### GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 1113, Prin. of English Composition (Core I)</td>
<td>3</td>
<td>English 1213, Prin. of English Composition (Core I), or</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1315, General Chemistry (Core II)</td>
<td>5</td>
<td>Exposatory Writing (Core I)</td>
<td>2</td>
</tr>
<tr>
<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>Physics 1113, American Federal Government (Core III)</td>
<td>3</td>
<td>HIST 1483, U.S., 1492-1865, or</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 1411, Freshman Engineering Experience</td>
<td>1</td>
<td>PHYS 2514, General Physics for Engr. &amp; Science Majors (Core II)</td>
<td>4</td>
</tr>
</tbody>
</table>

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

### TOTAL CREDIT HOURS

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>15</td>
</tr>
<tr>
<td>Sophomore</td>
<td>15</td>
</tr>
<tr>
<td>Junior</td>
<td>16</td>
</tr>
<tr>
<td>Senior</td>
<td>16</td>
</tr>
<tr>
<td>Fifth-year</td>
<td>15</td>
</tr>
</tbody>
</table>

*Students enter the accelerated program based on the undergraduate degree pattern offered in the year they first enrolled in the Oklahoma State System of Higher Education or later. Students must maintain a 3.0 GPA from the time of entering the accelerated program until graduation.

**NOTE:** Engineering transfer students may take ENGR 3511 in place of ENGR 1411.

Courses designated as Core I, II, III, or 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.

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.

*Students must enter the University-Wide General Education Approved Course List. 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 should submit an application to the School of Industrial Engineering for the accelerated program during the fall semester of the junior year. Students must also apply to the Price College of Business during the spring semester of the junior year to be admitted by that college to the MBA program.

*Students must take the GMAT and apply for the MBA program during the third year; minimum OU GPA and combined GPA of 3.0 is required.

Students must maintain a 3.0 OU GPA from the time of entering the accelerated program until graduation.

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To be chosen from the approved list of math electives consisting of MATH 2513, 3113, 3313, 3413, 3513, 3613, 4413, or CS 1813.

To be chosen from an approved list of IE electives available in the IE office, CEC 116.

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*These three courses are dual-counted, fulfilling requirements for both the undergraduate degree and the graduate business degree.

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COURSES IN CHEMISTRY AND BIOCHEMISTRY (CHEM)
1315 General Chemistry. Prerequisite: Mathematics 1303 or 1643, or math ACT equal to or greater than 20. Elements, atomic and molecular structure, chemical bonding theory, stoichiometry, and first principles of quantum mechanics. (F, Sp, Su)

COURSES IN CIVIL ENGINEERING AND ENVIRONMENTAL SCIENCE (CEES)
2113 Statics and Dynamics (Crosslisted with Petroleum Engineering 2113). Prerequisites: Physics 2514 and Mathematics 2433 or concurrent enrollment in Mathematics 2433. Vector representation of forces and moments; general three-dimensional frames and mechanisms; statics; centroids and moments of area and inertia. Free-body diagrams, equilibrium of a particle and of rigid bodies, principles of work and energy; principle of impulse-momentum. Motion of particles and rigid bodies in translating and rotating reference frames. Newton’s law of motion and Lagrange’s equation, including application to lumped-parameter systems. Analysis of trusses, frames and machines. (F, Sp)

2153 Mechanics of Materials. Prerequisites: 2113 or Aerospace and Mechanical Engineering 2113 or Petroleum Engineering 2113. Basic principles of mechanics, including the definition of stress and strain, transformations and principal values for the stress and strain tensors, kinematic relations, review of conservation equations and the development and application of constitutive laws for idealized materials. Elementary elastostatics utilizing Hooke’s law; constitutive relations for a linear-elastic continuum, including elastic parameters such as Young’s modulus, shear and bulk moduli and Poisson’s ratio. Solution of elementary one- and two-dimensional mechanics problems, including thermal stresses and strains, beam flexure, shear and deflections, pressure vessels and buckling of columns. (Sp)

COURSES IN COMPUTER SCIENCE (C S)
1313 Programming for Nonmajors. Prerequisite: Mathematics 1523 or concurrent enrollment. Introduction to the design and implementation of computer programs. Emphasis on problem solving. (F, Sp)

1321 Introduction to Computer Programming. Prerequisite: Mathematics 1523 or 1743 or 1823 or 2104 or 2423 or 2433. Introduction to the design and implementation of computer software with an emphasis on abstraction and program organization. (F, Sp)

COURSES IN ENGINEERING (ENGR)
1411 Freshman Engineering Experience. Prerequisite: declared major in Engineering or permission of advisor. F.S. Required of all entering freshmen with a declared Engineering major. Lecture hours cover a variety of topics including: majors and minors; career planning; advising; and extra-curricular activities. Students also work on multi-disciplinary engineering projects in smaller groups during the lab hour. (F)

2002 Professional Development. Prerequisite: sophomore standing. Develop an understanding of engineering ethics, teamwork, leadership, and professional responsibility through the concepts of contemporary, social, and global issues. (F, Sp)

2431 Electrical Circuits. Prerequisite: Mathematics 2423 and Physics 2524 or concurrent enrollment. Introduction to basic principles of electrical circuits. Topics include circuits (DC circuits, AC circuits, resonance, AC transients, DC transients) static electrical fields, static magnetic fields, and electronics (diodes, operational amplifiers). (F, Sp)

2461 Thermodynamics. Prerequisite: Mathematics 2433 and Physics 2524 or concurrent enrollment. Introduction to basic principles of thermodynamics. Topics include density, pressure, and temperature, the first law of thermodynamics for a system, the first law of thermodynamics for a control volume, the second law of thermodynamics, and psychometrics. (F)

