The mission of the Rice Center for Engineering Leadership (RCEL) is to educate and inspire Rice Engineers to become ethical leaders in technology who will excel in research, industry, enabling (non-engineering) career paths, or bold entrepreneurship. RCEL programming enhances traditional undergraduate education by developing skills that are not expressly covered by the traditional curricula from the School of Engineering. Ultimately, the goal of the Certificate in Engineering Leadership is to equip engineering students with the critical technical, communication, and leadership skills necessary to succeed and excel professionally.

The Certificate in Engineering Leadership is designed to familiarize undergraduate students with key leadership concepts and allow them to practice the skills necessary to function effectively in a variety of leadership roles in a global and national economy within a workplace, which is often increasingly diverse and multi-cultural. Through coursework, extracurricular activities, internship support, and community events, the Certificate in Engineering Leadership lays a foundation for leadership advancement within 3-5 years of graduation while also teaching students to envision their career impact beyond the 10-year horizon. RCEL programming covers a range of important competency domains, including such topics as creative problem solving, conflict resolution, developing self-awareness, setting goals, project management, oral/written communication, teamwork, and ethics.

At the graduate level the Professional Master’s in Engineering Management and Leadership (MEML) allows engineers to plan their career path within a company along the engineering management and leadership track helping fulfill both organizational and personal goals. MEML programming covers a range of important competency domains, including such topics as creative problem solving, conflict resolution, engineering project management, oral/written communication, and advanced technical teamwork. Engineering management covers the gap between engineering and management, namely the combination of technical decision making with analytical skills, optimization capabilities, and technical product development.
Rice Center for Engineering Leadership (RCEL)

RCEL 100 - SELF-AWARENESS AND THE ENGINEERING LEADER
Short Title: SELF-AWARENESS & THE ENGINEER
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: The purpose of this course is to prepare students to become future leaders. Engineering leadership is an emerging innovation in both education and practice and our course will prepare students to being their development journey toward this goal. Mutually Exclusive: Cannot register for RCEL 100 if student has credit for ENGI 140/ENGI 218.

RCEL 200 - PERSONAL DEVELOPMENT FOR THE ENGINEERING LEADER
Short Title: PERSONAL DEVELOPMENT ENG LEADR
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): RCEL 100
Description: The purpose of this course is to prepare students to become future leaders. Engineering leadership is an emerging innovation in both education and practice and our course will prepare students to being their development journey toward this end. This is the second half of the initial RCEL leadership course. Mutually Exclusive: Cannot register for RCEL 200 if student has credit for ENGI 140/ENGI 218.

RCEL 238 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Laboratory, Lecture, Seminar, Independent Study
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Topics and credit hours may vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

RCEL 241 - INTERNSHIP PRACTICUM FOR ENGINEERING LEADERSHIP
Short Title: INTERNSHIP PRACTICUM FOR ENG LEAD
Department: Center Engineering Leadership
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Internship/Practicum
Credit Hours: 0-1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: RCEL 241 is an applied practicum and internship course that provides guided career and professional development for engineering students in a real-world industrial, academic, research, or other professional context. It prepares students to assimilate quickly and to exceed employer expectations during their internships. This course offers variable credit (0 or 1 credit). If you choose to take the course for 1 credit, you must indicate your intent with the instructor upon registration. Mutually Exclusive: Cannot register for RCEL 241 if student has credit for ENGI 241. Repeatable for Credit.

RCEL 300 - DEVELOPMENT OF HIGH PERFORMING ENGINEERING TEAMS
Short Title: DEVELOPMENT OF HIGH PERFORMING
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): RCEL 200
Description: The purpose of this course is to prepare students for engineering leadership and followership roles in engineering contexts. This course is required for our school's certificate engineering leadership and includes a focus on practical skills and how these skills can be learned, developed, and applied in team situations. Mutually Exclusive: Cannot register for RCEL 300 if student has credit for ENGI 219/ENGI 315.

RCEL 400 - LEADING HIGH PERFORMING ENGINEERING TEAMS
Short Title: LEADING HIGH PERFORMING ENGINE
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): RCEL 300
Description: This course develops skills that are required for enterprise wide leadership positions. Topics include: managing and leveraging diversity, creative problem solving through intersectional thinking, ethical issue identification and resolution, risk management, performance management, development and communication of an enterprise wide vision, and development of a change management plan. Mutually Exclusive: Cannot register for RCEL 400 if student has credit for ENGI 219/ENGI 315.
RCEL 410 - ENGINEERING LAUNCH PAD-RESEARCH
Short Title: ENG LAUNCH PAD-RESEARCH
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ENGI 100
Description: RCEL 410 is one of four RCEL courses intended to jump-start the next steps for aspiring engineering leaders. The other courses deal with industry, Alternative Pathways, and Entrepreneurship, while RCEL 410 is focused on developing an understanding of leadership principles applicable in a Research environment. Students will gain insights into managing ethical dilemmas, developing communication strategies, creating a vision and goals, and project management in either an undergraduate or graduate student level engineering discipline. Research in academia, government labs, and industry will be compared and contrasted.

