



Community College

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Objectives

Learn a bit about

- Inver Hills Community College & proposed Electric Power Certificate
- Community Colleges and Technical Colleges - the difference



Inver Hills Community College

Part of the MinnState System - 26 colleges and 7 universities

~20 min drive to the U of M Twin Cities

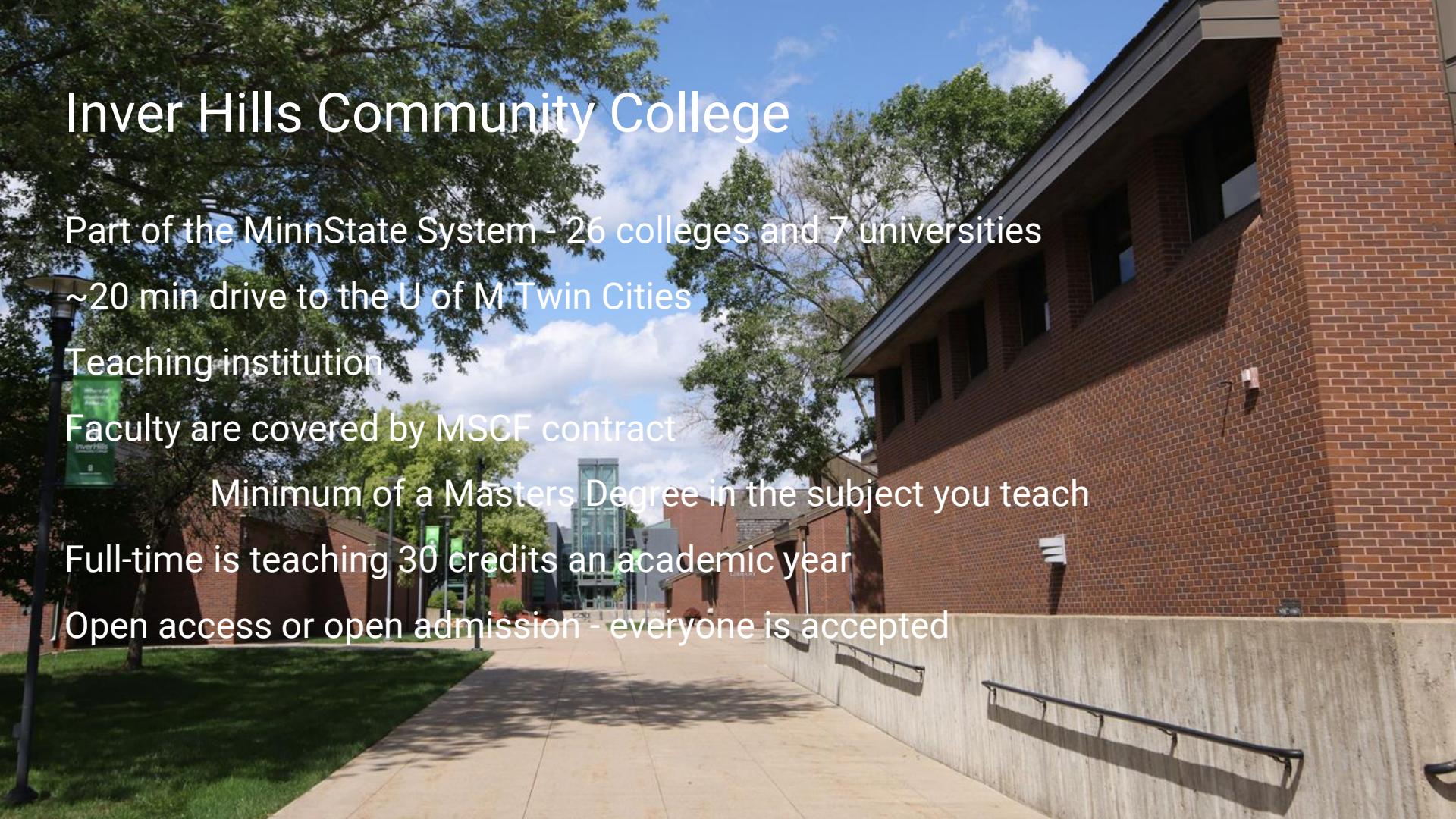
Teaching institution

Faculty are covered by MSCF contract

Minimum of a Masters Degree in the subject you teach

Full-time is teaching 30 credits an academic year

Open access or open admission - everyone is accepted



Inver Hills Engineering Students Demographic Data

Fall 2019	Percent
Veterans	5.4%
Pell Eligible	31.5%
First generation college	37%

First generation is defined using the Federal definition: Neither parent completed a bachelor's degree.

