

# ENGINEERING MANAGEMENT AND LEADERSHIP

## Contact Information

**Engineering Leadership**  
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The mission of the Rice Center for Engineering Leadership (RCEL) is to educate and develop and inspire Rice Engineers to become ethical leaders in technology who will excel in research, industry, enabling (non-engineering) career paths, or bold entrepreneurship.

At the undergraduate level, RCEL programming enhances traditional education by developing skills that are not expressly covered by the traditional curricula from the School of Engineering. The undergraduate 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 multicultural. 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 of 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.

Additionally, the Center offers two standalone and stackable graduate Certificates of Engineering Management and Leadership (CEML), one in *Engineering Project Management* and the other in *Product Management for Engineering Leaders*. The CEML program allows talented technical professionals to apply for and (upon acceptance) enroll in graduate-level engineering courses and earn a transcribed academic credential without

completing an entire master's degree. Graduate certificate students can gain partial exposure to the high-quality Rice education, yet not make a full commitment to a full graduate degree all at once. Additionally, the two CEML certificates are stackable, and CEML graduate certificate students may decide to apply for and (upon acceptance) return for a MEML degree. The two CEML certificates are also open and available to Rice graduate students in a degree-granting program (upon acceptance).

## Certificate

- [Certificate in Engineering Leadership \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/engineering-leadership-certificate/\)](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/engineering-leadership-certificate/)

## Master's Program

- [Master of Engineering Management and Leadership \(MEML\) Degree \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/meml/\)](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/meml/)
- [Master of Engineering Management and Leadership \(MEML\) Degree, Online Program \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/meml-online/\)](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/meml-online/)

## Certificates

- [Certificate in Engineering Project Management \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/engineering-project-management-certificate/\)\\*](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/engineering-project-management-certificate/)
- [Certificate in Engineering Project Management, Online Program \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/engineering-project-management-certificate-online/\)\\*](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/engineering-project-management-certificate-online/)
- [Certificate in Product Management for Engineering Leaders \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/product-management-engineering-leaders-certificate/\)\\*](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/product-management-engineering-leaders-certificate/)
- [Certificate in Product Management for Engineering Leaders, Online Program \(https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/product-management-engineering-leaders-certificate-online/\)\\*](https://ga.rice.edu/programs-study/departments-programs/engineering/engineering-management-leadership/product-management-engineering-leaders-certificate-online/)

\* *This certificate program is open to both Rice students enrolled in a graduate degree-granting program and to (standalone) graduate certificate students (https://ga.rice.edu/graduate-students/academic-opportunities/certificates/). Additionally, these certificates are stackable, meaning CEML graduate certificate students may decide to apply for and (upon acceptance) return for a MEML degree.*

## Faculty Director

C. Fred Higgs, III, *John and Ann Doerr Professor of Mechanical Engineering*

## Executive Director

Kazimir I. Karwowski

## Associate Director

John Via

## Professors in the Practice

Steve Gomez  
Joshua Gray  
James P. Hennessy  
Sergio D. Kapusta  
Tom Phalen  
David A. Van Kleeck  
John Via  
Claudia Zettner

## Lecturers

Edgar Avalos Guana  
Uyiosa Abusomwan  
Kazimir I. Karwowski  
Jerlyn Mardis  
Gayle M. Moran  
Germaine Porche  
George Webb

*For Rice University degree-granting programs:*

To view the list of official course offerings, please see [Rice's Course Catalog](https://courses.rice.edu/admweb/!SWKSCAT.cat?p_action=cata) ([https://courses.rice.edu/admweb/!SWKSCAT.cat?p\\_action=cata](https://courses.rice.edu/admweb/!SWKSCAT.cat?p_action=cata)).

To view the most recent semester's course schedule, please see [Rice's Course Schedule](https://courses.rice.edu/admweb/!SWKSCAT.cat) (<https://courses.rice.edu/admweb/!SWKSCAT.cat>).

