### Engineering (ENGI)

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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Short Title</th>
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<th>Course Type</th>
<th>Credit Hours</th>
<th>Description</th>
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<tr>
<td>ENGI 100</td>
<td>Introduction to Spatial Visualization</td>
<td>Intro Spatial Visualization</td>
<td>Engineering Division</td>
<td>Satisfactory/Unsatisfactory</td>
<td>Lecture/Laboratory</td>
<td>3</td>
<td>The ability to mentally visualize in three dimensions is an important skill for engineers and scientists. In this course, students will move through ten different modules that will strengthen spatial reasoning and visualization skills. All assigned work will be completed during the scheduled class time. Only students scoring &lt;70% on the PSVT:R will be allowed into the course. Course is limited to new first time matriculants only. Instructor Permission Required.</td>
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<tr>
<td>ENGI 120</td>
<td>Introduction to Engineering Design</td>
<td>INTRO TO ENGINEERING DESIGN</td>
<td>Engineering Division</td>
<td>Standard Letter</td>
<td>Lecture</td>
<td>3</td>
<td>Graduate level students may not enroll. Students learn the engineering design process and use it to solve meaningful problems drawn from the community and around the world. Teams of students evaluate design requirements and construct innovative solutions in the Oshman Engineering Design Kitchen. Students develop teaming and communication skills. Only first year students may enroll. Non-first year students wishing to take introductory engineering design may enroll in ENGI 220. ENGI 120 does not fulfill the FWIS requirement or carry D3 credit. Mutually Exclusive: Credit cannot be earned for ENGI 120 and FWIS 188.</td>
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<tr>
<td>ENGI 128</td>
<td>Introduction to Engineering Systems</td>
<td>INTRO TO ENGINEERING SYSTEMS</td>
<td>Engineering Division</td>
<td>Standard Letter</td>
<td>Lecture/Laboratory</td>
<td>3</td>
<td>Graduate level students may not enroll. This course will be a fun, hands-on introduction to the key concepts of electrical/mechanical/computational systems. Each student will use a small mobile robot to learn about block diagrams, abstraction and modularity, energy storage and conservation, feedback and control, digital communications, and software design. All interested freshmen are welcome, no previous experience or prerequisites are required. The course will conclude with a multi-robot final project.</td>
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<tr>
<td>ENGI 140</td>
<td>Engineering Leadership Development</td>
<td>ENGG LEADERSHIP DEVELOPMENT</td>
<td>Engineering Division</td>
<td>Standard Letter</td>
<td>Lecture/Laboratory</td>
<td>2</td>
<td>The purpose of this course is to prepare students to begin developing the skills, knowledge, and motivations needed to become an engineering leader. Learning methods for the class include assessments of current leadership skills, skill-learning via lectures and discussions, skill-practice and feedback via experiential exercises, and skill development via self-directed action planning. Major deliverables for the class include an autobiographical paper, an engineering leadership portfolio, and a leadership development plan.</td>
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<tr>
<td>ENGI 150</td>
<td>Survey of Engineering Disciplines</td>
<td>SURVEY OF ENGR DISCIPLINES</td>
<td>Engineering Division</td>
<td>Satisfactory/Unsatisfactory</td>
<td>Seminar</td>
<td>1</td>
<td>This seminar provides a survey of practice of engineering, including traditional and non-traditional career paths; graduate and professional options; and introductions to ethics, intellectual property, and written and oral communication. Engineering departments will provide overviews of their specific disciplines. Assignments include team presentations. Instructor Permission Required.</td>
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<tr>
<td>ENGI 200</td>
<td>Engineering Design Studio</td>
<td>ENGINEERING DESIGN STUDIO</td>
<td>Engineering Division</td>
<td>Standard Letter</td>
<td>Lecture/Laboratory</td>
<td>2-3</td>
<td>Graduate level students may not enroll. Students learn the engineering design process and use it to solve meaningful problems drawn from the community and around the world. Teams of students evaluate design requirements and construct innovative solutions in the Oshman Engineering Design Kitchen. Students develop teaming and communication skills. Only first year students may enroll. Non-first year students wishing to take introductory engineering design may enroll in ENGI 220. ENGI 120 does not fulfill the FWIS requirement or carry D3 credit. Mutually Exclusive: Credit cannot be earned for ENGI 120 and FWIS 188.</td>
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<tr>
<td>ENGI 220</td>
<td>Engineering Leadership Development</td>
<td>ENGG LEADERSHIP DEVELOPMENT</td>
<td>Engineering Division</td>
<td>Standard Letter</td>
<td>Lecture/Laboratory</td>
<td>2</td>
<td>Graduates of ENGI 120 and ENGI 220 will have the opportunity to gain a more in-depth knowledge of the engineering design process by furthering progress on specific engineering design projects. Students may extend their project work by completing advanced prototyping for their designs and conduct testing. Students will be held accountable through technical mentorship, weekly meetings, and prototype evaluations. Students will only work in design teams. Student teams wishing to continue their projects from ENGI 120/220 may apply. For application contact the instructor. Instructor Permission Required.</td>
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ENGI 210 - PROTOTYPING AND FABRICATION
Short Title: PROTOTYPING & FABRICATION
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ENGI 120
Description: Students in ENGI 210 will learn and practice advanced prototyping and fabrication skills useful in the construction of physical objects for engineering design projects. The course is structured as lecture and demonstration of basic and advanced prototyping techniques and out-of-class work practicing and honing the application of these techniques. Example techniques include low fidelity prototyping, 2D and 3D Computer Aided Design, electronics, foam cutting, laser cutting, plasma cutting, 3D printing, and molding/casting methods. Students will individually apply these techniques to create physical objects.
Course URL: engi210.blogs.rice.edu

