REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN INDUSTRIAL AND SYSTEMS ENGINEERING/MASTER OF BUSINESS ADMINISTRATION

B.S. Portion of the Program Accredted by the Engineering Accreditation Commission of ABET, **http://www.abet.org**

COLLEGE OF ENGINEERING — THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education
Summer 2015 through Spring 2016

GENERAL REQUIREMENTS

Total Credit Hours . . . . . **155•**
Minimum Retention/Graduation Grade Point Averages:
Overall - Combined and OU **3.00**
Major - Combined and OU **3.00**
Curriculum - Combined and OU **3.00**
A minimum grade of C is required for each course in the curriculum.

Industrial and Systems Engineering **A530**
Bachelor of Science in Industrial and Systems Engineering/Master of Business Administration **F140 Q340**

OU encourages students to complete at least 32 hours of applicable coursework each year to have the opportunity to graduate in five years.

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	**ENGL 1113**, Prin. of English Composition (Core I)	3	**ENGL 1213**, Prin. of English Composition (Core I), **or**	3
	CHEM 1315, General Chemistry (Core II)	5	**EXPO 1213**, Expository Writing (Core I)	
	❖**MATH 1914**, Differential and Integral Calculus I (Core I)	4	❖**MATH 2924**, Differential & Integral Calculus II	4
	P SC 1113, American Federal Government (Core III)	3	**HIST 1483**, U.S., 1492-1865, **or**	3
	ENGR 1411, Freshman Engineering Experience	1	**1493**, U.S., 1865-Present (Core IV)	
			PHYS 2514, General Physics for Engr. & Science Majors (Core II)	4
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**14**
SOPHOMORE	❖**MATH 2934**, Calculus & Analytic Geometry III	4	**CEES 2153**, Mechanics of Materials	3
	PHYS 2524, General Physics for Engr. & Science Majors	4	**ISE 3293**, Applied Engineering Statistics	3
	CEES 2113, Statics	3	**ISE 2303**, Design & Manufacturing Processes	3
	ENGR 2002, Professional Development	2	**ISE 2311**, Computer Aided Design & Graphics Lab	1
	ISE 2823, Enterprise Engineering	3	**C S 1323**, Fundamentals of Computer Programming, **or**	3
			1313, Programming for Non-Majors	3
			§MATH Elective	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**16**

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 should submit an application to the School of Industrial and Systems 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.

JUNIOR	**ISE 3304**, Design and Manufacturing II	4	**ISE 4223**, Fundamentals of Engineering Economy	3
	ISE 4113, Spreadsheet-Based Decision Support Systems	3	**ISE 4633**, Applied Engineering Optimization	3
	ISE 4553, Engineering Experimental Design	3	♠**ISE 4804**, Ergonomics in Systems Design	4
	ISE 4623, Systems Modeling and Optimization	3	♠**ISE 5563**, Quality Engineering	3
			ENGR 2461, Thermodynamics	1
	†Approved Elective: Social Science (Core III)	3	**ENGR 3441**, Fluid Mechanics	1
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
SENIOR	**B AD 5001**, Quantitative Methods and Modeling I	1	**ACCT 5212**, Managerial Accounting	2
	B AD 5100, MBA - Professional Development - Part A	0	**B AD 5112**, Global Economics	2
	B AD 5102, Managerial Economics	2	**B AD 5200**, MBA - Professional Development - Part B	0
	ACCT 5202, Financial Accounting	2	**FIN 5312**, Corporate Finance	2
	FIN 5302, Financial Markets and Securities	2	**MKT 5402**, Marketing Management	2
	MGT 5702, Organizational Behavior	2	**SCM 5502**, Supply Chain Management	2
	MIS 5602, Management Information Systems	2	✦MBA Elective	2
	✦MBA Elective	2	†Approved Elective: Non-Western Culture (Core IV)	3
	†Approved Elective: Artistic Forms (Core IV)	3		
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
FIFTH YEAR	♠**ISE 4333**, Production Systems and Operations	3	**ISE 4393**, Capstone Design Project (Capstone)	3
	ISE 4663, Systems Analysis Using Simulation	3	**B AD 5902**, Strategic Management	2
	ISE 5383, Systems Evaluation	3	✦MBA Elective	2
	♠**ISE 5853**, Data-Driven Decision Making II	3	✦MBA Elective	2
	ENGR 2431, Electrical Circuits	1	✦MBA Elective	2
	L S 5802, Business Ethics	2		
	MGT 5712, Negotiations and Leadership	2	†Approved Elective: Western Civ. & Culture (Core IV)	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**14**

Students may 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, 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.

