GENERAL ENGINEERING

Introductory and General Engineering Courses

Required Introductory Courses

DSGN 106-1 Design Thinking and Communication (0.5 Unit) Integrated introduction to the engineering design process and technical communication. Approaches to unstructured and poorly defined problems; conceptual and detailed design; team structure and teamwork; project planning; written, oral, graphical, and interpersonal communications; use of software tools; discussion of societal and business issues. One lecture, two workshops, lab. Registration for both quarters required. Primarily intended for first-year students.

DSGN 106-2 Design Thinking and Communication (0.5 Unit) Integrated introduction to the engineering design process and technical communication. Approaches to unstructured and poorly defined problems; conceptual and detailed design; team structure and teamwork; project planning; written, oral, graphical, and interpersonal communications; use of software tools; discussion of societal and business issues. One lecture, two workshops, lab. Registration for both quarters required. Primarily intended for first-year students.

GEN_ENG 205-1 Engineering Analysis I (1 Unit) Introduction to linear algebra from computational, mathematical, and applications viewpoints. Computational methods using a higher-level software package such as MATLAB.

GEN_ENG 205-2 Engineering Analysis II (1 Unit) Linear algebra and introduction to vector methods in engineering analysis. Statics and dynamics of rigid bodies and matrix analysis of trusses and networks. Engineering design problems. Prerequisites: C- or better in GEN_ENG 205-1; MATH 220-1.

GEN_ENG 205-3 Engineering Analysis III (1 Unit) Dynamic behavior of the elements. Modeling of mechanical (both translational and rotational), electrical, thermal, hydraulic, and chemical systems composed of those elements. Prerequisites: C- or better in GEN_ENG 205-2.

GEN_ENG 205-4 Engineering Analysis IV (1 Unit) Solution methods for ordinary differential equations, including exact, numerical, and qualitative methods. Applications and modeling principles; solution techniques. Prerequisites: C- or better in GEN_ENG 205-2; MATH 220-2.

GEN_ENG 206-4 Honors Engineering Analysis IV (1 Unit) Covers topics addressed in GEN_ENG 205-4 at a deeper level. Intended for students with demonstrated strength in mathematics, computer programming, and/or physics. Prerequisite: consent of instructor.

Optional General Engineering Courses

GEN_ENG 190-0 Engineering Freshman Seminar (0-1 Unit) Broad engineering or interdisciplinary subjects of current interest.

GEN_ENG 220-1 Analy/Comp Graph (0.5 Unit) Introduction to AutoCAD, geographic information systems (GIS), and electronic surveying and measuring.

GEN_ENG 220-2 Analy/Comp Graph II (0.5 Unit) Introduction to AutoCAD, geographic information systems (GIS), and electronic surveying and measuring.

GEN_ENG 295-0 Special Topics in Engineering (1 Unit) Intermediate-level topics suggested by students or faculty members and approved by the curriculum committee.

GEN_ENG 355-0 Domestic Study Affiliated (0 Unit) Fulltime registration in an academic program in the continental United States that is affiliated with Northwestern. Upon successful completion of the program, registration is replaced with credits transferred from the affiliated institution.

GEN_ENG 395-0 Special Topics in Engineering (1 Unit) Topics suggested by faculty and approved by the curriculum committee.

GEN_ENG 397-0 Selected Topics in Engineering (0.5 Unit) Topics of limited scope as suggested by faculty and approved by the curriculum committee.

GEN_ENG 399-0 Independent Study (1 Unit) Independent study on an engineering subject supervised by a faculty member and concluding with a final report.

Murphy Institute General Engineering Courses

Participation in the Murphy Institute and its courses is by invitation only. Additional information can be found on the Murphy Institute website: www.mccormick.northwestern.edu/academics/undergraduate/programs/honors-and-combined-degrees/murphy-institute/ (https://www.mccormick.northwestern.edu/academics/undergraduate/programs/honors-and-combined-degrees/murphy-institute/)

GEN_ENG 195-1 Engineering Dialog I (0.33-0.34 Unit) Weekly seminar addressing subjects of interest in engineering, design, engineering policy, and entrepreneurial activities. For participants in the invitation-only Murphy Institute Scholars Program. May be repeated.

GEN_ENG 196-1 Engineering Discourse I (0 Unit) Noncredit counterpart to GEN_ENG 195-1.

