# Engineering Leadership Minor

## Overview and Purpose

The engineering leadership minor provides students an opportunity to focus on building leadership, management, and interpersonal skills needed to solve many of our societal challenges. Students complete a series of leadership, project management and interpersonal skills courses using experiential learning strategies and combine subject area knowledge gained in courses from their majors with strategies and skills to effectively lead in the engineering profession.

Courses included in the minor are leadership courses developed for the minor and focus on leadership, management and interpersonal skill needs of engineering students as well as courses lead by the faculty in the Department of Agricultural Leadership, Education and Communication.

This minor is intended to serve students in the College of Engineering. The minor contributes to the National Academy of Engineers call to expose engineering students to formal studies of leadership development (NAE, 2004) and the College of Engineering’s mission to graduate the "Complete Engineer."

## Eligibility

Open to student in the College of Engineering only.

## Requirements

The engineering leadership minor is an interdisciplinary program; providing course offerings through the College of Engineering (COE) and the Department of Agricultural Leadership, Education and Communication (ALEC) at the University of Nebraska – Lincoln. To successfully complete the minor, students are required to complete 18 credit hours in leadership and professional development; 9 of which come from engineering leadership and management courses. Many of the ALEC courses are available as online courses. All ALEC courses are taught at the University of Nebraska – Lincoln.

## Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGR Leadership &amp; Management Courses (9 credit hours required)</td>
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<tr>
<td>ENGR 1000</td>
<td>INTERPERSONAL SKILLS FOR ENGINEERING LEADERS (ACE 2)</td>
<td>3</td>
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<tr>
<td>ENGR 2000</td>
<td>PROFESSIONALISM &amp; GLOBAL PERSPECTIVE (ACE 6 &amp; 9)</td>
<td>3</td>
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<tr>
<td>ENGR 3200</td>
<td>LEADERSHIP, MANAGEMENT, AND ETHICS (ACE 6 &amp; 8)</td>
<td>3</td>
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<tr>
<td>Leadership Courses (9 credit hours required)</td>
<td>9</td>
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<tr>
<td>Select one or two theory-based courses from the following:</td>
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<tr>
<td>ALEC 202</td>
<td>FOUNDATION OF LEADERSHIP THEORY &amp; PRACTICE</td>
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<tr>
<td>ALEC 302</td>
<td>DYNAMICS OF EFFECTIVE LEADERSHIP IN ORGANIZATIONS</td>
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<tr>
<td>ALEC 433</td>
<td>DYNAMICS OF EFFECTIVE LEADERSHIP IN GROUPS &amp; TEAMS</td>
<td>1</td>
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<tr>
<td>ALEC 477</td>
<td>LEADERSHIP &amp; MOTIVATION</td>
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<td>Select one or two application courses from the following:</td>
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<td>ALEC 407</td>
<td>SUPERVISORY LEADERSHIP</td>
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<tr>
<td>ALEC 410</td>
<td>ENVIRONMENTAL LEADERSHIP</td>
<td>1</td>
</tr>
<tr>
<td>ALEC 422</td>
<td>FACILITATION &amp; PROJECT PLANNING</td>
<td>1</td>
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## Additional Minor Requirements

All courses must be completed with a Pass, or grade of C or higher.

Up to 6 credit hours may be taken as Pass/No Pass.

### ENGR 200 SOPHOMORE ENGINEERING SEMINAR (0 credits)
Overview of career opportunities in engineering and construction management. Emphasizes internships, cooperative education and career placement.

Prerequisite(s)/Corequisite(s): Not open to non-degree graduate students.

### ENGR 1000 INTERPERSONAL SKILLS FOR ENGINEERING LEADERS (3 credits)
Establishes a foundation in communication and leadership skills that is needed for engineering students to be successful in their academic endeavors and future career opportunities. Introduction to the principles and practices of positive interpersonal relationships for leadership development. Self-awareness, awareness of others, effective interpersonal communication, and the building of trust relationships as a basis for understanding and developing leadership.

Prerequisite(s)/Corequisite(s): Not open to non-degree graduate students.

### ENGR 1010 INTRODUCTION TO ENGINEERING (3 credits)
Students will examine relevant and practical industrial and commercial engineering applications to gain necessary engineering skills that will help them succeed as a student as well as a professional engineer. A variety of engineering disciplines will be highlighted and discussed, as well as topics in the underlying physical, chemical, and biological scientific principles and processes related to each topic. The class will use a specified focus area that involves real world applications to aid in the conceptualization and learning of the course material. Students will develop engineering problem solving skills; gain expertise and experience using modern engineering and computational tools; and emulate an engineering team atmosphere - each of which can be applied to a profession engineering environment.

### ENGR 1910 FRESHMAN ENGINEERING SPECIAL TOPICS (1-3 credits)
Topics vary.

### ENGR 2000 PROFESSIONALISM & GLOBAL PERSPECTIVE (3 credits)
Enhance essential professional skills for personal and team success through investigating issues in a global context. Explore in-demand professional aptitudes (self-awareness, emotional intelligence, teamwork, communication, and workplace interaction expectations). Through industry/ community interaction, explore cultural and business norms and the application of broader perspectives to identify issues/solutions responsive and adaptive to their global context.