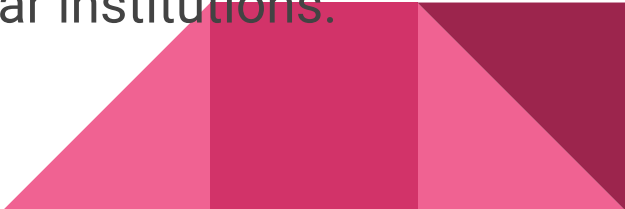
Total enrolled in engineering: 111 students



Inver Hills/US Demographic Data

	2019 % IHCC ENGR	2017 % of US ENGR BS	2017 % of US Population
Female	18.9%	21%	51.5%
Black/African American	9.1%	4%	12%
Native American/Alaskan/ Pacific Islander	1.8%	0.8%	< 4%
Asian	7.2%	10%	5%
Two or more races	7.2%		
Hispanic or Latinx	12.6%	10%	14%

Inver Hills Engineering

- Associate of Science degree in Engineering Fundamentals
 - Most students choose to transfer to the U of M - Twin Cities, where the courses transfer seamlessly.
 - The courses are taught at the level of U of M - CSE level, so transfer to other institutions as well.
 - Some students also transfer to state & private universities in MN and around the country.
 - Students tell me they are well prepared for 4-year institutions.
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Working with Community Colleges

- Work with the community college to set high standards - students will rise to the level required.
- Encourage connections between students in your classes. Foster a sense of belonging.
- Form orientation groups or new student groups for transfer students.
- Avoid grading on a curve (for every A there is an F). Promotes competition and discourages collaboration.



Cost Effective - Tuition

2020-2021 Academic Year data

Cost of tuition including required fees and a surcharge for the CSE
University of Minnesota - Twin Cities: **\$17,142**

Minnesota State system Community College (average): **\$5,665**

Community College Engineering is about $\frac{1}{3}$ the cost of University
Engineering



Engineering Fundamentals AS degree

Engineering Core Curriculum **Choose 13-14 credits**

<i>ENGR 1000 Orientation to Engineering</i>	1
<i>ENGR 1110 Introduction to Engineering</i>	4
<i>ENGR2000 Thermodynamics</i>	4
<i>ENGR 2020 Statics</i>	3
<i>ENGR 2024 Mechanics of Materials</i>	3
<i>ENGR 2025 Dynamics</i>	3
<i>ENGR 2041 Linear Circuits I</i>	4

General Education Curriculum **46-47 credits**


<input type="checkbox"/> <i>MATH 1133 Calculus I</i>	5
<input type="checkbox"/> <i>MATH 1134 Calculus II</i>	5
<input type="checkbox"/> <i>MATH 2219 Multivariable Calculus</i>	5
<input type="checkbox"/> <i>MATH 2221 Introduction to Linear Algebra</i>	3
<input type="checkbox"/> <i>MATH 2222 Introduction to Differential Equations</i>	3
<input type="checkbox"/> <i>CHEM 1061 Principles of Chemistry I</i>	5
<input type="checkbox"/> <i>PHYS 1081 Calculus Based Physics I</i>	5
<input type="checkbox"/> <i>PHYS 1082 Calculus Based Physics II</i>	5
<input type="checkbox"/> <i>ENG 1108 Writing and Research Skills</i>	4
<input type="checkbox"/> <i>COMM 1100 Interpersonal Communication</i>	3
<input type="checkbox"/> <i>MnTC Goal 5, 6, 8, 9 OR 10 course</i>	3 or 4

TOTAL CREDITS 60

ENGR 1701: Climate Crisis - Implementing Solutions

Qualitative Research - Phenomenology

Interviewed 13 former students, who transferred to 4-yr, and graduated or were close to graduating with a BS in engineering.

- Age range: 21 to 39 years. Average of 26 years.
 - 5 female, 7 male, 1 transgender student
 - 7 Pell-eligible
 - 8 first generation
 - 3 immigrants
 - Average student **debt** \$8,654. High \$25,000 and 6 students have \$0 debt
 - 6 students began in developmental math
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Developmental Education

- Developmental Education, or remedial, or basic skills education, is an important service of community colleges.
- Developmental-level courses are designed to remedy gaps in prior education. Typically, don't earn college credit
- “Nationwide, 44 percent of first-time community college students enroll in between one and three developmental courses; and 14 percent take more than three” (Cohen et al., 2014, p. 246).

Math and Engineering


- All engineering majors require: Calculus I, Calculus II, Multi-variable Calculus, Linear Algebra, and Differential Equations.
- The community college can prepare students to be calculus-ready.
 - College-level Math: College Algebra I, College Algebra II or Pre-Calculus.
 - Developmental Math: Introductory Algebra and Intermediate Algebra

Of 13 students interviewed 6 began in developmental math, 5 college-level math lower than Calculus, with 2 > Calculus



Origins of Community College


Proposals that junior colleges (now community colleges) “release universities of the duty of teaching freshmen and sophomores” or so universities would be responsible only for “higher-order scholarship” were presented by

- University of Michigan (1851)
 - University of Georgia (1859)
 - University of Minnesota (1869)
 - University of Chicago (1891-1906)
 - University of Illinois (1904-1920)
 - Stanford University (1891-1913)
 - Alexis Lange, Professor, University of CA and CA State Board of Education (1890-1924)
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What is a Community College?