GEN_ENG 195-2 Engineering Dialog II (0.33-0.34 Unit) Weekly seminar addressing subjects of interest in engineering, design, engineering policy, and entrepreneurial activities. For participants in the invitation-only Murphy Institute Scholars Program. May be repeated.

GEN_ENG 196-2 Engineering Discourse II (0 Unit) Noncredit counterpart to GEN_ENG 195-2.

GEN_ENG 195-3 Engineering Dialog III (0.33-0.34 Unit) Weekly seminar addressing subjects of interest in engineering, design, engineering policy, and entrepreneurial activities. For participants in the invitation-only Murphy Institute Scholars Program. May be repeated.

GEN_ENG 196-3 Engineering Discourse III (0 Unit) Noncredit counterpart to GEN_ENG 195-3.

GEN_ENG 195-4 Engineering Dialog IV (0.33-0.34 Unit) Weekly seminar addressing subjects of interest in engineering, design, engineering policy, and entrepreneurial activities. For participants in the invitation-only Murphy Institute Scholars Program. May be repeated.

GEN_ENG 196-4 Engineering Discourse IV (0 Unit) Noncredit counterpart to GEN_ENG 195-4.

Engineering Career Development

The mission of Engineering Career Development (ECD) is to provide all McCormick students with the tools necessary for lifelong career
management and to forge relationships with employer partners for this end.

Engineering Career Development offers students:

- Courses and workshops designed to aid students in preparing and conducting a job search
- Personalized, one-on-one career advising
- Employer events and on campus interviewing opportunities
- Work integrated learning programs that allow students to maintain their student status while enrolling in zero-credit, zero-tuition courses for co-op, internship, research, and service learning experiences.

For more information visit: www.mccormick.northwestern.edu/career-development/ (https://www.mccormick.northwestern.edu/career-development/)

### Engineering Career Development Course Offerings

#### Introductory Coursework

**CRDV 301-0 Introduction to Career Development (0 Unit)** Course preparing students for the Walter P. Murphy Cooperative Engineering Education Program, internships, and full-time employment. It includes units on job-search skills, self-assessment, transition to the workplace, workplace-management issues, and transition back to school.

### Cooperative Engineering Courses

- All courses in the CRDV 310 sequence are 0 credit.
- Sequence of courses covering the work terms of students in the Walter P. Murphy Cooperative Engineering Education Program.

#### Course

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<tbody>
<tr>
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<td>Cooperative Engineering Education</td>
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<tr>
<td>CRDV 310-2</td>
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<td>CRDV 310-3</td>
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<td>CRDV 310-4</td>
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<td>CRDV 310-5</td>
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<td>CRDV 310-6</td>
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<td>CRDV 310-7</td>
<td>Cooperative Engineering Education: Half-time</td>
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**CRDV 311-0 Cooperative Engineering Internship (0 Unit)** Series of courses designated for students seeking University recognition of their internship experience, or participating in an approved internship during the regular academic year.

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<tr>
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<td>Professional Engineering Internship</td>
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<td>CRDV 311-2</td>
<td>Professional Engineering Internship</td>
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<td>CRDV 311-3</td>
<td>Professional Engineering Internship</td>
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#### Engineering Internship Courses

- All courses in the CRDV 311 sequence are 0 credit.
- Series of courses designated for students seeking University recognition of their internship experience, or participating in an approved internship during the regular academic year.

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**CRDV 311-7**

- Engineering Internship: Half-time
- International Engineering Internship: Half-Time

### Engineering Projects in Service Learning Courses

- All courses in the CRDV 312 sequence are 0 credit.
- CRDV 312 courses require students to engage in an engineering-related, full-time community service project under the guidance of an appropriate faculty member, agency supervisor or mentor.

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<td>CRDV 312-1</td>
<td>Undergraduate Engineering Projects in Service Learning</td>
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<tr>
<td>CRDV 312-2</td>
<td>Undergraduate Engineering Projects in Service Learning</td>
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<tr>
<td>CRDV 312-3</td>
<td>Undergraduate Engineering Projects in Service Learning</td>
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**CRDV 312-7**

- Engineering Projects in Service Learning: Half-time
- International Engineering Service Learning: Half-Time

### Undergraduate Engineering Research Courses

- All courses in the CRDV 313 sequence are 0 credit.
- The CRDV 313 course sequence allows students to maintain half-time enrollment at Northwestern while engaged full-time in an University-based research project under the supervision of a faculty research sponsor. Students are evaluated by ABET criteria, the same as those in the Walter P. Murphy Cooperative Engineering Education Program and the Professional Engineering Internship Program.

