# 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

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### GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Minimum Retention/Graduation Grade Point Averages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall - Combined and OU .............................. 2.00</td>
</tr>
<tr>
<td>Major - Combined and OU ................................ 2.00</td>
</tr>
<tr>
<td>Curriculum - Combined and OU ............................ 2.00</td>
</tr>
</tbody>
</table>

A minimum grade of C is required for each course in the curriculum.

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### OU encourages students to complete at least 34 hours of applicable coursework each year to have the opportunity to graduate in four years.

<table>
<thead>
<tr>
<th>Year</th>
<th>FIRST SEMESTER</th>
<th>Hours</th>
<th>SECOND SEMESTER</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRESHMAN</td>
<td>ENGL 1113, Prin. of English Composition (Core I)</td>
<td>3</td>
<td>ENGL 1213, Prin. of English Composition (Core I), or</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHEM 1315, General Chemistry (Core II)</td>
<td>5</td>
<td>CHEM 1415, General Chemistry continued</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>MATH 1823, Calculus &amp; Analytic Geometry I (Core I)</td>
<td>3</td>
<td>MATH 2423, Calculus &amp; Analytic Geometry II (Core I)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ZOO 1114, Introductory Zoology</td>
<td>4</td>
<td>PHYS 2514, General Physics for Engineering &amp; Science Majors (Core II)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ENGR 1410, Freshman Engineering Orientation I</td>
<td>1</td>
<td>*C S 1323, Fundamentals of Computer Programming</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>TOTAL CREDIT HOURS</td>
<td>16</td>
<td>TOTAL CREDIT HOURS</td>
<td>18</td>
</tr>
<tr>
<td>SOPHOMORE</td>
<td>MATH 2433, Calculus &amp; Analytic Geometry III Majors</td>
<td>3</td>
<td>CHEM 3153, Organic Chemistry</td>
<td>3</td>
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<tr>
<td></td>
<td>PHYS 2524, General Physics for Engineering &amp; Science</td>
<td>4</td>
<td>CHEM 3152, Organic Chemistry Lab</td>
<td>2</td>
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<tr>
<td></td>
<td>CEES 2113, Statics and Dynamics</td>
<td>3</td>
<td>MATH 2443, Calculus &amp; Analytic Geometry IV</td>
<td>3</td>
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<tr>
<td></td>
<td>ENGR 2003, Engineering Practice I</td>
<td>3</td>
<td>CEES 2153, Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IE 2823, Enterprise Engineering</td>
<td>3</td>
<td>IE 2303, Design &amp; Manufacturing Processes</td>
<td>3</td>
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<tr>
<td></td>
<td>CHEM 3053, Organic Chemistry</td>
<td>3</td>
<td>IE 2311, Computer Aided Design and Graphics Lab</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>TOTAL CREDIT HOURS</td>
<td>19</td>
<td>TOTAL CREDIT HOURS</td>
<td>18</td>
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<tr>
<td>JUNIOR</td>
<td>IE 3304, Design and Manufacturing II</td>
<td>4</td>
<td>IE 4223, Fundamentals of Engineering Economy</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IE 4553, Engineering Experimental Design</td>
<td>3</td>
<td>IE 4563, Quality Engineering</td>
<td>3</td>
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<tr>
<td></td>
<td>IE 4623, Systems Modeling and Optimization</td>
<td>3</td>
<td>IE 4633, Applied Engineering Optimization</td>
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<tr>
<td></td>
<td>IE 3984, Ergonomics</td>
<td>4</td>
<td>TOTAL CREDIT HOURS</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>TOTAL CREDIT HOURS</td>
<td>16</td>
<td>TOTAL CREDIT HOURS</td>
<td>16</td>
</tr>
<tr>
<td>SENIOR</td>
<td>IE 4333, Production Systems and Operations</td>
<td>3</td>
<td>HIST 1483, U.S., 1492-1865, or</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>IE 4663, Systems Analysis Using Simulation</td>
<td>3</td>
<td>HIST 1493, U.S., 1865-Present (Core IV) Handling</td>
<td>3</td>
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<tr>
<td></td>
<td>ENGR 2431, Electrical Circuits</td>
<td>1</td>
<td>IE 4393, Capstone Design Project (Capstone)</td>
<td>3</td>
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<tr>
<td></td>
<td>ENGR 2461, Thermodynamics</td>
<td>1</td>
<td>TOTAL CREDIT HOURS</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>ENGR 3441, Fluid Mechanics</td>
<td>1</td>
<td>TOTAL CREDIT HOURS</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>TOTAL CREDIT HOURS</td>
<td>18</td>
<td>TOTAL CREDIT HOURS</td>
<td>18</td>
</tr>
</tbody>
</table>

