REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN CIVIL ENGINEERING

(Accredited by the Accreditation Board for Engineering and Technology)

COLLEGE OF ENGINEERING
THE UNIVERSITY OF OKLAHOMA

<table>
<tr>
<td>For Students Entering the Oklahoma State System for Higher Education: Summer 2000 through Spring 2001</td>
<td>GENERAL REQUIREMENTS
Total Credit Hours . . . . 134•
Minimum Retention/Graduation Grade Point Averages:
Overall - Combined and OU 2.00
Major - Combined and OU 2.00
Curriculum - Combined and OU 2.00
A minimum grade of C is required for each course in the curriculum.</td>
<td><u>Civil Engineering</u>

0908A
Bachelor of Science
in Civil Engineering</td>
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Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	ENGL **1113**, Prin. of English Composition (Core I) CHEM **1315**, General Chemistry (Core II) MATH **1823**, Calculus & Analytic Geometry I (Core I) ENGR **1001**, Engineering Computing ENGR **1112**, Intro. to Engineering	3 5 3 1 2	ENGL **1213**, Prin. of English Composition (Core I) CHEM **1415**, General Chemistry MATH **2423**, Calculus & Analytic Geometry II PHYS **2514**, General Physics for Engineering & Science Majors (Core II) ENGR **1213**, Graphics & Design	3 5 3 4 3
	TOTAL CREDIT HOURS	**14**	**TOTAL CREDIT HOURS**	**18**
SOPHOMORE	MATH **2433**, Calculus & Analytic Geometry III PHYS **2524**, General Physics for Engineering & Science Majors ENGR **2113**, Rigid Body Mechanics ENGR **2213**, Thermodynamics C E **2553**, Engineering Surveying	3 4 3 3 3	MATH **2443**, Calculus & Analytic Geometry IV MATH **3113**, Introduction to Ordinary Differential Equations ENGR **2153**, Strength of Materials ENGR **3223**, Fluid Mechanics C E **3403**, Macromeritics ENGL **3153**, Technical Writing	3 3 3 3 3 3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**18**
JUNIOR	C E **3212**, Environmental Engineering I C E **3253**, Dynamics of Rigid Bodies for Civil Engineers C E **3363**, Soil Mechanics C E **3414**, Structural Analysis I ENGR **2613**, Electrical Science §ENGR **3293**, Applied Engineering Statistics	2 3 3 4 3 3	P SC **1113**, American Federal Government (Core III) C E **3234**, Environmental Engineering II ‡C E **3673**, Structural Design—Concrete I, **or** Professional Elective C E **3884**, Transportation Engineering ¤Professional Elective	3 4 3 4 3
	TOTAL CREDIT HOURS	**18**	**TOTAL CREDIT HOURS**	**17**

SENIOR	HIST **1483**, U.S., 1492-1865, **or**
	    1493, U.S., 1865-Present (Core IV)
	ENGR **4223**, Fundamentals of Engineering Economy
	‡C E **3663**, Structural Design—Steel I, **or**
	    Professional Elective
	
	¤Professional Elective
	
	†Approved Elective, Core IV: Artistic Forms
	
	†Approved Elective: Core III: Social Science
		3
		
		3
		3
		
		3
		
		3
		
		3
			C E **4903**, Civil Engineering Design (Capstone)
			
			¤Professional Elective
			
			¤Professional Elective
			
			†Approved Elective, Core IV: Non-Western Culture
			
			†Approved Elective, Core IV: Western Civ. & Culture
				3
				
				3
				
				3
				
				3
				
				3

	TOTAL CREDIT HOURS	**18**	**TOTAL CREDIT HOURS**	**15**

Courses designated as Core I, II, III or IV are part of the General Education curriculum. Students must complete a minimum of 40 hours of General Education courses, chosen from the approved list.

†To be chosen from the University-Wide General Education Approved Course List. Six of these 12 hours must be upper-division (3000-4000). See list in the Class Schedule.

In the College of Engineering, in order to progress in your curriculum, and as a specific graduation requirement, a grade of C or better is required in each course in the curriculum. Please refer to the General Catalog for additional enrollment limitations.

Students should read the College of Engineering Scholastic Regulations which are posted on the Advising Bulletin Board across from CEC 104.

Students must successfully complete prerequisite courses (with a minimum C grade) before proceeding to the next course.

•Two college-level courses in a single foreign language are required; this may be satisfied by successful completion of 2 years in a single foreign language in high school. Students who must take foreign language at the University will have an additional 6-10 hours of coursework.

§Or an approved statistics elective. Faculty adviser must note on the Blue Sheet.

‡Requirement of either CE 3663 or 3673.