RCEL 420 - ENGINEERING LAUNCH PAD-INDUSTRY
Short Title: ENGINEERING LAUNCH PAD-INDUSTR
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): RCEL 300
Description: The purpose of this course is to prepare students for engineering leadership and followership roles in an industry context. This course is required for our school's certificate in engineering leadership and includes a focus on the practical skills needed to thrive in an industry environment.

RCEL 436 - INTRODUCTION TO PATENTS AND INTELLECTUAL PROPERTY FOR FUTURE ENGINEERING LEADERS
Short Title: INTRO TO PATENTS & INTELL PROP
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: RCEL 436 introduces undergraduate students to the fundamentals of intellectual property. Through class discussion, assignments, and guest speakers, the course provides a foundation for recognizing, evaluating, and leveraging IP opportunities and limitations in both research and industry, and thus equips students for the many encounters with IP that are likely to occur in their careers. Graduate/Undergraduate Equivalency: RCEL 536.

RCEL 440 - ENGINEERING LAUNCH PAD-ENTREPRENEURSHIP
Short Title: ENGINEERING LAUNCH PAD-ENTREPR
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: This course will focus on identifying the value proposition a potential venture has for a specific customer segment, and who those customers are and why. Students will be forced to "get out of the building" and interview potential customers to help refine their assumptions based on data. The goal is to help the teams create a scalable and repeatable business model for their venture.

RCEL 450 - ENGINEERING PROJECT MANAGEMENT AND LEADERSHIP ACTION LEARNING
Short Title: PROJECT MANAGEMENT AND LEADERS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: RCEL 450 combines project management and a practicum experience allowing students to practice leadership skills in an applied context utilizing a project. During the semester, each student will serve in a primary leadership capacity for a project. In addition to facilitating the project management of the project, each student will participate in an individualized action learning based model of leadership. Mutually Exclusive: Cannot register for RCEL 450 if student has credit for ENGI 317.
RCEL 477 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Seminar, Lecture, Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Topics and credit hours may vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

RCEL 501 - ENGINEERING MANAGEMENT & LEADERSHIP THEORY AND APPLICATION
Short Title: ENGINEERING MGMT & LEADERSHIP
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Technology-based innovation is the grand driver of economic progress, which hinges on strong technical leadership guiding engineering teams in mid-to-large corporate organizations and startup to small companies. By surveying and learning about the different type of EML approaches, this course outlines a framework for engineering professionals to progress from engineering manager to engineering executive (e.g., Vice President of Engineering, Chief Technology Officer). Practical methods from the engineering management literature that addresses technology-based innovation issues that have engineering management implications will be introduced. Seminal technology management principles, such as disruptive innovation, leaderless technology development, and digital platform strategy, found in companies ranging in size from start-up to large, will be examined.

RCEL 502 - ENGINEERING PROJECT MANAGEMENT
Short Title: ENGINEERING PROJECT MANAGEMENT
Department: Center Engineering Leadership
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Engineering Project Management is targeted for young professionals with 0 to 5 years experience. Content will provide instruction on the tools, techniques, and leadership characteristics required to successfully execute a project. The course will address the phases of project execution—initiating, planning, executing, monitoring and controlling, and closing. The course is designed to use a combination of video presentations, case studies, and project related exercises.

RCEL 503 - ENGINEERING PRODUCT MANAGEMENT IN INDUSTRY 4.0
Short Title: ENGINEERING PRODUCT MANAGEMENT
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: The fourth and latest industrial revolution, Industry 4.0, is comprised of intelligent automated machines and devices being developed by unconstrained manufacturing technologies (e.g., 3D printing), which can give them unprecedented sensing and communication capabilities. The internet of things (machines and sensors and the 'big data' they output) is creating new avenues for the remote collection of data from these new products. Engineering leaders will have a unique opportunity to guide engineering teams to create products that can leverage and evolve based on data from the supply chain to customer usage.

RCEL 504 - ETHICAL-TECHNICAL LEADERSHIP
Short Title: ETHICAL-TECHNICAL LEADERSHIP
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Technology-based companies are powered by teams of engineers who create products and services that create value and competitive advantages for organizations that can turn into profits. However, the matrices of technical and user related decision paths that engineering leaders make to guide the team are not always constrained by ethics in a formal way. This course will help students understand the impact of ethics on engineering and technology in order to apply ethics concepts to decision making on issues that emerge in the workplace during one's career.

