Electrical Engineering Emphasis Areas and Electives for the Omaha Campus

January 10, 2019

There are 27 credit hours of technical electives required. Of these 27 credit hours, at least 12 credit hours must be taken in Electrical and Computer Engineering (ECEN) courses which are referred to as "EE technical electives." Below is a list of courses in each emphasis area.

Each EE undergraduate student must choose one of the 8 emphasis areas listed below for at least 6 of the credit hours of EE technical electives, including at least one of the core courses shown in **bold**. In addition, at least one 3 or 4 credit hour course from a different EE emphasis area must be taken. The remaining 3 credits may be satisfied by any non-required 3000 or 4000 level ECEN course except ECEN 3990.

The courses preceded by ** are ECEN courses that have been offered on the Omaha campus either in person or by distance education link.

ELECTRICAL ENGINEERING OPTIONS

1. Energy & Power Systems:

**	**ECEN 3380 core**	**Intro Power and Energy Systems**
**	ECEN 4060	Power Systems Analysis
**	**ECEN 4280 core**	**Power Electronics**
**	ECEN 4300	Wind Energy
	ECEN 4360	Electric Machines
**	ECEN 4440	Linear Control Systems
	ECEN 4980X	Solar Energy

2. Electronics:

**	**ECEN 3100/ ECEN 4740 core**	**Digital Design and Interfacing/Digital Systems**
**	**ECEN 3520/ECEN 3610 core**	**Electronic Circuits II/Advanced Electronics and Circuits**
**	ECEN 3620	Data and Telecommunications Transceivers
	ECEN 4690	Analog Integrated Circuits
	ECEN 4700	Digital and Analog VLSI Design

3. Telecommunications

**	ECEN 3620	Data and Telecommunications Transceivers
**	**ECEN 4610/ECEN 4640 core**	**Digital Communications Media/Digital Communication Systems**
**	**ECEN 4660 core**	**Telecommunications Engineering I**

4. Communications & Signal Processing:

	ECEN 4100	Multivariate Random Processes
**	**ECEN 3250/ECEN 4620 core**	**Communications Systems/Communications Systems**
**	**ECEN 4240/ECEN 4630 core**	**Digital Signal Processing/Digital Signal Processing**
**	ECEN 4610/ECEN 4640	Digital Communications Media/Digital Communication Systems
	ECEN 4650	Intro Data Compression

5. Bioengineering:

**	**ECEN 4500 core**	**Bioinformatics**
**	ECEN 4600	Labview Programming
	ECEN 4980E	Computational and Systems Biology
	ECEN 4980S	Bioengineering Image and Signal Processing

6. Modeling and Simulation

ECEN **3980M core**	**Computational Modeling and Simulation: Discrete Systems**
ECEN 4480	Decision Analysis
ECEN 4980M	Computational Modeling and Simulation: Continuous Systems

7. Materials & Devices:

ECEN 4170	Semiconductor Fundamentals II
ECEN 4200	Plasma Processing of Semiconductors
ECEN **4210 core**	**Principles of Semiconductor Materials and Devices I**
ECEN 4220	Introduction to Physics and Chemistry of Solids

8. Electromagnetic Fields & Optics:

	ECEN 4080 core	**Engineering Electromagnetics**
	ECEN 4670,	Electromagnetic Theory and Applications
	ECEN 4680,	Microwave Engineering
**	ECEN 4790	Optical Fiber Communications
	ECEN 4800,	Introduction to Lasers and Laser applications
	ECEN 4860	Applied Photonics

The remaining 15 credit hours of technical electives which are referred to as "EE or other technical electives" may be taken from any 3000 or 4000 level course offering (with the exception of those listed below) in the Department of Electrical and Computer Engineering or in any other engineering department within the College of Engineering at UNL, or in UNL's departments of Biological Sciences (UNO Biology), Chemistry (UNO Chemistry), Computer Science and Engineering (UNO Computer Science program), Mathematics (UNO Mathematics), Statistics, or Physics and Astronomy (UNO Physics)

Not Allowed 300- and 400-Level Technical Electives

ENGR 4690 Technology, Science and Civilization

BIOS 310 School of Biological Sciences Seminar

BIOL 3500 Biological Principles of Aging

BIOL 3660 sustainable Landscape Design

IMSE 305 Introduction to Engineering Management

MATH 495 Seminar

MATH 496 Seminar in Mathematics

or any other seminar-type courses.

In addition, a list of courses at the 100 and 200 level, which also will be accepted as technical elective credits, are listed below.

Allowed 100 and 200 Level Technical Electives

AGEN 225 Engineering Properties of Biological Materials (BSEN 225)

ASTR 204 Introduction to Astronomy & Astrophysics or UNO PHYS 4350 Astrophysics

ASTR 224 Astronomy & Astrophysics Lab

BIOS 206 General Genetics or UNO BIOL 2140 Genetics

BIOS 213 Human Physiology or UNO BIOL 2740 Human Physiology and Anatomy I

CHME 202 Mass & Energy Balances or UNO CHME 2020 Mass and Energy Balances

CHME 331 Equilibrium Stage Operations

CHEM 110 General Chemistry II or UNO CHEM 1190 General Chemistry II and CHEM 1194 General Chemistry II Laboratory

CHEM 114 Fundamental Chemistry II or UNO CHEM 1190 General Chemistry II

CHEM 2xx Any 200 level chemistry course

CSCE 156 Computer Science II or UNO CSCI 1620 Introduction to Computer Science II

CSCE 235 Introduction to Discrete Structures or UNO MATH 2030 Discrete Mathematics

CSCE 251 Unix Programming Environment

MATL 260 Elements of Materials Science

MATL 262 Materials Lab I

MECH 223 Engineering Statics

MECH 250 Mechanics

MECH 200 Engineering Thermodynamics

No more than a total of 3 credit hours may be taken in ECEN 3990 or similar offerings from other departments.

However, students can choose a “Research Option.” The purpose of research option is to provide research experiences and offer opportunities for students to work with a faculty advisor on a specific research topic. A certificate of completion of thesis will be awarded to the students, and outstanding thesis awards will be presented at the end of semester functions. Requirements for the research option are listed below.

Research Option

1. Selection of a faculty advisor (ECE department faculty), research topic, and thesis committee (at least one other faculty).

2. Registration for 6 credit hours of undergraduate research (ELEC 3990) over at least two consecutive semesters on the same research topic.

3. GPA of above 3.0.

4. Write an undergraduate thesis or report and make an oral presentation to be graded by thesis committee members.

Science Electives

LIFE 120 and LIFE 120L FUNDAMENTALS OF BIOLOGY I or UNO BIOL 1450 BIOLOGY I (5 cr)

CHEM 109 or CHEM 111 or CHEM 113 or UNO CHEM 1180 (3 cr) and 1184 (1 cr)

PHYS 213 or UNO PHYS 2130 (4 cr)