## 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

**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. Recommended Prerequisite(s): RCEL 100 is recommended for Leadership Certificate candidates 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 ENGI

**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 242 - PROFESSIONAL COMMUNICATION FOR ENGINEERING LEADERS

**Short Title:** PROFESSIONAL COMMUNICATION

**Department:** Center Engineering Leadership

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Lower-Level

**Description:** To be truly influential in their fields, engineers need to be able to communicate their thoughts and opinions to management, peers, clients, and the public. They need to communicate clearly and confidently in a variety of professional situations. This course gives you the opportunity to learn, practice, and improve essential communication skills with emphasis on oral presentations, professional writing, and interpersonal communication. Graduate/Undergraduate Equivalency: RCEL 542.

**Course URL:** [rcelconnect.org](http://rcelconnect.org) (<http://rcelconnect.org>)

**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

**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. Recommended Prerequisite(s): For Leadership Certificate candidates, RCEL 200 recommended Mutually Exclusive: Cannot register for RCEL 300 if student has credit for ENGI 219/ENGI 315.

**RCEL 350 - MASTERING GLOBAL TECHNICAL LEADERSHIP: THE PARIS-BORN MÉTIER MANAGER MODEL****Short Title:** MASTERING GLOBAL TECH LEADERSH**Department:** Center Engineering Leadership**Grade Mode:** Standard Letter**Course Type:** Lecture**Credit Hours:** 3**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.**Course Level:** Undergraduate Upper-Level

**Description:** This course is ideal for students interested in global leadership roles within business, engineering, science, and global organizations. It is particularly relevant for those who want to explore the intersection of technology and sustainable development. Students from all majors are welcome, though a background in business, engineering, science, management, or global studies is preferred. Paris visits include UNESCO, The Picasso Museum, The Metier Museum, Tomb of Napoleon, SLB Headquarters, SLB Product Center, and the Sorbonne. Taught by Steve Gomez, Rice Professor in the Practice, and a former global métier manager for SLB (formerly Schlumberger), this interdisciplinary course explores the role of the Métier Manager in accelerating the development of ethical technical leaders in global organizations. Using Paris based SLB as a case study, students will learn how socio-technical solutions are developed to meet global sustainability challenges, focusing on the intersection of people, technology, and leadership in engineering and science.

**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

**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. Recommended Prerequisite(s): For Leadership Certificate candidates, RCEL 300 recommended 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-INDUST**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:** 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 430 - 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 Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.**Course Level:** Undergraduate Upper-Level**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 530.**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. Graduate/Undergraduate Equivalency: RCEL 540. Mutually Exclusive: Cannot register for RCEL 440 if student has credit for RCEL 540.**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. Recommended Prerequisite(s): For Leadership Certificate candidates, RCEL 200 recommended 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 students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Civil Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**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. In order to enroll in an online section of this course, you are expected to have a working camera and microphone. During class sessions, you must be able to participate using your microphone and you are expected to have your camera on for the duration of the class so that you are visible to the instructor and other students in the class, just as you would be in an in person class.

**RCEL 502 - ENGINEERING PROJECT MANAGEMENT****Short Title:** ENGINEERING PROJECT MANAGEMENT**Department:** Center Engineering Leadership**Grade Mode:** Standard Letter**Course Type:** Lecture**Credit Hours:** 3

**Restrictions:** Enrollment is limited to students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**Course Level:** Graduate

**Description:** Engineering Project Management is targeted for professionals with 0 to 5 years experience. Content will provide instruction on the tools, techniques, and leadership characteristics required to successfully execute Agile and predictive projects. The course will address the project from business case, through all phases of project execution, and value delivery. The course is designed to use a combination of case studies, project related exercises and simulations. In order to enroll in an online section of this course, you are expected to have a working camera and microphone. During class sessions, you must be able to participate using your microphone and you are expected to have your camera on for the duration of the class so that you are visible to the instructor and other students in the class, just as you would be in an in person class.

**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 students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**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. In order to enroll in an online section of this course, you are expected to have a working camera and microphone. During class sessions, you must be able to participate using your microphone and you are expected to have your camera on for the duration of the class so that you are visible to the instructor and other students in the class, just as you would be in an in person class.