### ENGR 2500 ENGINEERING COOPERATIVE EDUC (1-12 credits)
Cooperative education work in a regularly established cooperative education work-study program in any engineering curriculum. Special approval is required to take course for credit hours. C/N only.

Prerequisite(s)/Corequisite(s): Sophomore standing; permission of College of Engineering Dean's Office and department chair of student's engineering major. All engineering students participating in cooperative education must register each term prior to commencing work.

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1. Note that junior standing is required for these courses.
2. Credit received for being an undergraduate teaching assistant at the selection of the instructor.
ENGR 2910 SOPHOMORE ENGINEERING SPECIAL TOPICS (1-3 credits)
Topics vary.

ENGR 3000 CREATIVITY & WRITING FOR ENGNS (3 credits)
Writing technical engineering reports; creative thinking and brainstorming applied to a real engineering problem with individual solutions submitted in report form.
Prerequisite(s)/Corequisite(s): ENGL1160 and Sophomore

ENGR 3010 INTRO NUCLEAR/RAD ENGR CONCPTS (1 credit)
History of nuclear development, basic concepts of radiation and radioactivity, radioactive waste management, global warming, and the impact of nuclear power plants. Industrial applications, health, and nuclear medicine. Job opportunities at power plants, graduate school, and national laboratories. Tour of the University of Texas nuclear research reactor and demonstration experiments. (Requires off-campus travel.)
Prerequisite(s)/Corequisite(s): Not open to nondegree students

ENGR 3100 UTILIZTN OF NUCLEAR TECH SOC (3 credits)
The applications of nuclear science to society and the fundamental radiation principles utilized in these applications.
Prerequisite(s)/Corequisite(s): Not open to nondegree students

ENGR 3200 LEADERSHIP, MANAGEMENT, AND ETHICS (3 credits)
Explore professional leadership, ethics, project management tools and skills, and how to successfully implement and respond to change. In a team based environment, enhance essential professional skills for personal and team success by developing and presenting a responsive proposal considering: client needs, basic project controls and scheduling. Learn about personal styles, motivation and effectively implementing change. Examine ethical dilemmas regarding principles, stewardship, and civics from ethical, legal, and expediency perspectives.
Prerequisite(s)/Corequisite(s): Not open to non-degree graduate students

ENGR 3500 ENGINEERING COOPERATIVE EDUC (1-12 credits)
Cooperative education work in a regularly established cooperative education work-study program in any engineering curriculum. Special approval is required to take course for credit hours. C/N only.
Prerequisite(s)/Corequisite(s): Junior standing; permission of College of Engineering Dean's Office and department chair of student's engineering major. All engineering students participating in cooperative education must register each term prior to commencing work.

ENGR 3910 JUNIOR ENGINEERING SPECIAL TOPICS (1-3 credits)
Topics vary

ENGR 4000 PROFESSIONAL ETHICS &SOC RSPNSBLY (1 credit)
Discussions on professionalism and ethics of engineering practice; problems encountered by new graduates.
Prerequisite(s)/Corequisite(s): Senior

ENGR 4020 ENERGY SYSTEMS AND RESOURCES (3 credits)
Energy as a critical component of civilization. The critical role of energy from the economic and political point of view worldwide. Energy resources available, the technology to use the resources, the economics of energy production, the environmental consequences of energy use, and energy policy.
Prerequisite(s)/Corequisite(s): ENGR310, not open to nondegree students

ENGR 4050 ANALYSIS OF ENGINEERING MANAGEMENT (3 credits)
General concepts and principles of engineering management applied to cases. (Cross-listed with ENGR 8056)
Prerequisite(s)/Corequisite(s): CONE 2060

ENGR 4070 PROJECT MANAGEMENT (3 credits)
Project development, role of the project manager, project selection, project planning, budgeting and cost estimation, project scheduling, and project termination. (Cross-listed with ENGR 8076)

ENGR 4100 RADIATION PROTECTION AND SHIELDING (3 credits)
Basic principles and concepts of radiation protection and shield design. Dose-meter units and response functions, hazards of radiation doses, radiation sources, basic methods for dose evaluation, and shielding design techniques for photons and neutrons.
Prerequisite(s)/Corequisite(s): MENG 4010 or 8016 or ENGR 4210

ENGR 4110 NUCLEAR REACTOR THEORY (3 credits)
Introduction to neutron diffusion theory, neutron moderation, neutron thermalization, and criticality condition of nuclear reactor.
Prerequisite(s)/Corequisite(s): ENGR310, not open to nondegree students

ENGR 4120 NUCLEAR REACTOR ANALYSIS (3 credits)
Group diffusion method, multiregional reactors, heterogeneous reactors, reactor kinetics, and change in reactivity.
Prerequisite(s)/Corequisite(s): Not open to nondegree students

ENGR 4150 COGNITIVE ERGONOMICS (3 credits)
Human factors affecting work. Focus on humans: energy requirements, lighting, noise, monotony and fatigue, learning, simulations versus sequential tasks. Experimental evaluation of concepts. (Cross-listed with ENGR 8156)
Prerequisite(s)/Corequisite(s): ENGR 4300 or permission.