ENGI 218 - ENGINEERING LEADERSHIP LAB I
Short Title: ENGINEERING LEADERSHIP LAB I
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Description: Students develop a variety of leadership skills and abilities by solving weekly engineering challenges in small teams. Students practice various roles as team members and leaders, then receive rapid performance assessments and mentoring from fellow students and staff.

ENGI 219 - ENGINEERING LEADERSHIP LAB II
Short Title: ENGINEERING LEADERSHIP LAB II
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ENGI 218
Description: Students develop a variety of leadership skills and abilities by solving weekly engineering challenges in small teams. Students practice various roles as team members and leaders, then receive rapid performance assessments and mentoring from fellow students and staff. Instructor Permission Required.
Course URL: rcel.rice.edu/courses

ENGI 220 - INTRODUCTION TO ENGINEERING DESIGN II
Short Title: INTRO TO ENGINEERING DESIGN II
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Students with a class of Freshman may not enroll. Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Description: Students learn the engineering design process and use it to solve meaningful problems drawn from the community and around the world. Teams of students evaluate design requirements and construct innovative solutions in the Oshman Engineering Design Kitchen. Students develop teaming and communication skills. Students may not be in their first year of school. First year students wishing to take introductory engineering design may enroll in ENGI 120. ENGI 220 is taught as the same time as ENGI 120.

ENGI 241 - PROFESSIONAL EXCELLENCE FOR ENGINEERS
Short Title: PROF EXCELLENCE FOR ENGINEERS
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Internship/Practicum
Credit Hour: 1
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Description: Guided career and professional development course for engineering students, which includes required practicum and workplace experience. Instructor Permission Required.
Course URL: rcel.rice.edu/courses

