



# MINNESOTA STATE UNIVERSITY

M A N K A T O

## THE IRON RANGE ENGINEERING PROGRAM

*College of Science, Engineering, and Technology*

### WHY DOES IRON RANGE ENGINEERING EXIST?

We designed the Iron Range Engineering (IRE) program to be a high-quality transfer pathway for community college students that is focused on small inclusive cohorts of students.

Our motto is learning engineering by doing engineering because our industry partners and colleagues agree that real world experiences help cement engineering knowledge.

IRE was purposefully built on an apprenticeship model to provide cost effectiveness by allowing students to work in real engineering positions while developing their technical and problem-solving abilities with the support of professors and staff engineers.

### HOW DOES IRE WORK?

Students complete pre-engineering coursework at their community college before transferring to us. IRE's first semester is called the Bell Academy which is an intensive growth phase where students learn to work in industry by completing design projects, taking technical courses, and developing professional skills. The following two years are spent taking courses remotely while having the opportunity to work as engineers full time in industry for up to 24 months.



### WHAT DEGREE IS OFFERED BY IRE?

The degree offered is a BS in Engineering. Students can earn a focus area in any discipline of engineering based on their individual coursework and experiences (mechanical, electrical, mechatronic, biomedical, aerospace, and more). The degree also qualifies as a prerequisite for master's degree programs when the student chooses to pursue continued education.

### ACCREDITATION

Becoming a professionally license engineer requires graduation from an accredited program. Our Bachelor of Science in Engineering programs are accredited by the Engineering Accreditation Commission of ABET.

### STUDENT EXPERIENCE

#### Faculty/student:

Our staff is comprised of professors who teach in an active learning style and facilitators who are engineers coming from industry acting as staff mentors. As a group staff are focused on providing rapid response feedback on technical learning, professional behavior, and open-ended problem solving.

#### Learning Model

Student engineers in our program are taught based on the 3-Legged Stool Model as in the image below. In this model, one leg is Design (open ended problem solving), one is Professionalism (presenting, team interactions, career development), and one is Technical (engineering theory). When the base of this stool is solid, then the student is set up for success in our profession. Our technical core credits span the range of engineering disciplines and will prepare students for whatever type of engineer they want to be.



#### Internships/Co-ops/Jobs

The last 24 months of our program are spent working for a company or series of companies (anywhere in the world) in a paid engineering position. The staff instruct students on job search strategy and partner with industries across the nation to help students in their search for positions. Average salary during this phase as the students are finishing their degree is \$22/hr.

#### Our Scholars Community

Students interested in learning more can apply at a program level before they apply to the university. Once they apply, they become a Scholar with our program which means that IRE staff start working with them on their career goals and help prepare them for the Bell Academy. Students can apply in any semester while attending their community college.

## SAMPLE CURRICULUM (intended to show pre-requisite courses counting for IRE)

Attending Merritt College- A minimum of 2.5GPA in Mathematics, Science, and Lower Division Engineering courses is required, based on earned credits. This document is not intended to be an official agreement, but a tool for advising students.	
Math/Science Courses Merritt College	Econ/ General Ed Courses Merritt College
MATH 3A Calculus I (5 units) MATH 3B Calculus II (5 units) MATH 3C Calculus III (5 units) MATH 3F Differential Equations (3 units) PHYS 4A General Physics with Calculus (5 units) PHYS 4B General Physics with Calculus (5 units) CHEM 1A General Chemistry (5 units) CHEM 1B General Chemistry (5 units)	ECON 1 Principles of Economics (Macro-Economics) (3 units) Social Science Elective (4 credits) Social Science Elective (3 credits) Humanities Elective (4 credits) Humanities Elective (3 credits) Depth Requirement: Either 2 Social Sciences or 2 Humanities must come from the same department. Example: Macro + Micro-Economics would fulfill both the Economics and Depth transfer requirements. History can count as either a Social Science OR a Humanities class, but not both.
Additional IRE pre-requisite not offered at Merritt College:	Communications Courses Merritt College
Statics (3 credits) Dynamics (3 credits) Circuits (4 credits) [IRE has partnerships to help the student get this course if Merritt College does not have a partner locally.]	ENGL C1000 Composition and Reading (4 units) COMM 45 Public Speaking (3 units)
1st IRE Semester: The Bell Academy	2nd IRE Semester: While in Internships/Co-ops
ENGR 299 Bridge to Project-Based Engineering (3 credits) ENGR 492 Seminar (1 credit) ENGR 3XX Engineering Core Technical Competencies (7 1-credit courses) ENGR 3XX or 4XX Engineering Elective (1 credit)	ENGR 492 Seminar (1 credit) ENGR 311W Professionalism I (3 credits) ENGR 301 Design I (3 credits) ENGR 3XX Engineering Core Technical Competencies (4 1-credit courses) ENGR 4XX Advanced Technical Cores Competencies/Electives (2 1-credit electives)
3rd IRE Semester: While in Internships/Co-ops	4th IRE Semester: While in Internships/Co-ops
ENGR 492 Seminar (1 credit) ENGR 312W Professionalism II (3 credits) ENGR 302 Design II (3 credits) ENGR 3XX Engineering Core Technical Competencies (3 1-credit courses) ENGR 4XX Advanced Technical Cores Competencies/Electives (3 1-credit electives)	ENGR 492 Seminar (1 credit) ENGR 411W Professionalism III (3 credits) ENGR 401 Capstone Design I (3 credits) ENGR 3XX Engineering Core Technical Competencies (2 1-credit courses) ENGR 4XX Advanced Technical Cores Competencies/Electives (4 1-credit electives)
5th IRE Semester: While in Internships/Co-ops	<b>FOR MORE INFORMATION, CONTACT</b> Andrew Hanegmon, Engineering Facilitator 218-966-1192 Andrew.hanegmon@ire.minnstate.edu 1001 West Chestnut Street, Virginia, MN 55792 <b>Program Website:</b> <a href="http://www.ire.minnstate.edu">www.ire.minnstate.edu</a> Program Course List: <a href="https://mankato.mnsu.edu/academics/academic-catalog/undergraduate/integrated-engineering#CourseList">https://mankato.mnsu.edu/academics/academic-catalog/undergraduate/integrated-engineering#CourseList</a>
ENGR 492 Seminar (1 credit) ENGR 412W Professionalism IV (3 credits) ENGR 402 Capstone Design II (3 credits) ENGR 4XX Advanced Technical Cores Competencies/Electives (6 1-credit electives)	

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 Placement & Occupational Outlook for Majors are available at [www.mnsu.edu/cdc/](http://www.mnsu.edu/cdc/)  
 (Click on Resources and then Graduate Statistics)