¤Chosen from list of professional electives with approval of the faculty adviser–total of 15 hours; 3 hours must be design oriented. Professional elective list available in CEES Office, CEC 334.

COURSES IN CHEMISTRY AND BIOCHEMISTRY (CHEM)

1315 General Chemistry. Prerequisite: Mathematics 1503 or 1643, or math ACT equal to or greater than 23. First of a two-semester sequence in general chemistry. Topics covered: basic measurement, gas laws and changes in state, stoichiometry, atomic theory, electron configuration, periodicity, bonding, molecular structure and thermochemistry. **Laboratory** (F, Sp, Su)

1415 General Chemistry (Continued). Prerequisite: 1315 with a minimum grade of C or a satisfactory score on the chemistry placement examination. Topics covered include: nature of solutions, equilibrium, thermodynamics, acid and base properties, kinetics and electrochemistry. **Laboratory** (F, Sp, Su)

COURSES IN CIVIL ENGINEERING (C E)

2553 Engineering Surveying. Prerequisite: Mathematics 2423, Engineering 1112 and 1213 or concurrent enrollment. Theory and practice in errors, leveling, taping, angle measurement, stadia, mapping, traversing, areas, volumes, construction surveys, horizontal and vertical curves and land surveying. **Laboratory** (F)

3212 Environmental Engineering I. Prerequisite: Engineering 3223. Fluid flow, water distribution/wastewater collection design, surface water hydrology, storm sewer design, ground water hydrology. (F)

3234 Environmental Engineering II. Prerequisite: 3212. Design of systems to control environmental quality including water and wastewater treatment, ground water quality management, air pollution, and solid/hazardous waste management. **Laboratory** (Sp)

3253 Dynamics of Rigid Bodies for Civil Engineers. Prerequisite: Engineering 2113, Physics 2524 and Mathematics 3113. Kinematics and kinetics of rigid bodies; free vibrations of rigid bodies; free and forced vibrations in lumped parameter, undamped and damped linear systems of one, two or more degrees-of-freedom; application of Rayleigh's method and Lagrange's equations. (F)

3363 Soil Mechanics. Prerequisite: 3403, Engineering 3223. General treatment of the physical and mechanical properties of soils. Theories of lateral earth pressure, consolidation, bearing capacity, slope stability and groundwater flow. **Laboratory** (Sp)

3403 Macromeritics. Prerequisite: Chemistry 1415, Engineering 1213; corequisite: Engineering 2153. Study of the occurrence and properties of materials utilized by civil engineers; analyses of aggregates, concrete, masonry, steel, asphalt, and wood. **Laboratory** (Sp)

3414 Structural Analysis I. Prerequisite: Engineering 1213, 2153. Loads, reactions and force systems; introduction to design codes; analysis of frames and trusses; calculation of structural deformations; and analysis of indeterminate structures. Emphasis on classical solutions and time-tested approaches to structural engineering. Introduction to structural analysis computer programs to solve complex problems. (F)

3663 Structural Design—Steel I. Prerequisite: 3403, 3414. Design of steel structural members including tension elements, columns, beams and beam-columns; bolted and welded connection design; composite beam design; introduction to plastic design. **Laboratory** (F)

3673 Structural Design—Concrete I. Prerequisite: 3403, 3414. Analysis and design of reinforced concrete beams, columns, slabs, footings, etc., along with discussion of current building practice. **Laboratory** (Sp)

3884 Transportation Engineering. Prerequisite: 2553, 3363. Introduction to transportation planning, design, construction, operations and maintenance, emphasizing the highway/street mode. Includes demand modeling, route location and design, pavements including hot mix asphalt volumetrics and stability, drainage, and traffic control devices. **Laboratory** (Sp)

4903 Capstone Design. Prerequisite: completion of, or concurrent enrollment in, all professional electives and required engineering courses through the first semester of the senior year. Students must have attempted to pass the Fundamentals of Engineering (FE) Examination, or must attempt to pass the examination prior to the end of the semester. Development of a comprehensive, engineered solution to an open-ended problem by multidisciplinary student design teams. Semester project addresses a real-world problem and is coordinated with practicing engineers. (Sp)

COURSES IN ENGINEERING (ENGR)

1001 Engineering Computing. Prerequisite: Mathematics 1823 or concurrent enrollment. Introduction to computer programming and University computing facilities; program design and development; computer application exercises in engineering. (F, Sp, Su)

1112 Introduction to Engineering. Prerequisite: Mathematics 1523. Engineering fundamentals/problem solving, (principles of mechanics, energy balances, simple circuits), graphics, specifications, ethics, contracts, introduction to the engineering library. (F, Sp, Su)

