

- 2) demonstrate proficiency in a minimum of four recognized major civil engineering areas;
- 3) demonstrate the ability to conduct laboratory experiments and to critically analyze and interpret data in more than one of the recognized major civil engineering areas;
- 4) demonstrate the ability to perform civil engineering design by means of design experience integrated throughout the professional component of the curriculum; and
- 5) demonstrate an understanding of professional practice issues such as procurement of work; bidding versus quality-based selection processes; how the design professional and the construction professions interact to construct a project; the importance of professional licensure and continuing education; and/or other professional practice areas.

The ABET Criteria, in conjunction with the American Society of Civil Engineers also requires that civil engineering curriculums include in-depth instruction allowing students to accomplish the integration of systems using appropriate analytical, computational and experimental practices. They also require that faculty teaching in civil engineering departments show evidence of understanding professional practice and maintain currency in their respective professional areas. Program faculty must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives.

Freshman Year (33 credits)

C E 151, Introduction to Civil Engineering.....	3
GEOG 111G, Survey of Geology.....	4
ENGL 111G, Rhetoric and Composition.....	4
MATH 191, 192, Calculus and Analytic Geometry I, II.....	6
OEDG 109, Computer Drafting.....	3
PHYS 215, Engineering Physics I.....	3
PHYS 215L, Engineering Physics I Laboratory.....	1
SUR 222, Plane Surveying.....	3
Humanities or social science electives*.....	6

Sophomore Year (32 credits)

C E 231, Introduction to Fluid Mechanics.....	3
C E 233, Mechanics-Statics.....	3
C E 256, Environmental Science.....	3
C E 256L, Environmental Science Laboratory.....	1
C E 301, Mechanics of Materials.....	3
C E 331, Hydraulic Engineering.....	3
CHEM 111, General Chemistry I.....	4
ECON 251G, Principles of Macroeconomics, or ECON 252G, Principles of Microeconomics.....	3
ENGL 218G, Technical and Professional Communication.....	3
MATH 291, Calculus and Analytic Geometry III.....	3
M E 234, Mechanics-Dynamics.....	3

Junior Year (31 credits)

C E 311, Properties of Materials.....	3
C E 315, Determinate Structures.....	3
C E 356, Fundamentals of Environmental Engineering.....	3
C E 357, Soil Mechanics.....	3
C E 365, Intermediate Structural Mechanics, or C E 445, Concrete Design.....	3
COMM 265G, Principles of Human Communication.....	3
E E 201, Networks I, or M E 240, Thermodynamics.....	3
MATH 392, Differential Equations.....	3
STAT 371, Statistics for Engineers and Scientists I, or approved upper-division math elective.....	3
PHYS 216 and PHYS 216L, Engineering Physics II and Lab, or CHEM 112, General Chemistry II.....	4

Senior Year (35 credits)

C E 450, Engineering Economy and Law.....	3
C E 497, Senior Seminar.....	2
Civil engineering options.....	6
Humanities or social science electives (upper-division)*.....	6
Humanities or social science elective*.....	3
CE 445, Concrete Design.....	3
CE 382, Hydraulic Design.....	3
CE 457, Foundation Design.....	3
CE 471, Highway Design or CE 477 Construction.....	3
CE 469, CE 482, CE 485 or ENVE 456.....	3

*Humanities and social science electives must be selected to satisfy the college and university general education requirements.

Civil Engineering Options

Electives for Environmental Option (6 credits):

ENVE 455, Solid and Hazardous Waste Systems Design.....	3
C E 483, Surface Water Hydrology.....	3

Electives for Structural Option (6 credits):

C E 444, Elements of Steel Design.....	3
C E 468, Intermediate Mechanics of Materials.....	3

Electives for Water Resources Option (6 credits):

C E 483, Surface Water Hydrology.....	3
G EN 452, Geohydrology.....	3

Electives for Geotechnical Option (6 credits):

G EN 452, Geohydrology.....	3
G EN 459, Geomechanics and Rock Engineering.....	3

Electives for General Civil Engineering Option (6 credits):