ENGI 242 - COMMUNICATION FOR ENGINEERS: BUILDING A PRACTICAL TOOLBOX
Short Title: COMMUNICATION FOR ENGINEERS
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Prerequisite(s): ENGI 218
Description: Students develop communication skills starting with critical thinking about communication strategy and how to best organize a message for different audiences. They will build skills in oral presentations, writing, data visualization, and interpersonal communication to communicate clearly and confidently in a variety of professional situations. Graduate/Undergraduate Equivalency: ENGI 542. Mutually Exclusive: Credit cannot be earned for ENGI 242 and ENGI 542.
Course URL: rcelconnect.org (http://rcelconnect.org)
ENGI 300 - ENGINEERING DESIGN WORKSHOP
Short Title: ENGINEERING DESIGN WORKSHOP
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hours: 2-3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: Advanced design students will have the opportunity to further their design projects in an independent study course. Students will work with faculty to develop their own schedule, set their own deadlines, goals, and expectations to be met for grading purposes. Students may complete advanced prototyping for their designs, conduct tests, perform safety evaluations with external committee and/or write up their work for publication. The specific tasks that will be completed are dependent on the project needs. Students will be held accountable through technical mentorship, weekly meetings, and prototype evaluations. To be eligible for ENGI 300 students must have taken ENGI 120 (or equivalent), ENGI 210, and ENGI 200. Instructor Permission Required. Repeatable for Credit.

ENGI 302 - SUSTAINABLE DESIGN
Short Title: SUSTAINABLE DESIGN
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: The objective of this course is to develop skills in formulating and solving problems arising from emerging technologies for the energy and water industries, such as green construction or renewable energy technologies, in the context of sustainable design. Students will be challenged to examine the economic, social, and environmental dimensions of emerging challenges and opportunities, by identifying the relevant objectives, constraints, and decision variables as viewed by various stakeholders. Grad students will have extra research assignments involving some aspect of a design solution. Cross-list: CEVE 302.

ENGI 303 - ENGINEERING ECONOMICS
Short Title: ENGINEERING ECONOMICS
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: Introduction to the evaluation of alternative investment opportunities with emphasis on engineering projects and capital infrastructure. Time value of money concepts are developed in the context of detailed project evaluation and presentations. In addition, concepts and applications of risk analysis and investment under uncertainty are introduced. Requires oral and written presentations by students. Cross-list: CEVE 322. Graduate/Undergraduate Equivalency: ENGI 528. Mutually Exclusive: Credit cannot be earned for ENGI 303 and ENGI 528.

ENGI 315 - LEADING TEAMS AND INNOVATION
Short Title: LEADING TEAMS AND INNOVATION
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: Students learn the principles of engineering leadership, strategies for launching and leading engineering teams, and methods for utilizing creativity and innovation in engineering environments. Learning methods include case studies, simulations, group projects, and interactions with industry professionals. Graduate/Undergraduate Equivalency: ENGI 515. Mutually Exclusive: Credit cannot be earned for ENGI 315 and ENGI 515.

ENGI 317 - LEADERSHIP ACTION LEARNING
Short Title: LEADERSHIP ACTION LEARNING
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: This course allows students to practice leadership skills in an applied context as the leader of a team or project with a defined scope, schedule, and goal. Students will identify areas of leadership growth, and receive guided mentorship and feedback as they develop these skills through practice.

ENGI 318 - LEADING ENGINEERING LEADERSHIP LAB I
Short Title: LEADING ENG LEADERSHIP LAB I
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ENGI 315
Description: Students organize, execute, and debrief the leadership development activities completed by novice students in ENGI 218 (Engineering Leadership Lab I). ENGI 318 students learn advanced leadership and communication skills; get frequent practice delivering feedback; and receive intensive mentoring from course staff.

ENGI 319 - LEADING ENGINEERING LEADERSHIP LAB II
Short Title: LEADING ENG LEADERSHIP LAB II
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ENGI 315
Description: Students organize, execute, and debrief the leadership development activities completed by novice students in ENGI 219 (Engineering Leadership Lab II). ENGI 319 students learn advanced leadership and communication skills; get frequent practice delivering feedback; and receive intensive mentoring from course staff. This course is a continuation of ENGI 318. Instructor Permission Required.
and manufacturing and user documents. That may include standards and safety compliance, patent applications, implementation plans and conduct testing for refined design solutions problem, needed features and criteria for success. Students also develop or more environments, and learn to ask questions that elucidate the