ENGR 4160 PHYSICAL ERGONOMICS (3 credits)
Human performance in work. Human response to various environmental and task-related variables with emphasis on physical and physiological effects. (Cross-listed with ENGR 8166)
Prerequisite(s)/Corequisite(s): ENGR 4300 or permission.

ENGR 4170 OCCUPATIONAL SAFETY HYGIENE ENGINEERING (3 credits)
Introduction to occupational hygiene engineering with emphasis on workplace environmental quality. Heat, illumination, noise, and ventilation. (Cross-listed with ENGR 8176)
Prerequisite(s)/Corequisite(s): Senior standing or permission

ENGR 4200 NUCLEAR REACTOR ENGINEERING (3 credits)
The physics governing nuclear reactors and the design principles for commercial nuclear power plants. Reactor designs currently operating in the power industry.

ENGR 4210 ELEMENTS OF NUCLEAR ENGINEERING (3 credits)
Prerequisite(s)/Corequisite(s): MATH 1970, PHYS 2120, and ENGR 3010 or 3100

ENGR 4300 APPLIED STATISTICS AND QUALITY CONTROL (3 credits)
Systematic analysis of processes through the use of statistical analysis, methods, and procedures; statistical process control, sampling, regression, ANOVA, quality control, and design of experiments. Use of software for performing a statistical analysis. (Cross-listed with ENGR 8306).
Prerequisite(s)/Corequisite(s): MENG 3210

ENGR 4400 DISCRETE EVENT SIMULATION MODELING (3 credits)
Development of simulation models of discrete systems. Model development, Monte Carlo techniques, random number generators, and output analysis. (Cross-listed with ENGR 8406)
Prerequisite(s)/Corequisite(s): CONE 2060, MENG 3210 and CIST 1400 or CSCI 1620 or CSCI 2240 or permission

ENGR 4410 ENGINEERING ECONOMY (3 credits)
Economic factors involved in the comparison of engineering alternatives and the techniques of equipment selection and replacement.
Prerequisite(s)/Corequisite(s): Senior
ENGR 4500 ENGINEERING COOPERATIVE EDUC (0-12 credits)
Cooperative education work in a regularly established cooperative education work-study program in any engineering curriculum. Special approval is required to take course for credit hours. C/N only.
Prerequisite(s)/Corequisite(s): Senior standing; permission of College of Engineering Dean’s Office and department chair of student’s engineering major. All engineering students participating in cooperative education must register each term prior to commencing work.

ENGR 4600 PACKAGING ENGINEERING (3 credits)
Investigation of packaging processes, materials, equipment and design. Container design, material handling, storage, packing and environmental regulations, and material selection. (Cross-listed with ENGR 8606)
Prerequisite(s)/Corequisite(s): CONE 2060, MENG 3210, MENG 3730

ENGR 4610 RFID SYSTEMS IN THE SUPPLY CHAIN (3 credits)
Foundations of Radio Frequency Identification Systems (RFID). The fundamentals of how RFID components of tag, transponder, and antennae are utilized to create RFID systems. Best practices for implementation of RFID systems in common supply operations. (Cross-listed with ENGR 8616)

ENGR 4690 TECH, SCIENCE & CIVILIZATION (3 credits)
(Lect 2 Dis. 2) This course studies the development of technology as a trigger of change upon humankind, from the earliest tools of Homo Habilis to the advent of the radio telescope in exploring the creation of the universe. The course traces the paths from early science to development of the sciences and technologies that will dominate the new millennium. (8696 is for non SET students) (Cross-listed with ENGR8696)
Prerequisite(s)/Corequisite(s): Senior

ENGR 4810 SUPPLY CHAIN OPTIMIZATION (3 credits)
Foundations of supply chain network modeling. The concepts that support the economic and service trade-offs in supply chain and logistics management. Using decision support system (DSS) to design optimal logistics network models given data requirements and operational parameters. Using leading software packages to model problems arising in strategic management of logistics networks. (Cross-listed with ENGR 8816)

ENGR 4830 LOGISTICS IN THE SUPPLY CHAIN (3 credits)
The process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from the point of origin to the point of consumption. Domestic transportation systems, distribution centers and warehousing, international logistics, logistic system controls, and reengineering logistics systems. (Cross-listed with ENGR 8836)

ENGR 4900 GLOBAL EXPERIENCES IN ENGR (1-3 credits)
Individual or group educational experience combining classroom lectures, discussions, and/or seminars with field and/or classroom studies in a foreign country. Choice of subject matter and coordination of on- and off-campus activities are at the discretion of the instructor. Course offered credit/no credit only.

ENGR 4910 SENIOR ENGINEERING SPECIAL TOPICS (1-3 credits)
Topics vary.