C E 444, Elements of Steel Design; C E 455, Masonry Design; ENVE 455, Solid and Hazardous Waster Systems Design; A EN 459, Design of Water Wells/Pumping Systems; G EN 452, Geohydrology; C E 483, Surface Water Hydrology; A EN 475, Soil and Water Conservation; A EN 478, Irrigation and Drainage Engineering; or A EN 479, Irrigation Systems Design and Management.....	6
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MINOR: Agricultural Engineering

Minimum of 18 credits, designated as follows:

College of Agriculture and Home Economics

Soil Science Requirements, 3 credits from: SOIL 472, Soil morphology and Classification; SOIL 476, Soil Microbiology; SOIL 477, Soil Physics; SOIL 479, Environmental Soil Chemistry.....	3
Plant/Animal Science Requirement, 3 credits from: AGRO/HORT 365, Principles of Crop Production; ANSC 351G, Agricultural Animals of the World.....	3
Institutions/Economics Requirement, 3 credits from: AG E 315G, World Agriculture and Food Problems; AG E 337G, Natural Resources Economics; AG E 484, Water Resource Economics.....	3

College of Engineering

Irrigation Requirement, 3 credits from: AEN 478, Irrigation and Drainage Engineering; AEN 498, Special Topics.....	3
Engineering Specialty Requirement, 3 credits from: AEN 335, Engineering for Biological Systems; AEN 475, Soil and Water Conservation.....	3
Design Requirement, 3 credits from: AEN 440, Design Applications; AEN 459, Design of Water Wells/Pumping Systems.....	3

ENGINEERING PHYSICS

DEGREE: Bachelor of Science in Engineering Physics

The Engineering Physics program is offered jointly by the Physics Department and the College of Engineering. The faculty is drawn from the Departments of Physics, Electrical and Computer Engineering, and Mechanical Engineering.

A strong grasp of underlying physical principles behind the development of new technologies is necessary to keep up with new developments in a high-tech world. The BS in Engineering Physics program is designed to provide quality education of students for immediate employment with technical jobs in private industries (especially high-tech industries), research laboratories, and public sectors. The program trains students with a combination of engineering knowledge, physics principles, mathematical background, problem-solving strategies, and effective communications skills. The BS in Engineering Physics also provides an excellent preparation for graduate studies in either physics or an engineering discipline.

The engineering physics program is offered jointly by the Department of Physics and College of Engineering. The BS in Engineering Physics confers an

engineering credential. Students in the program complete an engineering core curriculum, either in Electrical and Computer Engineering or in Mechanical Engineering, as well as a rigorous course of study in physics and mathematics. A strong laboratory component prepares students in experimental techniques and technology using state-of-the-art equipment.

The goals of the program are

- 1.) to give students a strong education in the fundamentals of physics, engineering, applied mathematics, and computation;
- 2.) to develop skill in real-world problem solving starting from fundamental physical principles;
- 3.) to improve communication skills; and
- 4.) to develop ability to work in a team.

The student must choose either the Electrical Engineering Option or the Mechanical Engineering Option. The requirements are listed below. Students must earn a C or better in all required courses.

Requirements for Electrical Option (129 or 130 credits)

Physics (40 or 41 credits)

PHYS 213, Mechanics	3
PHYS 213L, Experimental Mechanics	1
PHYS 214, Electricity and Magnetism	3
PHYS 214L, Electricity and Magnetism Laboratory	1
PHYS 217, Heat, Light, and Sound	3
PHYS 217L, Experimental Heat, Light, and Sound	1
PHYS 315, Modern Physics	3
PHYS 315L, Experimental Modern Physics	3
PHYS 451, Intermediate Mechanics I	3
PHYS 454, Intermediate Modern Physics I	3
PHYS 455, Intermediate Modern Physics II	3
PHYS 475, Advanced Experimental Modern Physics 3, or PHYS 471, Modern Experimental Optics	2
PHYS 480, Thermodynamics	3
PHYS 495, Mathematical Methods of Physics I	3
Physics electives	6

Electrical Engineering (41 credits)

