniques, and rules necessary to function professionally as a researcher or engineer. Topics include economic analysis, ethics, professional communication including writing and oral presentation, research techniques including literature searching, citation, and the structure of a scientific paper. An integral part of the course is a year-long research or design project under the direction of a faculty member or other scientist or professional. This culminates in a Senior Thesis and a presentation in Departmental Seminar.

ENGR 600 Entrepreneurship in Engineering (3) Lecture 2.
This course in examines the role, and more significantly, the decision making process of the high tech engineer/entrepreneur within the business community. The class model will include taking a novel idea through the entire business cycle, from an idea through the start-up, developing into a domestic and international company, and finally through bankruptcy.

Note: Additional upper level ENGR courses are cross-listed in the departmental listings. For example, the description of ENGR 636 Introduction to the Finite Element Method may be found cross-listed as BMEN 636 Introduction to the Finite Element Method.