

General Engineering

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GENERAL ENGINEERING - METRO ENGINEERING

Beginning in Fall of 2013, there will be a second Bachelor of Science in Engineering Program. This new program will be similar to the original program but will be located on the campus of Normandale Community College in Bloomington, MN. The tentative title of this program is General Engineering—Metro Engineering.

GENERAL ENGINEERING - IRON RANGE ENGINEERING

The Bachelor of Science in Engineering (BSE) is a novel and unique engineering educational program offered in the Iron Range region of northeast Minnesota (Virginia, MN) for the 3rd and 4th year of the undergraduate engineering program. Students transfer into the Bachelor of Science in Engineering program after two years of pre-engineering work elsewhere.

These students learn traditional engineering knowledge and skills in a project based learning environment. The Iron Range Engineering (IRE) educational model is a project-based-learning (PBL) model in which students work with industry and others on real-life design projects with a focus on producing graduates with integrated technical/professional knowledge and competencies. Learning is done in the context of the design projects.

The IRE educational model emphasizes innovation, creativity, design, experimental techniques, and modeling techniques with an ultimate goal of regional economic development in the Iron Range region. The BSE program allows students to tailor their education to emphasize different engineering fields. Successful completion of the program culminates in the Bachelor of Science in Engineering.

Graduates will achieve at least two of the objectives, but will be capable of achieving all within one to four years of graduation.

- Designing, implementing and integrating thermal, electrical, mechanical, and computer-controlled systems, components, and processes that will serve the region, the nation and the world
- Continuing their education through technical or professional graduate programs, professional licensure, or certifications, and the wide variety of other types of life-long learning
- Creating, developing, leading, and managing in a wide range of enterprises that result in sustainable and enhanced economic regional development through their disciplinary expertise
- Demonstrating actions such as community service, professional ethics, professional responsibility and mentoring future engineers"

MINIMUM GENERAL ENGINEERING PROGRAM ENTRY REQUIREMENTS

A minimum of 49 semester credit hours including the following courses and credits must be completed before the student enters the engineering curriculum in the Fall of the junior year in full standing.

Calculus and Differential Equations - 16 semester hours
General Physics (calculus-based) - 8 semester hours
Additional math and science courses, including chemistry, - 8 semester hours
Introductory engineering courses including programming, statics, dynamics, and lab based electric circuits - 13 semester hours
English Composition - 4 semester hours

All courses and credits shown above must be completed before full enrollment in 300-level engineering courses, unless special permission is granted by department chair. All of the above courses must be taken for "grade". It is not acceptable for the student to take any of these courses on a pass/no credit basis. A grade of "C-" or better must be achieved in each course.

Application to Program: To be considered for admission, the student must have a cumulative GPA of 2.5 for all science, math, and engineering courses. Admission to the General Engineering Program is selective and subject to the approval of the General Engineering program faculty. Admission to the General Engineering Program also requires the completion of the application found at the following website: <http://ire.mnscu.edu>. Each application will be evaluated individually and the decision of General Engineering program faculty will be final. Failure to submit an application by stated deadline could result in the student being denied admission to the program. If a student is denied admission to the General Engineering Program, he/she can reapply to the program in subsequent years.

- A. Minnesota State University, Mankato students
This application for is submitted to the General Engineering Program along with a copy of that student's Minnesota State Mankato transcript and any transfer evaluations. Pre-engineering students at Minnesota State Mankato are not guaranteed admission to the program.
- B. Transfer students
Transfer students must submit an application to Minnesota State Mankato and follow all transfer policies. Students may be able to complete the required pre-engineering curriculum at another college or university and have these courses and credits transferred to Minnesota State Mankato when applying for admission to the General Engineering Program.

GPA Policy: Students graduating with a B.S. in Engineering degree must have:

1. A cumulative GPA of 2.5 or higher.
2. Grades of 1.67 "C-" or better for courses taken at Minnesota State Mankato to be accepted.

P/N Grading Policy. P/N credit will not be applied to any course used to meet the degree requirements.

All students must follow all Minnesota State Mankato policies.

General Engineering has a program accreditation visit scheduled by ABET (111 Market Place, Ste. 1050, Baltimore, MD 21202-4012 Phone 410-347-7700, www.abet.org) when the first graduates of the program successfully complete their program (Dec 2011). The ABET visit will be in Fall 2012 per ABET guidelines.

Required General Education

ENG	101	Composition (4)
MATH	121	Calculus I (4)
PHYS	221	General Physics I (4)

Economic Course

(Choose 3 credits)

ECON	201	Principles of Macroeconomics (3)
ECON	202	Principles of Microeconomics (3)

Communications

(Choose 3-4 credit)

CMST	102	Public Speaking (3)
ENG	271W	Technical Communication (4)

Chemistry

(Choose 3-5 credits)

CHEM	191	Chemistry for Engineers (3)
CHEM	201	General Chemistry I (5)

Prerequisites to the Major

Core Prerequisites (Choose 21 credits)
An additional 3 credits of engineering design and programming are required. Students need a total of 32 Math and Science credits comprised of courses from General Education and prerequisites to the major.