E E 111, Introduction to Electrical and Computer Engineering	4
E E 161, Computer-Aided Problem Solving	4
E E 211, AC Circuits	4
E E 221, Electronics I	4
E E 261, Digital Design I	4
E E 311, Signals and Systems	4
E E 315, Electromagnetics I	4
E E 341, Control Systems, or E E 332, Introduction to Electrical Power Engineering	4
E E 498, Capstone Design I	3
E E 499, Capstone Design II	3
Electrical engineering elective	3

Mathematics (15 credits)

MATH 191, Calculus and Analytic Geometry I	3
MATH 192, Calculus and Analytic Geometry II	3
MATH 291, Calculus and Analytic Geometry III	3
E E 301, Vector Principles	3
MATH 392, Ordinary Differential Equations	3

Natural Science (4 credits)

CHEM 111, General Chemistry I	4
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Additional General Education Requirements (28 credits)

ENGL 111G, Rhetoric and Composition	4
ENGL 218G, Technical and Scientific Communication	3
Critical thinking/analysis elective (noncomputer)	3
Historical perspective elective	3
Human thought elective	3
Social analysis elective	3
Literature/fine arts elective	3
Viewing a Wider World electives*	6

*Viewing a Wider World courses cannot be taken in engineering or physics.

Requirements for Mechanical Option (129 credits)

Physics (38 credits)

PHYS 213, Mechanics	3
PHYS 213L, Experimental Mechanics	1
PHYS 214, Electricity and Magnetism	3
PHYS 214L, Electricity and Magnetism Laboratory	1
PHYS 217, Heat, Light, and Sound	3
PHYS 217L, Experimental Heat, Light, and Sound	1
PHYS 315, Modern Physics	3
PHYS 315L, Experimental Modern Physics	3
PHYS 454, Intermediate Modern Physics I	3
PHYS 455, Intermediate Modern Physics II	3
PHYS 461, Intermediate Electricity and Magnetism I	3
PHYS 462, Intermediate Electricity and Magnetism II	3
PHYS 475, Advanced Experimental Modern Physics	3
PHYS 495, Mathematical Methods of Physics I	3
Physics elective	3

Mechanical Engineering (43 credits)

C E 301, Mechanics of Materials	3
M E 102, Introduction to Mechanical Engineering	1
M E 159, Graphical Communication and Design	2
M E 236, Engineering Mechanics I	3
M E 237, Engineering Mechanics II	3
M E 240, Thermodynamics	3
M E 260, Mechanical Engineering Problem Solving	3
M E 328, Engineering Analysis I	3
M E 329, Engineering Analysis II	3
M E 333, Intermediate Dynamics	3
M E 338, Fluid Mechanics	3
M E 341, Heat Transfer	3
M E 426, Design Project Laboratory I	3
M E 427, Design Project Laboratory II	3
M E 449, Senior Seminar	1
Engineering elective	3

Mathematics (15 credits)

MATH 191, Calculus and Analytic Geometry I	3
MATH 192, Calculus and Analytic Geometry II	3
MATH 291, Calculus and Analytic Geometry III	3
MATH 392, Ordinary Differential Equations	3
Math elective from M E list	3

Natural Science (4 credits)

CHEM 111, General Chemistry I	4
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Additional General Education requirements (28 credits)

ENGL 111G, Rhetoric and Composition	4
ENGL 218G, Technical and Scientific Communication	3
Critical thinking/analysis elective (non-computer)	3
Historical perspective elective	3
Human thought elective	3
Social analysis elective	3
Literature/fine arts elective	3
Viewing a Wider World electives*	6

*Viewing a Wider World courses may not be taken in engineering or physics.

ELECTRICAL and COMPUTER ENGINEERING

The Klipsch School of Electrical and Computer Engineering

Professor Stephen Horan, department head

Associate Professor Paul Furth, associate department head

College Associate Professor Sheila Horan, freshman adviser

Professors Black, (emeritus), Carden (emeritus), Castillo, Flachs (emeritus), Giles, Stephen Horan, Johnson*, Jordan (emeritus), Kazda (emeritus), Kersting (emeritus), Ludeman (emeritus), Merrill (emeritus), Ng, Ramirez-Angulo,