NOTE: Engineering transfer students may take ENGR 3410 in place of ENGR 1410 and ENGR 1420.

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

1To be chosen from the University-Wide General Education Approved Course List. These three 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 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 zoology electives consisting of ZOO 2204, 3113, 3203, 3333, or 4244.

†To be chosen from a 2000- or 3000-level English literature or writing course.

Admission requirements vary with medical schools. Students should consult with advisers in the Pre-Medical Professions Advising Office as well as the Williams Students Services to ensure completion of the necessary prerequisite courses. This may include additional coursework not required for this specific undergraduate degree program in Industrial Engineering.

*This course fulfills the Computer Literacy Requirement for graduation as required by the Oklahoma State Regents for Higher Education.

Some medical schools also require PHYS 1311 and 1321; OU does not.

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IE: Pre-Medicine
0913E Bachelor of Science in Industrial Engineering
2632 Enterprise Engineering. Prerequisite: sophomore standing. Introduction to the industrial en-
gineering role as enterprise system integrator. Systems concepts, modeling and analysis; integrated product/service and operational process design; productivity and quality improvement; computer technology insertion; project organization, and global supply chain management. (F, Sp)

TG2393 Applied Engineering Statistics. Prerequisite: Mathematics 2433. Introduction to probabil-
ity and statistics; random variables, expectation, discrete and continuous distributions, sampling and descriptive statistics, parameter estimation, use of statisti-
cal packages. Not available for graduate credit for students in engineering disciplines. (F, Sp, Su)

G3104 Design and Manufacturing II. Prerequisite: 2303, 2311. Civil Engineering and Environ-
mental Science 2153 (or concurrent enrollment) or Aerospace and Mechanical Engineering 3143 (or concurrent enrollment). Topics: Dimensions and tolerances—type, design and oper-
ation; assembly and fit design; tolerance standards; process planning—precedure representation in-
 machinery, operation and machine sequencing; parts and fixtures—design and analysis; time and cost-
estimation for machining; automation; processes/assembly integration. Laboratory (F)

TG2411 Manufacturing Engineering Systems I. Prerequisite: Introduction to concepts of economic analysis to optimize benefits utilizing multivariable, 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 maxi-
mum rate of return, risk assessment, multivariate economic models of work schedules. (Sp)

TG4333 Production Systems and Operations. Prerequisite: 2823 and 4623, or by permission. Operations-oriented topics for production systems. Supply chain process (factual planning, opera-
tional scheduling and sequencing, management and planning, demand promising). Customer ser-
vice process—E-Business and information technology applications for production systems. (F)

4363 Facility Planning, Warehousing, and Material Handling (Slashed with 5363). Prerequi-
site: 4623. Facility location and layout models, design, analysis, and improvement of warehousing opera-
tions, material handling systems in manufacturing and warehousing operations, informa-
tional technologies for management of operations, supply chain relationships. No student may earn credit for both 4363 and 5363. (Sp)

4393 Capstone Design Project. Prerequisite: 4333, 4563, 4663, and 4853. Restricted to graduat-
ing industrial engineering students; to be taken in the last semester. Current projects drawn from
production and service organizations will be presented by personnel from these organizations. Study of
these problems under the guidance of their instructor, using industrial engineering methodology. (Sp) [V]

