

Electrical Engineering (EE)



Career Profile

Electrical engineering is a dynamic profession that allows electrical engineers to use knowledge of the properties of electrical energy to do useful work for mankind. Electrical engineers design and develop circuitry that makes possible the operation of every type of electrical and electronic product.

The products created by electrical engineers are everywhere: radios, televisions, cell phones, computers, video games, electrical lights, and many more.

Accreditation

The South Dakota School of Mines and Technology is accredited by the Higher Learning Commission of the North Central Association of Colleges and Secondary Schools, the recognized accrediting agency for the north central states.

The electrical engineering program is also accredited by the Accreditation Board for Engineering and Technology (ABET).

Faculty

Chair: Dr. Brian Hemmelman, associate professor
Professors: Steven P. Miller Endowed Chair Dr. Keith Whites, and Dr. Michael Batchelder
Assistant Professors: Dr. Dimitrios Anagnostou, Dr. Wael Fathelbab, Dr. Donald Lefevre, Dr. Thomas Montoya, and Dr. Nian Zhang
Instructor: Elaine Linde

Labs and Facilities

The Electrical and Computer Engineering Department houses well-equipped laboratories designed to give students easy access to experimental support for their studies. General-purpose laboratories are fully equipped to provide hands-on experiential learning under the direct supervision of electrical and computer engineering faculty in the areas of circuit analysis, electronics, digital logic, control systems, applied electromagnetics, electromechanics, and energy conversion. In addition, there are special-purpose laboratories serving the fields of thin-film electronic materials, direct-write circuit fabrication, antenna design and fabrication, microwave engineering, communication systems, mechatronics and real-time embedded systems, robotics, digital signal processing, biomedical instrumentation, reconfigurable Field Programmable Gate Array (FPGA) logic, and computer architecture.

Features and Strengths

A two-semester capstone design experience requires electrical engineering students to conduct their own design project in a simulated industrial environment. This foundation provides students with a broad base of understanding that allows them to apply their knowledge of scientific and engineering principles to the practical and innovative solutions of existing and future problems. Students are required to develop a high level of written and oral communication skills and to work well as a member of a team. They must develop a social and ethical awareness so they understand their responsibility to protect occupational and public health and safety and to implement these factors in their professional activities.

Program Overview

The electrical engineering curriculum is principally oriented toward preparing students for careers by providing them with the engineering and technical education appropriate to meet modern technological challenges. The basic curriculum includes required coursework in mathematics, basic sciences, humanities, social sciences, and fundamental engineering topics such as circuit analysis, electronics, electrical systems, electromagnetics, energy systems, and properties of materials. Electrical engineering students are required to select three senior elective courses from communication systems, power systems, power electronics, control systems, microwave engineering, antennas for wireless communications, digital systems, digital signal processing, VLSI design, microprocessor system design, computer networks, computer architecture, and embedded real-time systems.

Outcomes

- School of Mines electrical engineering graduates received salary offers that average nearly \$57,000.
- 100 percent of 2006-07 School of Mines electrical engineering graduates were placed in their field or entered a graduate program within a year of graduation.
- 75 percent of graduates gain real-life experience through internships and co-ops.
- Companies hiring electrical engineering graduates include IBM, Intel, HP, Motorola, Boeing, Caterpillar, Raytheon, and Rockwell.

Student Organizations

Students at the School of Mines also have a variety of opportunities for extra-curricular activities that range from music, intramurals, and drama to ski and snowboarding clubs, and more than 75 other clubs and professional student organizations. These are important activities for our students and we encourage them to take full advantage of out-of-classroom events. In particular, electrical engineering majors are encouraged to participate in IEEE, the professional society for electrical engineers.

The Center for Advanced Manufacturing and Production (CAMP) is designed to teach students engineering, science and design skills, as well as the ability to work in teams. Team members design, build, market and raise the money for their projects. All students are welcome to work on CAMP projects.

Research

Research in the electrical engineering department includes advanced materials and processes for future combat systems, funded by the Army Research Laboratory; maskless mesoscale material deposition and laser write technologies, and more.

