THE UNIVERSITY OF OKLAHOMA

GENERAL REQUIREMENTS

<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>
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<tr>
<td></td>
<td>*CHEM 1315, General Chemistry (Core II)</td>
<td>5</td>
<td>EXP 1213, Expository Writing (Core I)</td>
<td>4</td>
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<tr>
<td></td>
<td>MATH 1914, Differential and Integral Calculus I (Core I)</td>
<td>4</td>
<td>MATH 2924, Differential and Integral Calculus II</td>
<td>4</td>
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<tr>
<td></td>
<td>ENGR 1441, Freshman Engineering Experience</td>
<td>3</td>
<td>PHYS 2514, General Physics for Engineering &amp; Science</td>
<td>4</td>
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<tr>
<td></td>
<td>HIST 1483, U.S., 1492-1865, or</td>
<td>3</td>
<td>Majors (Core II)</td>
<td>3</td>
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<tr>
<td></td>
<td>1493, U.S., 1865-Present (Core IV)</td>
<td></td>
<td>PSC 1113, American Federal Government (Core III)</td>
<td>3</td>
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<tr>
<td></td>
<td>TOTAL CREDIT HOURS</td>
<td>16</td>
<td>TOTAL CREDIT HOURS</td>
<td>14</td>
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</tbody>
</table>

‡ In order to progress into 2nd year courses in AME, students must successfully complete (grade C or better) MATH 1914; MATH 2924; PHYS 2514 and CHEM 1315 with 3.0 Combined Retention GPA, and possess a minimum 3.0 Combined Retention GPA in 24 or more credit hours.

‡‡ Approval for admission to the accelerated BS/MS program must be initiated at the beginning of the second semester of the junior year.

‡§ 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.

**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.

NOTE: Engineering transfer students may take ENGR 3511 in place of ENGR 1411. Fourth and fifth year graduate electives must satisfy MS in mechanical engineering requirements.

GALLOGLY COLLEGE OF ENGINEERING

REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING/MASTER OF SCIENCE

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

#Approved Experimental Elective

Graduate-level Elective

#Approved Technical Elective

Students are eligible for graduate status upon graduation with the Bachelor of Science in Mechanical Engineering.

‡Dependent upon whether a student chooses the thesis or non-thesis option, Non-thesis option additionally requires: AME Graduate-level Elective (3 hrs.) and AME 5990 Special Project (3 hrs.) to be taken in the Summer between the Senior and the Fifth Year, and Comprehensive Exam to be taken in the last semester of study.

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

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

‡‡A list of Technical, Experimental, and Engineering Science electives is available in the AME Office, FH 212.

‡§CHEM 1315 can be substituted with CHEM 1335 (Fall only).

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COURSES IN AEROSPACE AND MECHANICAL ENGINEERING (AME)

2113 Statics. Prerequisite: Physics 2514; MATH 1823 or 1914; MATH 2423 or 2924; and CHEM 1315 all with a minimum grade of C or better with an overall average of 3.0 in these four courses. First semester, credit hours are weighted toward Mechanical Engineering majors. MATH 2924 or concurrent enrollment in Mathematics 2433 or 2934. Vector representation of forces and moments: general three-dimensional systems of forces; centroids and moments of area and inertia. Free-body diagrams, equivalence of a particle and of rigid bodies, distributed loads, friction and internal shear and moment loads. Analysis of trusses, frames, and machines. (F) 2213 Thermodynamics. Prerequisite: Physics 2514; MATH 1823 or 1914; MATH 2423 or 2924; and CHEM 1315 all with a minimum grade of C or better with an overall average of 3.0 in these four courses. (AP credit accepted and weighted based upon score.) Mathematics 2433 or 2934; and Physics 2524, or concurrent enrollment in MATH 2433 or 2934 and PHYS 2524. First and second law of thermodynamics are developed and applied to the solutions of problems from a variety of engineering fields. Extensive use is made of differential calculus to interrelate thermodynamics functions. (F)

