

REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

(Accredited by the Accreditation Board for Engineering and Technology)

COLLEGE OF ENGINEERING THE UNIVERSITY OF OKLAHOMA

For Students Entering the
Oklahoma State System
for Higher Education:
**Summer 2000 through
Spring 2001**

GENERAL REQUIREMENTS
Total Credit Hours 131 •
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.

Industrial Engineering

0913A
Bachelor of Science in
Industrial Engineering

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) P SC 1113 , American Federal Government (Core III) ENGR 1112 , Intro. to Engineering	3 5 3 3 2	ENGL 1213 , Prin. of English Composition (Core I) MATH 2423 , Calculus & Analytic Geometry II (Core I) HIST 1483 , U.S., 1492-1865, or 1493 , U.S., 1865-Present (Core IV) PHYS 2514 , General Physics for Engineering & Science Majors (Core II) C S 1313 , Computer Programming	3 3 3 4 3
	TOTAL CREDIT HOURS	16	TOTAL CREDIT HOURS	16
SOPHOMORE	MATH 2433 , Calculus & Analytic Geometry III PHYS 2524 , General Physics for Engineering & Science Majors ENGR 2113 , Rigid Body Mechanics ENGR 2313 , Structure & Properties of Materials I E 2823 , Work Analysis & Design Engineering	3 4 3 3 3	MATH 2443 , Calculus & Analytic Geometry IV MATH 3333 , Linear Algebra ENGR 2153 , Strength of Materials ENGR 2213 , Thermodynamics ENGR 3293 , Applied Engineering Statistics †Approved Elective: Social Science (Core III)	3 3 3 3 3 3
	TOTAL CREDIT HOURS	16	TOTAL CREDIT HOURS	18
JUNIOR	ENGR 2613 , Electrical Science ENGR 4223 , Fundamentals of Engineering Economy I E 2303 , Design & Manufacturing Processes I E 3253 , Introduction to Industrial Engineering Systems Modeling and Analysis I E 4623 , Deterministic Models of Operations Research †Approved Elective: Artistic Forms (Core IV)	3 3 3 3 3 3	I E 4553 , Engineering Experimental Design I E 3304 , Analysis for Manufacturing Processes I I E 4633 , Probabilistic Models of Operations Research I E 4824 , Introduction to Ergonomics †Approved Elective: Western Civ. & Culture (Core IV)	3 4 3 4 3
	TOTAL CREDIT HOURS	18	TOTAL CREDIT HOURS	17
SENIOR	I E 4323 , Facilities Planning & Design I E 4663 , Systems Analysis Using Simulation I E 4833 , Research Techniques in Ergonomics ‡I E Elective †Approved Elective: Non-Western Culture (Core IV)	3 3 3 3 3	I E 4393 , Senior Design Project (Capstone) I E 4653 , Production Planning & Control ‡I E Elective ‡I E Elective §MATH Elective	3 3 3 3 3
	TOTAL CREDIT HOURS	15	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.

§To be chosen from the approved list of math electives consisting of MATH 3113, 3343, 3413, 3513, 3613, 4033, 4373, 4433, 4643, or 4673.

‡To be chosen from an approved list of IE electives available in the IE office, CEC 124.

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)

COURSES IN COMPUTER SCIENCE (C S)

1313 Computer Programming. Prerequisite: Mathematics 1523 or equivalent. Introduction to the design and implementation of computer programs using procedural languages such as FORTRAN and C. Emphasis on problem solving and on scientific and engineering applications. (F, Sp)

COURSES IN ENGINEERING (ENGR)

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

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)

2313 Structure and Properties of Materials. Prerequisite: 1112, Chemistry 1315 and concurrent enrollment in Physics 2524. The behavior of materials under various conditions and environments is correlated to atomic and molecular structure and bonding. (F, Sp)

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)

†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 multivariate, 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 INDUSTRIAL ENGINEERING (I E)

2303 Design and Manufacturing Processes (Crosslisted with AME 2303). Prerequisite: Engineering 1112 and 2313. Introduction to the fundamentals of product design and manufacturing process selection. **Laboratory** (F, Sp)

2823 Work Analysis and Design Engineering. Prerequisite: sophomore standing. Introduction to industrial engineering profession. The analysis and description of human activity through observational methods: charting methods for operations analysis, activity sampling, time studies, predetermined time systems. Design or work tasks using the principles of methods engineering. Job structuring, motivation and payment systems. **Laboratory** (F)

