

ENGINEERING LEADERSHIP MINOR

Description

Overview and Purpose

Open to College of Engineering students only.

The engineering leadership minor provides College of Engineering students an opportunity to focus on building leadership, management, teamwork and interpersonal skills needed to solve many of our societal challenges. Courses provide developmental skills with experiential learning to enhance personal growth, improve practice, and provide frameworks for continued application of concepts in these areas. Courses explore strategies and skills for effective leadership in the engineering profession, and the working world, and for building relationships.

The minor includes leadership courses led by faculty in the College of Engineering and faculty in the Department of Agricultural Leadership, Education and Communication.

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 "Complete Engineers." The leadership minor provides the framework around the technical skills and coursework to achieve the ABET Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Admission

Open to students in the College of Engineering only.

College Requirements

College Admission

College Entrance Requirements

Students must have high school credit for (one unit is equal to one high school year):

1. Mathematics – 4 units: 2 of algebra, 1 of geometry, and 1 of precalculus and trigonometry
2. English – 4 units
3. Natural sciences – 3 units that must include 1 unit of physics and 1 unit of chemistry (chemistry requirement waived for students in construction management or computer science)
4. Foreign language – 2 units of a single foreign language

5. Social studies – 3 units
6. Students having a composite ACT score of 28 or greater (or equivalent SAT score) will be admitted to the College of Engineering even if they lack any one of the following: trigonometry, chemistry, or physics. Students without test scores who are missing a full unit of trigonometry/pre-calculus/calculus or chemistry or physics will be evaluated through College Review.

A total of 16 units is required for admission.

Engineering requires that student performance meet one of the following standards: composite ACT of 24, SAT of 1180, ACT Math subscore of 24, SAT Math subscore of 580, or a 3.5 cumulative GPA.

Any domestic first-year student who does not gain admission to Engineering but does gain admission to the University of Nebraska-Lincoln (UNL) will be reviewed through College Review. College Review is conducted through the College Review Committee which considers factors beyond standardized testing. Any first-year student who is not admitted through college review is placed in Pre-Engineering (PENG) with the Exploratory and Pre-Professional Advising Center (Explore Center). Students in the Explore Center can transfer to the College of Engineering once college admission requirements are met.

Students for whom English is not their language of nurture must meet the minimum English proficiency requirements of the University.

Students who lack entrance units may complete precollege training by Independent Study through the University of Nebraska-Lincoln Office of On-line and Distance Education, in summer courses, or as a part of their first or second semester course loads while in the Explore Center or other colleges at UNL.

Students should consult their advisor, their department chair, or Engineering Student Services (ESS) if they have questions on current policies.

Other Admission Requirements

Students who transfer to the University of Nebraska-Lincoln from other accredited colleges or universities and wish to be admitted to the College of Engineering (COE) must meet COE first-year student entrance requirements, have a minimum cumulative GPA of 2.5, and be calculus-ready. Students not meeting either of these requirements must enroll in the Explore Center or another University college until they meet COE admission requirements. Students transferring from UNO, UNL, or UNK to the College of Engineering must be in good academic standing with their institution.

The COE accepts courses for transfer for which a C or better grade was received. Although the University of Nebraska-Lincoln accepts D grades from the University of Nebraska Kearney and the University of Nebraska Omaha, not all majors in the COE accept such low grades. Students must conform to the requirements of their intended major and, in any case, are strongly encouraged to repeat courses with a grade of C- or less.

Students who were previously admitted to COE and are returning to the College of Engineering must demonstrate a cumulative GPA of 2.5 to be readmitted to COE.

College Degree Requirements

Grade Rules

Grade Appeals

In the event of a dispute involving any college policies or grades, the student should appeal to their instructor, and appropriate department chair or school director (in that order). If a satisfactory solution is not achieved, the student may appeal their case through the College Academic Appeals Subcommittee.

Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted at the University of Nebraska–Lincoln. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Engineering. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Students who have transferred from a community college may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska-Lincoln. # This decision should be made in consultation with the student's College of Engineering academic advising team (e.g., ESS professional advisor and the chief faculty advisor for the student's declared degree program). # The chief faculty advisor has the final authority for this decision. Eligibility is based on a) enrollment in a community college during the catalog year the student wishes to utilize, b) maintaining continuous enrollment of at least 12 credit hours per semester at the previous institution for at least 2 semesters, and c) continuous enrollment at the University of Nebraska-Lincoln within 1 calendar year from the student's last term at the previous institution. # Students must complete all degree requirements from a single catalog year and within the timeframe allowable for that catalog year.

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 (UNL). 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 UNL.