RCEL 505 - ENGINEERING ECONOMICS FOR LEADERS
Short Title: LEADING ENGINEERING ECONOMICS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course will explore economic analysis of capital expenditure decisions, financial mathematics, microeconomics, and decision-making under risk and uncertainty. Topics covered in this course include time value of money, analysis of alternatives using net present value and internal rate of return, depreciation, taxes, and inflation. Computational approaches, such as probabilistic design in engineering designs, which connect randomly varying design parameters to economic impact, will sometimes be considered based on course composition. Engineering ethics case studies that involve engineering economics will be explored as well. Mutually Exclusive: Cannot register for RCEL 505 if student has credit for CEVE 322/CEVE 528/ENG 303/ENG 528.
RCEL 506 - APPLIED STATISTICS AND DATA SCIENCE FOR ENGINEERING LEADERS
Short Title: STATS & DATA FOR ENGINEERS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hour: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Modern engineering leaders face myriad projects and problems that involve the generation, collection, analysis, visualization and interpretation of data, much of which is now known as big data (upwards of millions of observations) and/or high-dimensional (upwards of millions of variables). In turn, engineering leaders must be able to leverage the abundance of data to generate new knowledge and be proficient in data-driven decision making. This course will provide a foundation in statistics and data science with a view toward preparing engineering leaders to engage and direct teams in data based solutions to engineering problems.

RCEL 507 - MASTER'S IN ENGINEERING MANAGEMENT AND LEADERSHIP CAPSTONE
Short Title: MEML CAPSTONE
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hour: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course represents the capstone of the MEML program. It is a project-based and discussion-based course where students develop economically-sustainable, technological solutions to society's most complex grand challenges using the methods and competencies taught in the MEML program. Students are expected to devise Industry 4.0 relevant solutions, with mechanisms for continuous learning and improving the solution from end-user data, while bounding all approaches with a demonstrable ethical-technical framework.

RCEL 530 - ENGINEERING LAUNCH PAD-NON-ENGINEERING PATHWAYS
Short Title: ENGINEERING LAUNCH PAD-PATHWAY
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Engineering students explore alternative professional paths, including policy, law, medicine, industry consulting, and other viable career options beyond industry and research. Students will identify a focus career track and complete a series of assignments designed to increase familiarity and competency in that discipline. Graduate/Undergraduate Equivalency: RCEL 430.

RCEL 536 - INTRODUCTION TO PATENTS AND INTELLECTUAL PROPERTY FOR FUTURE ENGINEERING LEADERS
Short Title: INTRO TO PATENTS & INTELL PROP
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: RCEL 536 introduces graduate (non-law) students to the fundamentals of intellectual property. Through class discussion, assignments, and guest speakers, the course provides a foundation for recognizing, evaluating, and leveraging IP opportunities and limitations in both research and industry, and thus equips students for the many encounters with IP that are likely to occur in their careers. Graduate/Undergraduate Equivalency: RCEL 436.

RCEL 610 - ETHICS FOR ENGINEERS
Short Title: ETHICS FOR ENGINEERS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Course Level: Graduate
Description: Engineers can encounter a variety of ethical issues and dilemmas in fulfilling their professional responsibilities. Ethical problems can be considered somewhat analogous to engineering design problems: both involve significant complexities, high degrees of uncertainty, a number of boundary conditions and constraints, conformance with criteria, identification and evaluation of alternatives responses, and deciding on the best solution or action. This course will prepare engineering students to understand the ethical issues related to their profession, analyze the various options and alternative course of actions, and implement the solutions to their ethical problems.

RCEL 677 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Center Engineering Leadership
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Lecture, Laboratory, Lecture/Laboratory, Seminar, Research, Independent Study
Credit Hours: 1-4
Course Level: Graduate
Description: Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

Description and Code Legend
Note: Internally, the university uses the following descriptions, codes, and abbreviations for this academic program. The following is a quick reference:

Course Catalog/Schedule
• Course offerings/subject code: RCEL

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Center Description and Code
• Rice Center for Engineering Leadership: RCEL

Undergraduate Certificate Description and Code
• Certificate in Engineering Leadership: CEL

Graduate Degree Description and Code
• Master of Engineering Management and Leadership: MEML

Graduate Degree Program Description and Code
• Degree Program in Engineering Management and Leadership: ENML

Graduate Degree Program Option Description and Code*
• Degree Program Option - Online (MEML degree only): OMEML

CIP Code and Description
• ENML Major/Program: CIP Code/Title: 15.1501 - Engineering/Industrial Management
• CEL Certificate: CIP Code/Title: 52.0213 - Organizational Leadership

* Systems Use Only: this information is used solely by internal offices at Rice University (such as OTR, GPS, etc.) and primarily within student information systems and support.

Classification of Instructional Programs (CIP) 2020 Codes and Descriptions from the National Center for Education Statistics: [https://nces.ed.gov/ipeds/cipcode/]