3253 Introduction to Industrial Engineering Systems Modeling and Analysis. Prerequisite: permission of instructor. Study of systems typically encountered by industrial engineers, including decision analysis, scheduling, manufacturing, communications, inventory, automated manufacturing systems. Definition of general systems concepts and processes for systems modeling and analysis. Use of simulation as an example vehicle for modeling. **Laboratory** (F)

†G3304 Analysis for Manufacturing Processes I. Prerequisite: 2303, 2313; corequisite Engineering 2153. Production planning, testing of engineering materials, methods and economics of casting, fundamentals of metal alloys. Hot working processes of rolling, forging and extrusion; cold working processes of rolling, drawing, swaging and squeezing; measurement and gauging; principles, types, production and economics of machine tools; methods, design and economics of welding. **Laboratory** (Sp)

3960 Honors Reading. 1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. Consists of topics designated by the instructor in keeping with the student's major program. Covers materials not usually presented in the regular courses. (F, Sp, Su)

3970 Honors Seminar. 1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. Projects covered will vary. Deals with concepts not usually presented in regular coursework.

3980 Honors Research. 1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. Provides an opportunity for the gifted honors candidate to work on a special project in the student's field. (F, Sp)

3990 Special Topics. 1 to 3 hours. Directed study for undergraduates. (F, Sp, Su)

†G4323 Facilities Planning and Design. Prerequisite: 3304, 4623. Systematic plant layout methods, analytical and computer-aided approaches for the layout problem. Location models and analysis. Material handling concepts, models and equipment. Warehousing and storage principles and models. Automation in facilities design. (F)

4393 Senior Design Project. Prerequisite: senior standing, students must have taken the EIT exam, and permission. Restricted to graduating industrial engineering students; to be taken in the last semester. Current problems drawn from production and service organizations will be presented by personnel from these organizations. Students will solve these problems under the guidance of their instructor, using industrial engineering methodology. (Sp)

4553 Engineering Experimental Design (Slashlisted with 5553). Prerequisite: Engineering 3293. Fundamentals of design of experiments. Analysis of variance models for single factor designs with blocking factors and multi-factor designs, including factorial and nested designs. Fixed, random and mixed models. Analysis of covariance models. No student may earn credit for both 4553 and 5553. (Sp)

†G4623 Deterministic Models of Operations Research. Prerequisite: Mathematics 3333, or permission. Linear programming (problem formulation, simplex method, duality, sensitivity analysis), integer programming, dynamic programming. (F)

†G4633 Probabilistic Models of Operations Research. Prerequisite: 3253, Engineering 3293. Basic probability concepts, Markov chains, decision analysis, queueing models and applications, inventory models and applications, simulation, PERT, CPM. (Sp)

†G4653 Production Planning and Control. Prerequisite: 4623, 4633. Elements of material requirements planning. Forecasting to develop master production schedules. Coordinated inventory ordering policies, periodic review, S-s policies and dynamic lot sizing procurement strategies. Sequencing and scheduling methods of flow and job shops. (Sp)

4663 Systems Analysis Using Simulation. Prerequisite: 4633, Engineering 3293. Introduce the basic concepts of simulation and network modeling to support the science of systems analysis. **Laboratory** (F)

G4713 Management of the Engineering Function. Prerequisite: 2823. Intensive analysis of the specialized problems of engineering organizations which include technical human power. Procedures and design for the control of engineering projects. (F)

G4753 Organization Systems. Prerequisite: 4713 or permission. The organization is examined as a complex of subsystems to accomplish production or service objectives. Individuals as members of the subsystems are examined as human factor elements in contributing to the analysis of effectiveness and efficiency of systems. (Sp)

†G4824 Introduction to Ergonomics. Prerequisite: 2823 or permission of instructor. The measurement of human physical capabilities and limitations: anthropometry, biomechanics, work physiology. The human response to and measurement of the physical environment: heat, light, noise and vibration. Workplace, equipment and job design with regard to performance efficiency, health and safety. The human being as a consumer and generator of energy. **Laboratory** (F, Sp)

4833 Research Techniques in Ergonomics. Prerequisite: 4824, 4553. The experimental investigation of human performance: problem formulations, experimental design, instrumentation, data processing, analysis and communication. (F)

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)

†G3333 Linear Algebra I. Prerequisite: 2433 or permission of instructor. Systems of linear equations, determinants, finite dimensional vector spaces, linear transformations and matrices, characteristic values and vectors. (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)