EE	230	Circuit Analysis I (3)
MATH	122	Calculus II (4)

MATH	223	Calculus III (4)
MATH	321	Ordinary Differential Equations (4)
ME	212	Statics (3)
ME	214	Dynamics (3)
PHYS	222	General Physics II (3)
PHYS	232	General Physics II Laboratory (1)

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PHYS	223	General Physics III (3)
PHYS	233	General Physics III Laboratory (1)

Chemistry

CHEM	202	General Chemistry II (5)
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Biology

BIOL	105	General Biology I (4)
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Major Common Core

All students must complete 8 credits of ENGR 370 and 8 credits of ENGR 371. All students must complete 16 credits of ENGR 455. Students have the option of an emphasis in an engineering area, such as mechanical or electrical, by completing at least 12 of the 16 credits of ENGR 455 in that area. Students must complete 4 credits of ENGR 492.

ENGR	301	Design I (3)
ENGR	302	Design II (3)
ENGR	311	Professionalism I (3)
ENGR	312	Professionalism II (3)
ENGR	370	Mechanical Core Competencies (1-8)
ENGR	371	Electrical Core Competencies (1-8)
ENGR	401	Capstone Design I (3)
ENGR	402	Capstone Design II (3)
ENGR	411	Professionalism III (3)
ENGR	412	Professionalism IV (3)
ENGR	455	Advanced Technical Competencies (1-8)
ENGR	492	Seminar (1)

Major Restricted Electives

Choose 6-7 credits of approved Arts and Humanities courses and choose 6-7 credits of approved Social Science courses for a total of 13 credits. The Depth Requirement can be fulfilled by a designated sequence (such as HIST 180 and HIST 181) or by taking a 100-level and a 300-level course in the same topic area (such as PHIL 100W and PHIL 321W). A list of approved courses can be found at the program website. Students should also meet the University's diverse cultures graduation requirement.

COURSE DESCRIPTIONS**ENGR 301 (3) Design I**

Students learn and practice the essential elements of engineering design through industry project implementation: scoping, modeling, experimentation, analysis, modern tools, design reviews, multi-disciplinary systems view, creativity, safety, business plans, global/societal/environmental impacts.
Fall, Spring

ENGR 302 (3) Design II

Students further learn and practice the elements of engineering design through industry project implementation: scoping, modeling, experimentation, analysis, modern tools, design reviews, multi-disciplinary systems view, creativity, safety, business plans, global/societal/environmental impacts.
Pre: ENGR 301
Fall, Spring

ENGR 311 (3) Professionalism I

Students learn and develop the elements of professionalism while operating in project teams interacting daily with clients from industry. Topics include leadership, metacognition, teamwork, communication, professional and personal responsibility.
Fall, Spring

ENGR 312 (3) Professionalism II

Students further learn and develop the elements of professionalism while operating in project teams interacting daily with clients from industry. Topics include further examination of leadership, metacognition, teamwork, communication, professional and personal responsibility.
Pre: ENGR 311
Fall, Spring

ENGR 370 (1-8) Mechanical Core Competencies

Students gain breadth across all objectives and depth in an area of: properties, material science, mechanics of materials, advanced statics, advanced dynamics, thermodynamics, fluid mechanics, heat transfer.
Pre: Admission to program
Fall, Spring

ENGR 371 (1-8) Electrical Core Competencies

Students gain breadth across all objectives and depth in a focused area in these core competencies: DC/AC circuits, instrumentation, 3-phase AC, electromagnetics, electronics, digital logic, electric machines.
Pre: Admission to program
Fall, Spring

ENGR 398 (0) CPT: CO-Operative Experience

Curricular Practical Training: Co-Operative Experience is a zero-credit full-time practical training experience for one summer and on adjacent fall or spring term. Special rules apply to preserve full-time student status. Please contact an advisor in your program for complete information.
Pre: MATH 223. At least 60 credits earned; in good standing; instructor permission; co-op contract; other prerequisites may also apply.
Fall, Spring, Summer

ENGR 401 (3) Capstone Design I

The first in a two-semester sequence of capstone design. Students build on the experience gained in ENGR 301/ ENGR 302 to bring their implementation to that expected of contributing engineers in industry.
Pre: ENGR 302, ENGR 312
Fall, Spring

ENGR 402 (3) Capstone Design II

This is the second capstone design course and fourth design course overall. Expectation include potential patent applications, entry in business plan competitions, or some similarly high level achievement.
Pre: ENGR 401, ENGR 411
Fall, Spring

ENGR 411 (3) Professionalism III

Students further learn and develop the elements of professionalism while operating in project teams interacting daily with clients from industry. Further development/practice of leadership, metacognition, teamwork, communication, professional and personal responsibility in project context.
Pre: ENGR 312
Fall, Spring

ENGR 412 (3) Professionalism IV

Students further learn/develop professionalism while interacting regularly with clients from industry. Topics include further development and practice of leadership, metacognition, teamwork, communication, professional and personal responsibility, in project context, with reflection on education growth.
Pre: ENGR 411
Fall, Spring

ENGR 455 (1-8) Advanced Technical Competency

In depth study in an area of engineering related to an industry project and 12 credits of this course is in an area of engineering allows student to gain an emphasis.
Pre: ENGR 370, ENGR 371
Fall, Spring

ENGR 492 (1) Seminar

Students learn about engineering practice through seminars with practicing engineers from industry and are assisted in their development as learners through workshops. This course is repeated by General Engineering students every semester.

Fall, Spring