1213 Graphics and Design. Drafting, blueprint reading, orthographic projection, sketching and the graphical representation of engineering data. Students will carry out design projects related to their fields of specialization. **Laboratory** (F, Sp)

2113 Rigid Body Mechanics. Prerequisite: 1112, Physics 2514 and Mathematics 2433 or concurrent enrollment in 2433. Vector representation of forces and moments; general three-dimensional theorems of statics; free bodies; two- and three-dimensional statically determinate frames; centroids and moments of inertia of areas. Absolute motion of a particle; motion of rigid bodies; rotating axes and the Coriolis component of acceleration; Newton's laws applied to translating and rotating rigid bodies; principles of work and energy and impulse and momentum in translation and rotation; moments of inertia of masses. (F, Sp, Su)

2153 Strength of Materials. Prerequisite: 2113. Elementary elasticity and Hooke's law; Poisson's ratio; solution of elementary one- and two-dimensional statically indeterminate problems; stresses and strains due to temperature changes; stresses induced by direct loading, bending and shear; deflection of beams; area-moment and moment distribution; combined stresses; structural members of two materials; columns. (F, Sp)

2213 Thermodynamics. Prerequisite: 1112, Mathematics 2433 and Physics 2524 or concurrent enrollment. First and second laws of thermodynamics are developed and applied to the solution of problems from a variety of engineering fields. Extensive use is made of partial differential calculus to interrelate the thermodynamic functions. (F, Sp, Su)

2613 Electrical Science. Prerequisite: 1112, Mathematics 2423; Physics 2524 or concurrent enrollment. Formulation and solution of circuit equations, network theorems, sinusoidal steady-state analysis, simple transients. (F, Sp, Su)

3223 Fluid Mechanics. Prerequisite: 2213, Mathematics 2433; concurrent enrollment in 2113 and Mathematics 3113. Coverage of the fundamentals of fluid statics and dynamics. Formulation of the equation of fluid flow, i.e., Navier Stokes Equations, Eulers Equations, Bernoulli Equations, etc. and their application. Examples of ideal fluid flow and viscous fluid flow, such as flow in open and closed conduits. (F, Sp, Su)

†G3293 Applied Engineering Statistics. Prerequisite: 1112, 1001 or Computer Science 1313 or 1323; Mathematics 2433. Introduction to probability, one and higher dimensional random variates, functions of random variables, expectation, discrete and continuous distributions, sampling and descriptive statistics, parameter estimation, use of statistical packages. Not available for graduate credit for students in engineering disciplines. (F, Sp, Su)

G4223 Fundamentals of Engineering Economy. Prerequisite: permission. Introduction to concepts of economic analysis to optimize benefits utilizing multivariant, multistaged mathematical models. Topics include cost and worth comparison, capital costs and sources, time value of money, replacement economics, taxes, economic efficiency of alternate designs, minimum costs and maximum benefits, risk and uncertainty, and economics of work schedules. (F, Sp, Su)

COURSES IN MATHEMATICS (MATH)

1823 Calculus and Analytic Geometry I. Prerequisite: 1523 at OU, or satisfactory score on the placement test, or satisfactory score on the ACT/SAT. Topics covered include equations of straight lines; conic sections; functions, limits and continuity; differentiation; maximum-minimum theory and curve sketching. A student may not receive credit for this course and 1743. (F, Sp, Su)

2423 Calculus and Analytic Geometry II. Prerequisite: 1823. Integration and its applications; the calculus of transcendental functions; techniques of integration; and the introduction to differential equations. A student may not receive credit for this course and 2123. (F, Sp, Su)

2433 Calculus and Analytic Geometry III. Prerequisite: 2423. Polar coordinates, parametric equations, sequences, infinite series, vector analysis. (F, Sp, Su)

2443 Calculus and Analytic Geometry IV. Prerequisite: 2433. Vector calculus; functions of several variables; partial derivatives; gradients, extreme values and differentials of multivariate functions; multiple integrals; line and surface integrals. (F, Sp, Su)

†G3113 Introduction to Ordinary Differential Equations. Prerequisite: 2443 or concurrent enrollment. Duplicates two hours of 3413. First order ordinary differential equations, linear differential equations with constant coefficients, Laplace transformations, power-series solutions of differential equations, Bessel functions. (F, Sp, Su)

COURSES IN PHYSICS (PHYS)

2514 General Physics for Engineering and Science Majors. Prerequisite: Mathematics 1823. Not open to students with credit in 1205. Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, waves. (F, Sp, Su)

2524 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics 2423. Not open to students with credit in 1215. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)