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<td>CRDV 313-1</td>
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<tr>
<td>CRDV 313-3</td>
<td>Undergraduate Engineering Research</td>
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**CRDV 313-7**

- Engineering Research Experience: Half-time
- International Engineering Research Experience: Half-Time

### Engineering Office Of Personal Development

The Engineering Office Of Personal Development (EOPD) strives to cultivate a student body of engineers who are:

- More self aware
- Empowered to take ownership of and responsibility for their learning
- Knowledgeable about the opportunities available to them, and how those opportunities connect to their personal goals
- Highly resilient and possess the scope of vision to take on complex problems

For more information visit: www.mccormick.northwestern.edu/personal-development/ (https://www.mccormick.northwestern.edu/personal-development/)
Engineering Office of Personal Development Course Offerings

PRDV 101-1 McCormick First-Year Experience (0 Unit)  A series of peer-led small group discussions for first-year engineering students, covering topics like higher education culture, time management, strategies for success in courses, and mindset. Attendance is required.

PRDV 101-2 McCormick First-Year Experience (0 Unit)  A series of peer-led small group discussions for first-year engineering students covering topics such as academic strategies, choice of major, exploration of non-major options, and health and well-being. Attendance is required.

PRDV 325-0 Emotional Intelligence 101 - Managing Yourself, Maximizing Your Potential (1 Unit)  Introduction to emotional intelligence theories and concepts; provides practical tools for building skills in stress management, intrapersonal and interpersonal awareness, peak performance, resilience/adaptability, and general mood.

PRDV 335-1 Engineering Improv I: The Art of Allowing (0.5 Unit)  Start anywhere, remember you are not the most important person in the scene, and say yes. Through these and other improv techniques, students learn to tackle unexpected obstacles, building skills that can be leveraged in both academic and non-academic contexts to face challenges with resilience.

PRDV 335-2 Engineering Improv II: The Art of Inspiration (0.5 Unit)  This course builds on Improv I and takes students deeper into concepts and applications. Prerequisite: PRDV 335-1 Engineering Improv I.

PRDV 345-0 Whole-Body Thinking: Collaborative Problem Solving through Partner Dancing (1 Unit)  In this approach to swing dancing, the goal is for two people to join hands and use the rhythms they hear in swinging, jazz-rhythm-based music as a means of connecting with each other.

PRDV 395-0 Special Topics in Personal Development (1 Unit)  Topics suggested by students or faculty and approved by the curriculum committee. Prerequisite: consent of instructor.

PRDV 396-0 Topics in Personal Development (0 Unit)  Topics of limited scope as suggested by faculty or students and approved by the McCormick Office of Personal Development.

PRDV 397-0 Selected Topics in Personal Development (0.5 Unit)  Topics of limited scope as suggested by faculty or students and approved by the McCormick Curriculum Committee.

Northwestern Institute on Complex Systems

The Northwestern Institute on Complex Systems (NICO) was founded in 2004 with the goals of uncovering fundamental principles governing complex systems in science, technology, and human behavior and applying these principles to solve societally relevant problems through the analysis, design, and control of complex systems. Today, NICO serves as a hub and facilitator for pathbreaking research in complexity and data science transcending the boundaries of established disciplines. NICO is a collaboration between the McCormick School of Engineering and the Kellogg School of Management.

Northwestern Institute on Complex Systems Course Offerings

NICO 101-0 Introduction to Programming for Big Data (0.67 Unit)  The skills needed to go from data to knowledge and application, which go under the name of Data Science, are in big demand in industry, government, and academia. This course provides an introduction to the foundational skills needed by data scientists. Prior knowledge of programming is not needed.

NICO 102-0 Project for Introduction to Programming for Big Data (0.33 Unit)  The skills needed to go from data to knowledge and application, which go under the name of Data Science, are in big demand in industry, government, and academia. This course provides an opportunity to develop programming skills by working on a data centered project. Formal Studies Distro Area