**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 students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**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. In order to enroll in an online section of this course, you are expected to have a working camera and microphone. During class sessions, you must be able to participate using your microphone and you are expected to have your camera on for the duration of the class so that you are visible to the instructor and other students in the class, just as you would be in an in person class. Mutually Exclusive: Cannot register for RCEL 504 if student has credit for COMP 604.



**RCEL 505 - ENGINEERING ECONOMICS FOR ENGINEERING 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 students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**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/ENGI 303/ENGI 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 Hours:** 3

**Restrictions:** Enrollment is limited to students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**Course Level:** Graduate

**Description:** Data Science has taken the world by storm. Examples of great success can be seen everywhere. This has opened the way for myriad industries and sectors to try to develop their own best practices. Especially since the COVID pandemic, data science, machine learning, artificial intelligence, and other computational technologies have grown rapidly during the past couple of years. However, not everyone knows which, how, when, or why to implement these techniques. Many engineers, for example, oversee or work with daily streams of data and want to use them in the most efficient way possible. The main objective of this course is to provide a comprehensive introduction to statistical and computational methods for modern data problems faced by engineers and engineering managers. By using statistical frameworks and data science as main drivers, the student will survey and compare algorithms for various data applications, learning how to select the most suitable according to real life scenarios. In order to enroll in an online section of this course, you are expected to have a working camera and microphone. During class sessions, you must be able to participate using your microphone and you are expected to have your camera on for the duration of the class so that you are visible to the instructor and other students in the class, just as you would be in an in person class.

**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 Hours:** 3

**Restrictions:** Enrollment is limited to students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**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. In order to enroll in an online section of this course, you are expected to have a working camera and microphone. During class sessions, you must be able to participate using your microphone and you are expected to have your camera on for the duration of the class so that you are visible to the instructor and other students in the class, just as you would be in an in person class.

**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 540 - ENGINEERING LAUNCH PAD-ENTREPRENEURSHIP****Short Title:** ENGINEERING LAUNCH PAD-ENTREPR**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:** 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. Graduate/ Undergraduate Equivalency: RCEL 440. Mutually Exclusive: Cannot register for RCEL 540 if student has credit for RCEL 440.

**RCEL 541 - INTERNSHIP PRACTICUM FOR ENGINEERING LEADERS****Short Title:** MEML INTERNSHIP PRACTICUM**Department:** Center Engineering Leadership**Grade Mode:** Satisfactory/Unsatisfactory**Course Type:** Internship/Practicum**Credit Hour:** 1

**Restrictions:** Enrollment is limited to students with a major in Bioengineering, Computational & Applied Math, Chemical Engineering, Computer Science, Computational Science & Eng, Data Science, Electrical & Computer Eng., Engineering Mgmt & Leadership, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng or Statistics. Enrollment is limited to Graduate level students. Enrollment limited to students in a Graduate Certificate, Master Materials Sci & NanoEng, Master of Bioengineering, Master of Chemical Eng, Master of Civil & Env Eng, Master of Comp & Appl Math, Master of Comp Sci & Eng, Master of Computer Science, Master of Data Science, Master of Electrical Comp Eng, Master of Eng Mgmt & Leadership, Master of Industrial Eng, Master of Mechanical Eng or Master of Statistics degrees.

**Course Level:** Graduate

**Description:** RCEL 541 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. RCEL 541 prepares students to assimilate quickly and to exceed employer expectations during their internships. Students will develop a functional awareness of the vision, mission, strategy, and objectives of the organization, such that they may identify how their interests and skills align with the needs and culture of the company.



**RCEL 542 - PROFESSIONAL COMMUNICATION FOR ENGINEERING LEADERS****Short Title:** PROFESSIONAL COMMUNICATION**Department:** Center Engineering Leadership**Grade Mode:** Standard Letter**Course Type:** Lecture/Laboratory**Credit Hours:** 3**Restrictions:** Enrollment is limited to Graduate level students.**Course Level:** Graduate

**Description:** To be truly influential in their fields, engineers need to be able to communicate their thoughts and opinions to management, peers, clients, and the public. They need to communicate clearly and confidently in a variety of professional situations. This course gives you the opportunity to learn, practice, and improve essential communication skills with emphasis on oral presentations, professional writing, and interpersonal communication. Graduate/Undergraduate Equivalency: RCEL 242.