**ENGI 350 - NEEDS IDENTIFICATION AND DESIGN IMPLEMENTATION**

**Short Title:** NEEDS ID & DESIGN IMPLEMENT

**Department:** Engineering Division

**Grade Mode:** Standard Letter

**Course Type:** Lecture

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to graduate level students. Graduate level students may not be enrolled.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** ENGI 120 or ENGI 200 or FWIS 188

**Description:** Students in this course will identify needs situated in two or more environments, and learn to ask questions that elucidate the problem, needed features and criteria for success. Students also develop implementation plans and conduct testing for refined design solutions that may include standards and safety compliance, patent applications, and manufacturing and user documents.

**ENGI 355 - DIGITAL DESIGN AND VISUALIZATION**

**Short Title:** DIGITAL DESIGN & VISUALIZATION

**Department:** Engineering Division

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 3

**Restrictions:** Graduate level students may not enroll.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** ENGI 120 or ENGI 220 or FWIS 188

**Description:** Students will acquire intermediate-level proficiency in the creation of virtual models and engineering drawings using computer aided design. Emphasis will be placed on best modeling practices including efficient part creation, dimensioning, tolerancing, and formatting of engineering drawings. Students will use a number of programs to format data and create models.

**ENGI 428 - ENTREPRENEURSHIP INDEPENDENT STUDY**

**Short Title:** ENTREPRENEURSHIP IND STUDY

**Department:** Engineering Division

**Grade Mode:** Standard Letter

**Course Type:** Independent Study

**Credit Hour:** 1

**Restrictions:** Graduate level students may not enroll.

**Course Level:** Undergraduate Upper-Level

**Description:** Students who have completed entrepreneurship coursework/training may use this course to learn the process of developing startups or launching new ventures. Students will meet weekly with course instructors and complete periodic assignments on advancing ventures. Instructor Permission Required.

**ENGI 505 - ENGINEERING PROJECT MANAGEMENT AND ECONOMICS**

**Short Title:** ENGINEERING PROJ MGMT & ECON

**Department:** Engineering Division

**Grade Mode:** Standard Letter

**Course Type:** Lecture

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Graduate level students.

**Course Level:** Graduate

**Description:** Life cycle economic analysis approach to project development and management, project planning, and project economic analysis, contracting network scheduling techniques, risk management, organizational structures, and cases. 505 requires an additional paper. Cross-list: CEVE 505.

**ENGI 510 - TECHNICAL AND MANAGERIAL COMMUNICATIONS**

**Short Title:** TECHNICAL AND MANAGERIAL COMM

**Department:** Engineering Division

**Grade Mode:** Standard Letter

**Course Type:** Seminar

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Graduate level students.

**Course Level:** Graduate

**Description:** In this communications course designed for Professional Masters students, the approach will be experiential and interactive, with in-class exercises, analyses and numerous presentations. The focus will be on your practicing and refining the oral and written presentation skills you will need in your professional career. You should be prepared to participate in class and must be very comfortable speaking and writing English. You should not take this course in your first semester at Rice. Preference will be given to PM students.
ENGI 530 - ENGINEERING PRACTICUM  
Short Title: ENGINEERING PRACTICUM  
Department: Engineering Division  
Grade Mode: Satisfactory/Unsatisfactory  
Course Type: Internship/Practicum  
Credit Hour: 1  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: This graduate course is designed to supplement technical coursework in the school of engineering with practical application and reflection on the challenges and value of applying knowledge to real-world problems in professional settings. Students undertake a work internship and write a report under supervision of a faculty member. NOTE: Instructor permission required, and must be obtained prior to the start of the internship. Instructor Permission Required. Repeatable for Credit.