Community colleges - provide the first two years of a college education. **Courses typically transfer to a four-year college or university.** Students earn an AA - Associates of Arts or AS - Associate of Science degree and sometimes a certificate.

Technical colleges - degrees and diplomas in a variety of programs to prepare students for employment. **Courses typically do not transfer to a four-year college or university.** Students earn certificates, AAS - Associates of Applied Science, or possibly an AS - Associate of Science degree.



U of M CSE Enrollment - Fall 2021 data

Number of CSE freshman applications: >10,000

Number of incoming CSE freshman: 1,453 (largest incoming class in history)


Number of CSE transfer students: 264

Approximately 8500 students with interest in science and engineering did not matriculate to the U of M.



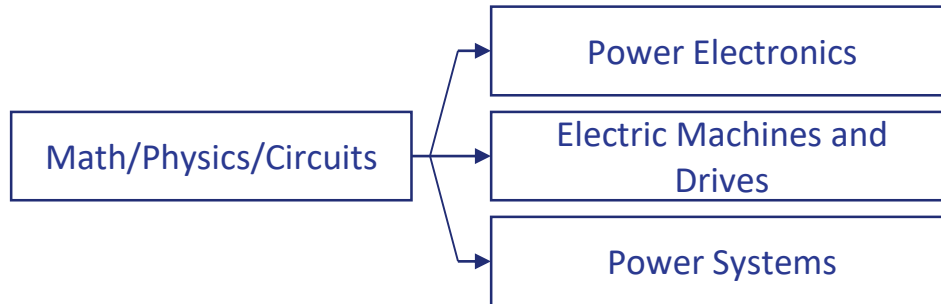
The US needs Engineers

The United States Bureau of Labor Statistics (2021) predicts

- Average 6% increase in all engineering jobs 2020 to 2030
 - +120,000 new engineering jobs by 2030.
 - Electrical and Electronics engineers (3%) on +303,800 (2021) or ~10,000 new jobs
 - \$1.2 Trillion Infrastructure Bill
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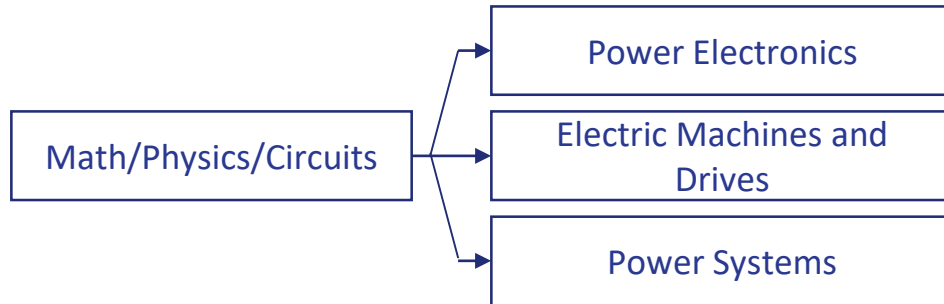
Inver Hills Electric Power Certificate

- Gateway course - ENGR 1701: Climate Crisis Implementing Solutions (Fall 2023)
- Propose a 9 credit Certificate comprised of the 3 courses.
- Students with an Associates Degree (AA or AS)
 - If they have had adequate Math/Physics/Circuits then students would take the three courses
 - Otherwise, they would take the Math/Physics/Circuits course as a pre-req before taking the 3 courses.



Inver Hills Electric Power Certificate

- Courses would be taught by qualified instructors from industry
 - Instructors found with the help of MinnState Centers of Excellence and UMN
 - Must have minimum MS in Engineering
- Would be available to students across MN.
 - Working to co-list courses at multiple institutions
- Will be a model for other States' community colleges



Timeline

- Be prepared to teach in the Fall of 2024
 - Requires submitting to academic council by October, 2023

Power Electronics

Electric Machines and Drives

Power Systems

Consider an Electric Power AS Degree

- Build an AS degree geared for transfer. Students could choose to go directly to work and continue their education later.
- UMN Minimum Transfer Requirements for EE

Aerospace Engineering and Mechanics
Electrical Engineering
Industrial and Systems Engineering
Mechanical Engineering

- Calculus I & II (MATH 1271 & 1272 or 1371 & 1372);
- Calculus-based Physics I & II (PHYS 1301 & 1302W);
- Chemistry I (CHEM 1061/1065)

Thank you. Questions?

Thank you for listening

Special thank you to Dr. Ned Mohan