**Course URL:** [rcelconnect.org](http://rcelconnect.org) (<http://rcelconnect.org>)**RCEL 610 - ETHICS FOR ENGINEERS****Short Title:** ETHICS FOR ENGINEERS**Department:** Center Engineering Leadership**Grade Mode:** Standard Letter**Course Type:** Lecture**Credit Hours:** 3

**Restrictions:** Enrollment is limited to students with a major in Applied Physics/Bioengineering, App Phys/Chem-Biomolecular Eng, Applied Physics/Electrical Eng, Applied Physics/Mechanical Eng, Appl Phys/Materials Sci NanoEn, Applied Physics/Statistics, Bioengineering, Computational & Applied Math, Chemical Engineering, Civil Engineering, Computer Science, Computational Science & Eng, Electrical & Computer Eng., Electrical Engineering, Environmental Engineering, Industrial Engineering, Mechanical Engineering, Materials Science & NanoEng, Systems/Synthetic/Phys Biology or Statistics. Enrollment is limited to Graduate level students.

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

**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.

**RCEL 615 - LEADERSHIP COACHING FOR ENGINEERS****Short Title:** LEADERSHIP COACHING FOR ENGR**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:** 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.

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

**Description:** Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

**RCEL 698 - MEML PROFESSIONAL MASTERS SEMINAR SERIES I****Short Title:** MEML PROFESSIONAL MASTER SEM I**Department:** Center Engineering Leadership**Grade Mode:** Satisfactory/Unsatisfactory**Course Type:** Seminar**Credit Hours:** 0

**Restrictions:** Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Eng Mgmt & Leadership degree.

**Course Level:** Graduate

**Description:** The Professional Masters Seminar Series presents a combination of seminars on topics related to MEML and industry-focused professional development. This course includes attendance and reports based on the seminars, colloquia, and RCEL speaker series held each semester. Repeatable for Credit.

**RCEL 699 - MEML PROFESSIONAL MASTERS SEMINAR SERIES II****Short Title:** MEML PROFESSIONAL MASTER SEMII**Department:** Center Engineering Leadership**Grade Mode:** Satisfactory/Unsatisfactory**Course Type:** Seminar**Credit Hours:** 0

**Restrictions:** Enrollment is limited to Graduate level students. Enrollment limited to students in a Master of Eng Mgmt & Leadership degree.

**Course Level:** Graduate

**Description:** The Professional Masters Seminar Series presents a combination of seminars on topics related to MEML and industry-focused professional development. This course includes attendance and reports based on the seminars, colloquia, and RCEL speaker series held each semester. 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

## **Department (or Program) 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 Certificate Descriptions and Codes**

- Certificate in Engineering Project Management: EPM
- Certificate in Product Management for Engineering Leaders: PML

## **Graduate Degree Program Option Description and Code\***

- Degree Program Option - Online (MEML degree only): OMEML

## **Graduate Certificate Program Descriptions and Codes\***

- Certificate Program Option - Online and Standalone (EPM and PML certificates): GR CERT O-EN
- Certificate Program Option - On-Campus and Standalone (EPM and PML certificates): GR CERT M-EN
- Certificate Standalone (Degree) Code: (Standalone, Post-Baccalaureate): GC-B

## **CIP Code and Description<sup>1</sup>**

- **ENML** Major/Program: CIP Code/Title: *15.1501 - Engineering/Industrial Management*
- **CEL** Certificate: CIP Code/Title: *52.0213 - Organizational Leadership*
- **EPM** Certificate: CIP Code/Title: *15.1501 - Engineering/Industrial Management*
- **PML** Certificate: CIP Code/Title: *15.1501 - Engineering/Industrial Management*

\* *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.*

<sup>1</sup> Classification of Instructional Programs (CIP) 2020 Codes and Descriptions from the National Center for Education Statistics: <https://nces.ed.gov/ipeds/cipcode/>.