Curriculum Listing

<http://catalog.sdsmt.edu>

ELECTRICAL ENGINEERING CURRICULUM/CHECKLIST

FRESHMAN YEAR

First Semester

MATH 123	Calculus I	4
CHEM 112	General Chemistry I	3
CHEM 112L	General Chemistry I Lab	1
CENG 244	Intro to Digital Systems	4
Humanities or Social Sciences Elective(s)		3
PE	Physical Education ¹	1
TOTAL		16

Second Semester

ENGL 101	Composition I	3
MATH 125	Calculus II	4
PHYS 211	University Physics I	3
PE	Physical Education ¹	1
Humanities or Social Sciences Elective(s)		3
Free Elective		2
TOTAL		16

SOPHOMORE YEAR

First Semester

EE 220	Circuits I	4
MATH 321	Differential Equations	4
CSC 150	Computer Science I	3
PHYS 213	University Physics II	3
PHYS 213L	University Physics II Lab	1
Humanities or Social Sciences Elective(s)		3
TOTAL		18

Second Semester

ENGL 279	Technical Comm I	3
EE 221	Circuits	4
MATH 225	Calculus III	4
EE 351	Mechatronics and Measurement Systems	4
Humanities or Social Sciences Elective(s)		3
TOTAL		18

JUNIOR YEAR

First Semester

ENGL 289	Tech Comm II	3
EE 311	Systems	3.5
EE 320	Electronics I	4
EE 381	Electric and Magnetic Fields	3
EM 216	Statics and Dynamics	4
TOTAL		17.5

Second Semester

EE 312	Signals	3.5
EE 322	Electronics II	4
EE 330	Energy Systems	4
EE 382	Applied Electromagnetics	3
Approved Math Elective ²		3
TOTAL		17.5

For More Information contact:

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SENIOR YEAR

First Semester

EE 362	Electric and Magnetic Properties of Materials	3
IENG 301	Basic Engr Economics	2
ME 211 OR PHYS 341	Thermodynamics	3
EE 464	Senior Design I	2
EE	Electrical Engr Elective ³	4
Free Elective ⁴		3
TOTAL		17

Second Semester

EE 465	Electrical Engr Design II	2
EE	Electrical Engr Elective ³	4
EE	Electrical Engr Elective ³	3
Technical Elective ⁵		3
Humanities or Social Sciences Elective(s)		3
Free Elective		1
TOTAL		16

136 credits required for graduation

Curriculum Notes

¹ Music Ensemble courses, (MUEN 101, 121 or 122) may be substituted for Physical Education courses. Any other substitutions must be approved in advance by the physical education department chair.

² MATH 381 and 441 are approved electives.

³ Eleven (11) electrical engineering elective credits required.

EE Electives

EE 421	Communications Systems	4
EE 431	Power Systems	4
EE 432	Power Electronics	4
EE 451	Control Systems	4
EE 481	Microwave Engineering	4
EE 483	Antennas for Wireless Communications	4

CENG 342 Digital Systems 4

CENG 420 Design of Digital Signal Processing Systems 4

CENG 440 VLSI Design 4

CENG 442 Microprocessor Design 4

CENG 444 Computer Networks 4

(credit for only one of CENG 444 or CSC 463 may be used)

CENG 446 Advanced Computer Architectures 4

(credit for only one of CENG 446 or CSC 440 may be used) CENG

447 Embedded and Real-Time Computer Systems 4

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⁴ A free elective is any college level course 100 level or above that is acceptable toward an engineering or science degree. Military science courses, 100 level and above, apply as free electives only; substitution for departmental, technical, humanities, or social science electives is not permitted.

⁵ A technical elective is any science or engineering course 200 level or above that does not duplicate the content of any other course required for graduation. Co-op credits may be used for technical elective credit. A maximum of six (6) co-op credits may be used for the EE degree.

Electrical engineering students are required to take the FE (Fundamentals of Engineering) exam prior to graduation.