Courses

Code	Title	Credits
ENGR Leadership & Management Courses (9 credit hours required)		
ENGR 100	INTERPERSONAL SKILLS FOR ENGINEERING LEADERS (ACE 2)	3
ENGR 200	PROFESSIONALISM & GLOBAL PERSPECTIVE (ACE 6 & 9)	3
ENGR 320	LEADERSHIP, MANAGEMENT, AND ETHICS	3
Leadership Courses (9 credit hours required)		9
Select one or two theory-based courses from the following:		
ALEC 202	FOUNDATION OF LEADERSHIP THEORY & PRACTICE	
ALEC 302	DYNAMICS OF EFFECTIVE LEADERSHIP IN ORGANIZATIONS	
ALEC 455	DYNAMICS OF EFFECTIVE LEADERSHIP IN GROUPS & TEAMS ¹	
ALEC 477	LEADERSHIP & MOTIVATION	
Select one or two application courses from the following:		
ALEC 407	SUPERVISORY LEADERSHIP	
ALEC 410	ENVIRONMENTAL LEADERSHIP ¹	
ALEC 422	FACILITATION & PROJECT PLANNING ¹	
ALEC 466	LEADERSHIP & DIVERSITY IN ORGANIZATIONS & COMMUNITIES ¹	
Experiential Learning in Leadership (0 -3 cr hrs)		

ALEC 337 INSTRUCTIONAL INTERNSHIP IN LEADERSHIP DEVELOPMENT ²

Total Credits **18**

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.

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 10 FRESHMAN ENGINEERING SEMINAR (0 credits)

Overview of the engineering field as well as major specific information. Information will be provided to help with transitional needs to UNL and the College of Engineering (time management, study skills, and resources), involvement opportunities (student organizations, research, and study abroad), learning about engineering, and interactive learning to increase non-technical complete engineer competencies. Open only to first-year students considering or admitted to the College of Engineering.

Prerequisite(s): First year College of Engineering students. Not open to non-degree graduate students.

ENGR 15 SPATIAL VISUALIZATION TRAINING (0 credits)

Develop and improve spatial visualization skills.

ENGR 20 SOPHOMORE ENGINEERING SEMINAR (0 credits)

Overview of career opportunities in engineering and construction management. Emphasizes internships, cooperative education and career placement.

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

ENGR 30 TRANSFER STUDENT ENGINEERING SEMINAR (0 credits)

ENGR 30 is open only to students transferring to the College of Engineering from another institution. Overview of transfer credit analysis, degree audits, career opportunities in engineering and construction management. Emphasis on internships, cooperative education, and career placement.

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

ENGR 100 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): Not open to non-degree graduate students.

ENGR 101 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 191 FRESHMAN ENGINEERING SPECIAL TOPICS (1-3 credits)

Topics vary.

ENGR 200 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 220 TECHNICAL COMMUNICATION I (3 credits)

Introduction to written and oral communication and document design principles and strategies as applied in the sciences and technology. Communications for various audiences and/or purposes and/or situations.

ENGR 250 ENGINEERING COOPERATIVE EDUCATION (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): 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.

ENGR 291 SOPHOMORE ENGINEERING SPECIAL TOPICS (1-3 credits)

Topics vary.

ENGR 300 CREATIVITY AND WRITING FOR ENGINEERS (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): ENGL 1160 and Sophomore

ENGR 301 INTRODUCTION TO NUCLEAR AND RADIATION ENGINEERING CONCEPTS (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): Not open to nondegree students

ENGR 310 UTILIZATION OF NUCLEAR TECHNOLOGIES IN SOCIETY (3 credits)

The applications of nuclear science to society and the fundamental radiation principles utilized in these applications.

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

ENGR 320 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): Not open to non-degree graduate students.

ENGR 350 ENGINEERING COOPERATIVE EDUCATION (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): 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 391 JUNIOR ENGINEERING SPECIAL TOPICS (1-3 credits)

Topics vary

ENGR 395 ENGINEERING INTERNSHIP (0-1 credits)

Provides an opportunity to reflect on experience gained through an internship related to the major field of study and an integral or important part of their program of study. Develop non-technical professional skills through reflective writing assignments. May be repeated.

Prerequisite(s): Undergraduate major in the College of Engineering; sophomore standing; permission from instructor.

ENGR 400 PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY (1 credit)

Discussions on professionalism and ethics of engineering practice; problems encountered by new graduates.

Prerequisite(s): Senior

ENGR 402 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 world wide. 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): ENGR 301, not open to nondegree students

ENGR 410 RADIATION PROTECTION AND SHIELDING (3 credits)

Basic principles and concepts of radiation protection and shield design. Dosi-metric 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): MECH 4010 or ENGR 421

ENGR 411 NUCLEAR REACTOR THEORY (3 credits)

Introduction to neutron diffusion theory, neutron moderation, neutron thermalization, and criticality condition of nuclear reactor.

Prerequisite(s): ENGR 310. Not open to non-degree graduate students.

ENGR 412 NUCLEAR REACTOR ANALYSIS (3 credits)

Group diffusion method, multiregional reactors, heterogeneous reactors, reactor kinetics, and change in reactivity.

Prerequisite(s): ENGR 411. Not open to non-degree graduate students.

ENGR 420 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 450 ENGINEERING COOPERATIVE EDUCATION (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): 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 460 PACKAGING ENGINEERING (3 credits)

Investigation of packaging processes, materials, equipment and design. Container design, material handling, storage, packing and environmental regulations, and material selection.

Prerequisite(s): CONE 206; MECH 3210; MECH 3730

ENGR 461 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.

ENGR 469 TECHNOLOGY, SCIENCE AND 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. (869 is for non SET students.) (Cross-listed with ENGR 869).

Prerequisite(s): Senior or permission.

ENGR 481 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.

ENGR 483 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.

ENGR 490 GLOBAL EXPERIENCES IN ENGINEERING (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.

ENGR 491 SENIOR ENGINEERING SPECIAL TOPICS (1-3 credits)

Topics vary.

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.