4553 Engineering Experimental Design (Slashed with 5553). Prerequisite: 1293 or Engineering
2393. Fundamentals of design of experiments. Analysis of variance models for single factor de-
signs and multiple factor designs, including factorial and nested designs. Fixed and random mixed models. Analysis of covariance models. No student may earn credit for both 4553 and 5553. (F)

4563 Quality Engineering (Slashed with 5563). Prerequisite: 3293 or Engineering 3293, and 4663. Quality methods in detail of statistical process control, non-parametric testing, and acceptance sam-
ing procedures. Pre-requisite: Mathematics 2433. Introduction to quality engineering; improvement
environments for engineering and management utilization. Focus will be on statistical process control
tools and total quality management. No student may earn credit for both 4563 and 5363. (Sp)

4623 Systems Modeling and Optimization. Prerequisite: 2823. Problem solving using analytical
models. Introduction to optimization, linear programming, integer, dynamic programming, and
gradient methods. Simple optimization problems, decision criteria, optimization software such as LINDO, LINCO, EXCEL SOLVER. Analytical decision making. Intro-
duction to stochastic programming. (F)

4633 Applied Engineering Optimization. Prerequisite: Engineering 3293 or 3293, 4623. Data
structure and algorithms of optimization. Topics include: Engineering 3293, 4623, 4663. Data
selection, transportation, transshipment, and assignment problems. Routing techniques, facility lay-
out models, queuing models and applications, Monte Carlo simulations and applications. (Sp)

4663 Systems Analysis Using Simulation. Prerequisite: Engineering 3293 or 3293, 4633. Imple-
ments the science of systems analysis through the use of simulation modeling and statistical analy-
sis techniques. Analysis of time and state of systems. No student may earn credit for both 4663 and
5663. (Sp)

TG4824 Ergonomics. Prerequisite: junior standing or permission of instructor. The measurement of
human physical capabilities and limitations. Measurement of the environment and elicited hu-
man responses. Workplace, equipment and job design with regard to human performance effi-
cacy. Pre-requisite: Human Factors. Laboratory, and Field Study. (Sp)

4853 Applied Research Methods (Slashed with 5853). Prerequisite: 4553 and 4824. Expe-
mental methodology for empirical investigation, including problem formulation. The development
and measurement of performance criteria, experimental and oral communication. The measure-
ment of human performance is typically the vehicle used for students in this course. No student may
earn credit for both 4853 and 5853. (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) [I-M]

2423 Calculus and Analytic Geometry II. Prerequisite: 1823. Integration and its appli-
cations; the calculus of transcendental functions; techniques of integration; and the introduction to differen-
tial equations. A student may not receive credit for this course and 2123. (F, Sp, Su) [I-M]

TG2411 Calculus and Analytic Geometry III. Prerequisite: 2423. Polar, cylindrical, and spherical
coordinates, parametric equations, sequences, infinite series, vector analysis. (F, Sp, Su)

4433 Calculus and Analytic Geometry IV. Prerequisite: 2433. Vector calculus; functions of several
variables; partial differentiation; integrals of multiple variables; multiple integrals; line and surface in-
tegrals. (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, wave and en-
ergy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid me-
diums. (F, Sp, Su) [II-NL]

2524 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics
2524. Not open to students with credit in 1215. Temperature, heat, thermodynamics, electricity, opti-
cal properties of matter. Laboratory. (F, Sp, Su)

COURSES IN ZOOLOGY (ZOO)

1114 Introductory Zoology. Major biological principles and concepts as illustrated in the struc-
ture, function and evolution of animals. Emphasis is on self-regulatory mechanisms, especially in
the vertebrates, and their adaptive significance. (F, Sp, Su) [II-NL]

1121 Introductory Zoology Laboratory. Prerequisite: previous completion or concurrent enroll-
mont. Lab study of structure and development of vertebrates. Experiments on the physiological
process of selected vertebrates and invertebrates. (F, Sp, Su) [I-IAB]