ENGI 542 - COMMUNICATION FOR ENGINEERS: BUILDING A PRACTICAL TOOLBOX  
Short Title: COMMUNICATION FOR ENGINEERS  
Department: Engineering Division  
Grade Mode: Standard Letter  
Course Type: Lecture/Laboratory  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: Students develop communication skills starting with critical thinking about communication strategy and how to best organize a message for different audiences. They will build skills in oral presentations, writing, data visualization, and interpersonal communication to communicate clearly and confidently in a variety of professional situations. Additional assignments apply for grad students. Graduate/Undergraduate Equivalency: ENGI 542. Mutually Exclusive: Credit cannot be earned for ENGI 542 and ENGI 242.  
Course URL: rcelconnect.org (http://rcelconnect.org)

ENGI 545 - STRATEGIC THINKING FOR COMPLEX PROBLEM SOLVING  
Short Title: STRATEGIC THINKING  
Department: Engineering Division  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: This course shows how to solve complex, ill-defined, non-immediate problems. It explains how to combine innovative and critical thinking to: -1- frame the problem, -2- diagnose the problem, -3- identify potential solutions, and -4- choose a solution and implement it. The approach is based on cases, each student will work on a project of their choosing. The course is equally applicable to academic and non-academic projects (such as consulting) in an industry; as such, it is open to students from all schools and departments. It is a part of a larger professional development initiative at Rice to equip students with skills that employers are specifically asking for. Cross-list: LEAD 545.
ENGI 600 - WRITTEN AND ORAL COMMUNICATION SEMINAR FOR ENGINEERING GRADUATE STUDENTS
Short Title: GRADUATE COMMUNICATIONS SEM
Department: Engineering Division
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hours: 0
Restrictions: Enrollment is limited to Graduate level students.

Description: You have important research results, but unless you can explain them clearly and persuasively, you won't advance in your field. This interactive seminar is open to engineers actively writing a paper for publication, an extended PhD proposal, a Master’s thesis, or a PhD dissertation. The written and oral assignments will help you present your research findings to a wide range of audiences - whether expert, interdisciplinary, international, or general. Topics include content and organization, plagiarism and paraphrase, crafting a persuasive abstract and literature review, effective visuals, and giving feedback to others. Apply directly to jhewitt@rice.edu. Instructor Permission Required.

ENGI 610 - MANAGEMENT FOR SCIENCE AND ENGINEERING
Short Title: MGT FOR SCIENCE/ENGINEERING
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.

Description: This course is for graduate and undergraduate students who want to understand the basics of management in new and/or small technology-based businesses and is particularly relevant to students who are interested in careers in technology or entrepreneurial ventures. NSCI 610/ENGI 610 is team taught to provide insight into how technology oriented firms manage people, projects, accounting, marketing, strategy, intellectual property, organizations and entrepreneurship. Student's active participation is essential. Students who take this course are eligible for MGMT 625. Please contact Dr. Harry Wilkinson: hewilkinson@sbcglobal.net. Cross-list: NSCI 610.

ENGI 614 - LEARNING HOW TO INNOVATE?
Short Title: LEARNING HOW TO INNOVATE?
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 2
Restrictions: Enrollment is limited to Graduate level students.

Description: Innovation has become a buzzword. Many of us aspire to be successful innovators, but how? There is ample attention for entrepreneurship, but less is available to support your innovation ambition. This course aims to give you an unconventional innovation experience. Repeatable for Credit.

ENGI 615 - LEADERSHIP COACHING FOR ENGINEERS
Short Title: LEADERSHIP COACHING FOR ENGR
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.

Description: Leadership coaching is a professional skill that leaders use to enhance another person’s ability to achieve their goals. Students will learn how to lead others in their own professional development through the use of coaching. This course emphasizes experiential learning and some graduates will be selected to become coaches to Rice engineering undergraduates. Repeatable for Credit.

ENGI 779 - BUSINESS AND URBAN ANALYTICS
Short Title: BUSINESS & URBAN ANALYTICS
Department: Engineering Division
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.

Description: The project based class offers the unique opportunity for students from distinct fields of business and engineering to solve a real world data driven problem in a collaborative way. The data and the problem statement will come from the Rice University’s Administrative Center for Sustainability and Energy Management (ACSEM) at the start of the semester. Instructor Permission Required. Cross-list: MGMT 779.