4411 Fluid Mechanics. Prerequisite: Mathematics 2433. Introduction to basic principles of fluid mechanics. Topics include fluid properties, fluid statics, dimensionless parameters and similitude, control volume, open channel flow, and external flow. (F)

COURSES IN INDUSTRIAL ENGINEERING (I E)
2303 Materials, Design and Manufacturing Processes (Crosslisted with Aerospace and Mechanical Engineering 2303). Prerequisite: Aerospace and Mechanical Engineering 2113 or Civil Engineering and Environmental Science 2113 or Engineering 2113. Mechanical and physical properties of engineering materials. Introduction to design concepts, manufacturing processes and equipment used in engineering. (Sp)

2311 Computer Aided Design and Graphics Laboratory for Industrial Engineers. Corequisites: 2303. Provides students with a basic understanding of technical graphics communication and computer-aided design for industrial engineering applications. By using computer-aided design/graphics software, SolidWorks/AutoCAD, students will learn basic principles of engineering graphics and geometric modeling to assist in design problem visualization and planning. (Sp)

2823 Enterprise Engineering. Prerequisite: sophomore standing. Introduction to the industrial engineering 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, operations, and global supply chain management. (F)

1G293 Applied Engineering Statistics. Prerequisite: Mathematics 2433. Introduction to probability, one and higher dimensional random variables, function 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)

49304 Design and Manufacturing II. Prerequisite: 2303, 2311, Civil Engineering and Environmental Science 2113 or concurrent enrollment or Aerospace and Mechanical Engineering 3143 or concurrent enrollment. Dimensioning and tolerancing; tolerances—type, design and specification; assembly and fit design; tolerance standards; process planning—predece representation in machining, operation and machine sequencing; jigs and fixtures—design and analysis; time and cost estimation for machining; automation; processes/system integration. Laboratory (F)

G4223 Fundamentals of Engineering Economy. Prerequisite: Mathematics 2423. 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 maximum benefits, risk and uncertainty and economics of work schedules. (Sp)

G4333 Production Systems and Operations. Prerequisite: 2823 and 4623, or by permission. Operations-oriented topics for production systems. Supply chain process (tactical planning, operations scheduling and sequencing, management and planning, demand planning). Customer service process; E-Business and information technology applications for production systems. (F)

4393 Capstone Design Project. Prerequisite: 4333, 4563, 4663, and 4853. 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) [V]

4533 Engineering Experimental Design (Slashlisted with 5553). Prerequisite: 2913 or 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 4533 and 5553. (F)

4623 Systems Modeling and Optimization. Prerequisite: 2823. Problem solving using analytical models. Introduction to optimization, linear programming, integer, dynamic programming, and goal programming methods. Simplex method and sensitivity analysis. Practical applications using software such as LINGO, UNICOR, EXCEL, SPOILER. Analytical decision making. Introduction to stochastic programming. (F)

4633 Applied Engineering Optimization. Prerequisite: Engineering 3293 or 3297, 4623. Data mining techniques, heuristics and applications of operations research to financial engineering, site selection, transportation, transshipment and assignment problems. Routing techniques, facility layout models, queuing models and applications, Monte Carlo simulation. (Sp)

4663 Systems Analysis Using Simulation. Prerequisite: Engineering 3293 or 3297, 4633. Extends the science of systems analysis through the use of simulation modeling and statistical analysis; inclusive of time study analysis for performing input modeling tasks. Laboratory (F)

4673/5673 Computer Simulation and Analysis. Prequisite: 4623 and 4824. Introduction to mathematical modeling of simulation models and the development and use of simulation models for industrial systems. (Practicum) (F)

4824 Simulation Modeling and Analysis. Prerequisite: 2113. Analysis of simulation models, simulation experiments, analysis of results, and implementation of simulation models. Credit is not given for both 4824 and 5824. (F)

4825/5825 Analysis of Queuing Systems. Prerequisites: 4623 and 4824. Analysis of single- and multiple-server queuing systems, different types of queuing systems, and the characteristics of the various systems. (Practicum) (F)

4826/5826 Simulation Modeling and Programming. Prerequisites: 4623 and 4824. Applications of simulation techniques, heuristics and applications of operations research to financial engineering, site selection, transportation, transshipment and assignment problems. Routing techniques, facility layout models, queuing models and applications, Monte Carlo simulation. (Sp)

COURSES IN MECHANICAL ENGINEERING (ME)
2002 Professional Development. Prerequisite: sophomore standing. Development of the ability to model various engineering problems. Emphasis on problem-solving skills. (F)

2303 Calculus and Analytic Geometry II. Prerequisite: Mathematics 2433 or concurrent enrollment or Mathematics 2433 or concurrent enrollment or Aerospace and Mechanical Engineering 3143 or concurrent enrollment. Dimensioning and tolerancing; tolerances—type, design and specification; assembly and fit design; tolerance standards; process planning—predece representation in machining, operation and machine sequencing; jigs and fixtures—design and analysis; time and cost estimation for machining; automation; processes/system integration. Laboratory (F)

COURSES IN PHYSICS (PHYS)
2514 General Physics for Engineering and Science Majors. Prerequisite: Mathematics 1823 or Mathematics 1914 with grade of C or better. Not open to students with credit in 1205, Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics, waves and oscillations, statics, work and energy, Archimedes’ principle. (F, Sp, Su) [II-LAB]

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)

Course descriptions for the graduate business courses and electives may be found online at http://catalog.ou.edu/courses/courses.htm.