2303 Materials, Design and Manufacturing Processes (Crosslisted with ISE 2303). Prerequisite: 2113 or MATH 1914 for Engineering 2113. Mechanical and physical properties of engineering materials. Introduction to design concepts, manufacturing processes and equipment used in (sp). 2402 Engineering Computing. Prerequisite: Mathematics 1823 or 1914 or concurrent enrollment. Introduction to computer programming and computing facilities. Program design and development; computer application exists in engineering. (Sp)

2523 Dynamics. Prerequisite: AIME 2113, MATH 2433 or 2934. Dynamics (kinematics and kinetics) of particles and rigid bodies for rectilinear, curvilinear and angular motion; work and energy methods; conservations of impulse and momentum; introduction to mechanical vibrations. (Sp)

3103 Interactive Engineering Design Simulation. Prerequisite: AIME 3143, Solid Mechanics; and AIME 3513, Fluid Mechanics or AIME 3253, Aerodynamics. Visualization and introductory finite element techniques for product design and development. Three-dimensional CAD models, components and assemblies, graphics, rendering and simulations. Concepts and theory of feedback control systems. Representation of electromechanical systems including analysis, synthesis and optimization. Topics include but are not limited to: ducts and pipes systems, fluid machinery, heat exchangers, thermal storage devices, furnaces, combustors, refrigeration and air conditioning systems. (Irreg.)

3143 Solid Mechanics. Prerequisite: AIME 2113 or ENGR 2113; MATH 3133, or MATH 3413 and MATH 3401; AIME 2303; AIME 2533. Concepts of stress and strain; mechanical behavior of engineering materials; analysis of uniform stress states; analysis of members in torsion; stresses and deformations in beams and other structures. Theory of plasticity. (F)

3153 Fluid Mechanics. Prerequisite: AIME 2113, AIME 2223, AIME 2353, and MATH 3113; majors only. Principles of fluid mechanics: fluid statics, flow descriptions, conservation equations, dimensional analysis, potential flow, viscous flow and internal flow. (F) 3173 Heat Transfer. Prerequisite: AIME 2924, MATH 2423, or concurrent enrollment. Principles of heat transfer by conduction, convection, and radiation; mass transfer and combined modes of heat transfer. (Sp)

3353 Design of Mechanical Components. Prerequisite: 2303 and 3143. Analysis and design of mechanical subsystems and selection of elements such as gears, shafts, clutches, brakes and modern mechanical components. (Sp)

3363 Design of Fluid and Thermal Systems. Prerequisite: AIME 2402 or C S 1313 or C S 1323, AIME 3153 or AIME 3253, and AIME 3173. Design of fluid flow, heat transfer and energy systems including analysis, synthesis and optimization. Topics include but are not limited to: ducts and piping systems, fluid machinery, heat exchangers, thermal storage devices, furnaces, combustors, refrigeration and air conditioning systems. (Irreg.)

G3723 AIME Numerical Methods for Engineering Computation. Prerequisite: AIME 2402 or CH E 2002 or ENGR 2003 or C S 1313 or C S 1323, and MATH 3113 or MATH 3413 or MATH 3401. Computer applications and software. Techniques for solving engineering problems. Sample applications: heat transfer, fluid flow, and structural analysis. Includes use of computer software to solve engineering problems. (F)

G4234 Aerospace Propulsion Systems. Prerequisite: AIME 2213 and AIME 3253. Propulsion systems, review of compressible flow, combustion and thermochanical analysis, gas turbines and jet engines. Design of ramjets and scramjets. Propulsion engine cycle analysis. (F)

G4422 Internal Combustion Engines Laboratory. Prerequisite: 3122 or graduate standing. Test equipment and instrumentation, propulsion systems, reciprocating engines, supercharger fuel systems, tests and evaluation. (Lecture and Laboratory, (Sp)

5533 Design Practicum. Prerequisite: senior standing, 3363 and 4163. Design study of actual problems in industry. Lecture and Laboratory, (Sp) [V]

5593 Space Systems and Mission Design (Crosslisted with 5593). Prerequisite: 4493 or permission from instructor. Topics include basic or bital mechanics, or bit determination, perturbations, numerical techniques, interplanetary transfer, influence of space environment, atmospheric re-entry. Space vehicles subsystems design; propulsion, attitude determination and control, structural design, thermal control, power and telecommunications. Investigation into mission design concepts and constraints. No student may earn credit for both 4913 and 5593. (Sp)