†To be chosen from 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 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 2513, 3113, 3333, 3413, 3513, 3613, 4433, or C S 1813.

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

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

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

❖MATH 1823, 2423, 2433, and 2443 sequence can be substituted for MATH 1914, 2924, and 2934.

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) [II-LAB]

COURSES IN CIVIL ENGINEERING AND ENVIRONMENTAL SCIENCE (CEES)

2113 Statics. Prerequisites: Physics 2514 and Mathematics 2433 or 2934 or concurrent enrollment in Mathematics 2433 or 2934. Vector representation of forces and moments: general three-dimensional theorems of statics; centroids and moments of area and inertia. Free-body diagrams, equilibrium of a particle and of rigid bodies, distributed loads, friction and internal shear and moment loads. Analysis of trusses, frames, and machines. (F)

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)

1323 Introduction to Computer Programming. Prerequisite: MATH 1523 or concurrent enrollment, or placement into MATH 1743 or MATH 1823 or higher. 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 instructor. 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 or 2924; and Physics 2524 or concurrent enrollment. Introduction to basic principles of electrical circuits. Topics include DC circuits analysis, DC transients, static electrical fields, static magnetic fields, capacitors, inductors, and filters. (F, Sp)

2461 Thermodynamics. Prerequisite: Mathematics 2433 or 2934; 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)

3441 Fluid Mechanics. Prerequisite: Mathematics 2433 or 2934. Introduction to basic principles of fluid mechanics. Topics include fluid properties, fluid statics, dimensionless parameters and similitude, control volume equations, open channel flow, and external flow. (F)

COURSES IN INDUSTRIAL AND SYSTEMS ENGINEERING (ISE)

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. Corequisite: 2303. Provides students with a basic understanding of technical graphics communication and computer-aided design for industrial engineering applications. By using computer-aided design/drafting 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 Engi neering. 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)

†G3293 Applied Engineering Statistics. Prerequisite: Mathematics 2433 or MATH 2924. Introduction to probability, one and higher dimensional random variates, 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)

†G3304 Design and Manufacturing II. Prerequisite: 2303, 2311, Civil Engineering and Environmental Science 2153 (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—predence representation in machining, operation and machine sequencing; jigs and fixtures—design and analysis; time and cost estimation for machining; automation; processes/sys tem integration. **Laboratory** (F)

4113 Spreadsheet-Based Decision Support Systems. Prerequisite: E/ISE 4623 or concurrent enrollment in I E/ISE 4623, Computer Science 1313 or C S 1323, or permission of instructor. Covers all aspects of spreadsheet-based software functionality that are relevant to supporting decision-making. Microsoft Excel is used as the subject tool. Students will learn advanced functions of Excel that are available through the spreadsheet interface, the Visual Basic language and its integration with the spreadsheet environment, principles of decision-support systems studied in a variety of applications, including facility layout, warehousing, portfolio optimization, and various statistical inference problems. (F)

G4223 Fundamentals of Engineering Economy. Prerequisite: MATH 2423 or 2924. Development and use of time value of money interest formulas. Inflation considerations and bond problems. Bases for comparison of alternatives, including present worth, annual worth, rate of return and savings-investment ratio methods. Decision-making among independent, dependent, capital-constrained and un-equal lived projects. Depreciation methods and their effect on corporate income taxes, leading to after-tax cash flow analysis. Benefit-cost and cost effectiveness analysis.

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

4393 Capstone Design Project. Prerequisite: ISE 4333, ISE 4383, ISE 4663, and ISE 4853. Restricted to graduating industrial & systems 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. (F,Sp) [V]

4553 Data-Driven Decision Making I (Slashlisted with 5553). Prerequisite: I E/ISE 3293. Fundamentals of statistical models for describing engineering systems and processes. Analysis of variance, multiple regression, logistic regression, time series, clustering. Emphasis is placed on decision making. No student may earn credit for both 4553 And 5553. (F)

4623 Deterministic Systems Models. Prerequisite: I E/ISE 2823. Problem solving using analytical models: theory, methodology, and application. Topics include linear programming, simplex algorithm and sensitivity analysis, integer programming, and dynamic programming. Practical applications in transportation networks, project management and scheduling, deterministic inventory models, decision making, and systems integration. Solution methods using computer software. (F)

4633 Probabilistic Systems Models. Prerequisite: I E 3293 or ISE 3293 AND I E 4623 or ISE 4623. Problem solving using stochastic models: theory, methodology, and application. Topics include probability distributions, Poisson processes, Markov chains and Markov decision processes, queuing theory, and Monte Carlo simulation. Practical applications in probabilistic inventory models, maintenance activities, decision making, and systems integration. Solution methods using computer software. (Sp)

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

4804 Ergonomics in Systems Design. Prerequisite: junior standing or permission of instructor. Human-systems integration, considering the impacts of the physical structure, the information flow, and the environmental conditions on human performance. Students learn how to design, evaluate and improve systems from the perspective of the human(s) working in and impacted by the system. **Laboratory** (Sp)

G5383 Systems Evaluation (Slashlisted with 4383). Prerequisite: permission of department. Focuses on the development and evaluation of alternate system and process designs. Development of system goals, requirements, and performance measures; ranking of alternatives and decision analysis techniques. Review and development of trade studies. Applications in facility layout, maintenance, supply chain, and other contexts. No student may earn credit for both 4383 and 5383. (F)

G5563 Quality and Reliability Engineering (Slashlisted with 4563). Prerequisite: I E/ISE 3293 and I E/ISE 4553 or I E/ISE 5553. The use of statistical methods for quality control and improvement in product and process environments, as well as introductory applied probability for component and system reliability. Topics include philosophies of quality management, control chart theory and application, process capability, and performance metrics of reliability. Focus is given to decision making in engineering systems. No student may earn credit for both 4563 and 5563. (Sp)

G5853 Applied Research Methods (Slashlisted with 4853). Prerequisite: 4553 and 4804. Experimental methodology for empirical investigation. Includes the development and measurement of empirical hypotheses, designs, performance criteria, and analyses. Techniques for empirical reporting. The measurement 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)

1914 Differential and Integral Calculus I. Prerequisite: satisfactory score on the placement test or, for incoming freshmen direct from high school, satisfactory score on the ACT/SAT. Duplicates three hours of 1823 and one hour of 2423. Limits and continuity, differentiation, applications of differentiation to optimization and curve sketching, integration, the fundamental theorem of calculus, the substitution rule, applications of integration to computation of areas. (F, Sp, Su) [I-M]

2924 Differential and Integral Calculus II. Prerequisite: 1914 with a grade of C or better. Duplicates two hours of 2423 and two hours of 2433. Further applications of integration, the natural logarithmic and exponential functions, indeterminate forms, techniques of integVectors ration, improper integrals, parametric curves and polar coordinates, infinite sequences and series. (F, Sp, Su)

2934 Differential and Integral Calculus III. Prerequisite: 2924 with a grade of C or better. Duplicates one hour of 2433 and three hours of 2443. Vectors and vector functions, functions of several variables, partial differentiation and gradients, multiple integration, line and surface integrals, Green-Stokes-Gauss theorems. (F, Sp, Su)

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 and dynamics, os cillations, gravitation, fluid mechanics, waves. (F, Sp, Su) [II-NL]

2524 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics 2423 or 2924 with a grade of C or better. 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.