4613 Multimedia In Engineering (Slashed with 5613). Prerequisite: Junior, senior, or graduate standing or permission of instructor. Introduces engineering students to electronic media. Topics will center on engineering and how electronic media can be used by engineers to illustrate technical theories, data visualization, simulation, animation, virtual reality, and robotics to enhance time simulations. Emphasizes developing effective interactive media programs for all engineering disciplines. No student may earn credit for both 4613 and 5613. (F)

4653 Air Conditioning Systems. Prerequisite: 3173. Theory and design of systems for controlling properties such as temperature, humidity, air purity, air distribution and noise in enclosures. (Sp)

4812 Dynamics and Controls Laboratory. Prerequisite: 3122 or equivalent or graduate standing. May be repeated with change of project; maximum credit four hours. Objectives are to teach the implementation of instrumentation and controls for mechanical systems and explore design factors of the control of mechanical systems. Lecture and Laboratory (Sp)

4822 Fluid and Thermal Laboratory. Prerequisite: 3173, 3122 or equivalent or graduate standing. May be repeated with change of content; maximum credit six hours. Experimental studies in heat transfer or fluid mechanics. Lecture and Laboratory (F)

G5573 Advanced Engineering Analysis I. Prerequisite: Mathematics 3413 or equivalent. Vector and tensor analysis. Calculus of variations followed by variational methods and/or the method of weighted residuals. (Irreg.)

G5980 Research for Master’s Thesis. Variable enrollment, two to nine hours; maximum credit applicable toward degree, six hours. (F, Sp, Su)

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: ENGR 1410 or ENGR 1411, or ENGR 3511 or ENGR 3410 or concurrent enrollment; ENGL 1213 or EXPO 1213, and sophomore standing. Develop an understanding of engineering ethics, teamwork, leadership, and professionalism through the concepts of contemporary, social, and global issues. (F, Sp)

2431 Electrical Circuits. Prerequisite: MATH 2423 or 2924; and PHYS 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)

2531 Electrical Circuits II. Prerequisite: ENGR 2431. Introduction to intermediate principles of electrical circuits. Topics include amplifiers, filters, signal conditioning, A/D and D/A conversion, and common digital and analog circuits. (Sp)

3431 Electromechanical Systems. Prerequisite: ENGR 2431. Introduction to basic principles of electromechanical systems. Topics include physical principles of sensing and actuation, types of sensors and actuators, and interfacing and communication protocols. (F, Sp)

COURSES IN MATHEMATICS (MATH)

1914 Differential and Integral Calculus I. Prerequisite: satisfactory score on the math assessment. Introduction to differential and integral calculus. Applications of differentiation to optimization and curve sketching, integration, the fundamental theorem of calculus, the substitution rule, applications of integration to computation of areas and volumes. (F, Sp, Su) [I-M]

1914 Differential and Integral Calculus II. Prerequisite: 1914 with a grade of C or better. (Irreg.)

2524 General Physics for Engineering and Science Majors. Prerequisites: Mathematics 1823 or Mathematics 1914 with grade of C or better. No 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, and waves. Prerequisite: 4593 or permission of instructor. A general understanding of computer-based methods for manufacturing, assembly and design introduction from design workshop. No student may earn credit for both 4593 and 5593. (Sp)

G2232 Modern Physics for Engineers. Prerequisite: Mathematics 3113 or equivalent. Relativity, atomic structure, nuclear theory, wave mechanics, statistical physics, solid state physics. (F, Sp, Su)

COURSES IN PHYSICS (PHYS)

2514 General Physics for Engineering and Science Majors. Prerequisites: 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, oscillations, gravitation, fluid mechanics, and waves. Prerequisite: 4593 or permission of instructor. A general understanding of computer-based methods for manufacturing, assembly and design introduction from design workshop. No student may earn credit for both 4593 and 5593. (Sp)

G2232 Modern Physics for Engineers. Prerequisite: Mathematics 3113 or equivalent. Relativity, atomic structure, nuclear theory, wave mechanics, statistical physics, solid state physics. (F, Sp, Su) [I-M]