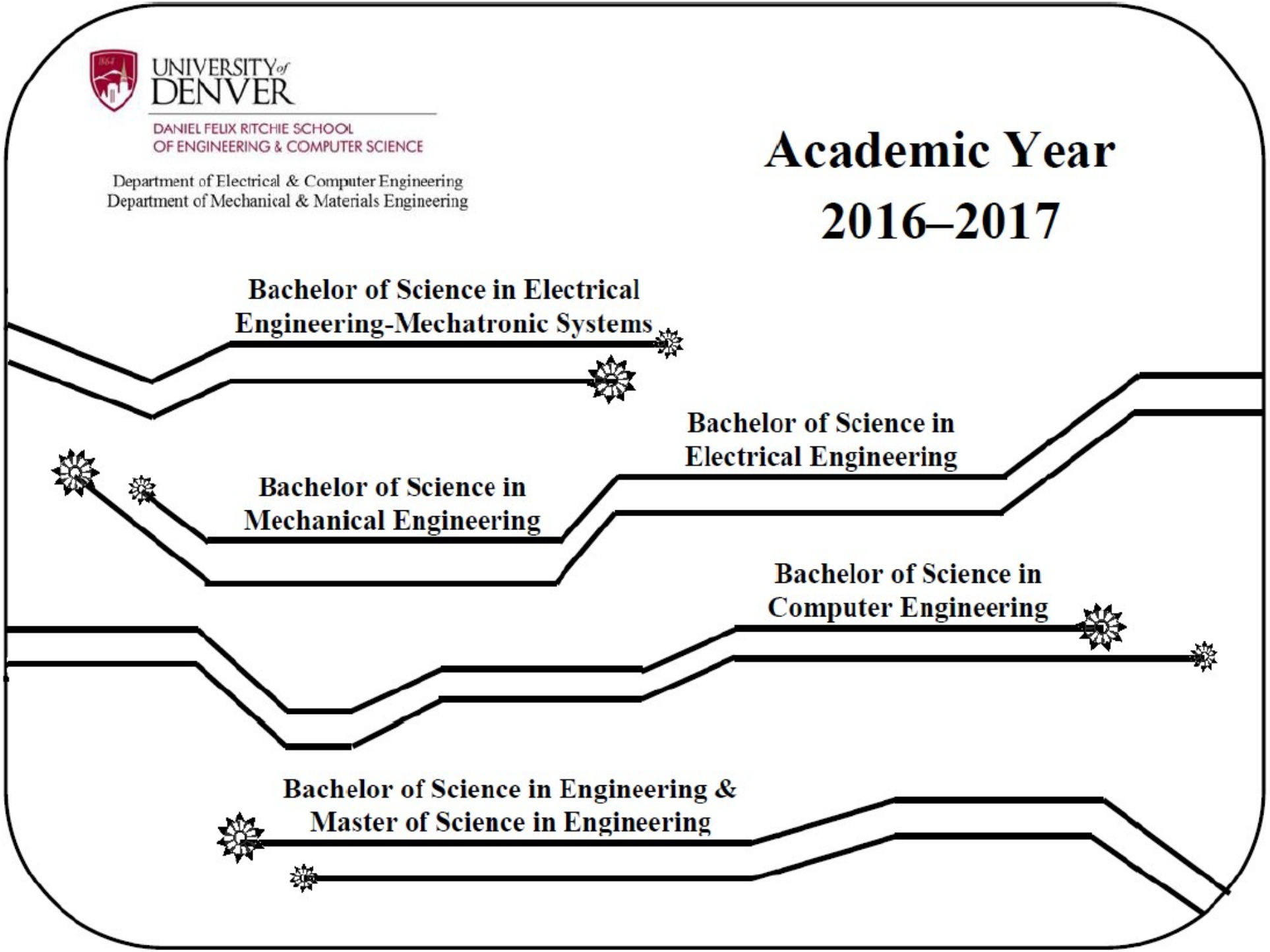
UNIVERSITY of DENVER

DANIEL FELIX RITCHIE SCHOOL
OF ENGINEERING & COMPUTER SCIENCE

Department of Electrical & Computer Engineering
Department of Mechanical & Materials Engineering

Academic Year 2016–2017



Bachelor of Science in Computer Engineering (BSCpE)

Sample Schedule:

Autumn		Winter		Spring	
First Year					
CHEM 1010 - General Chemistry	3	ENGR 1622 - Introduction to Mechatronic Systems I with Multisim and Mathcad	4	ENGR 1632 - Introduction to Mechatronic Systems II with LabView	
CHEM 1240 - General Chemistry Lab	1	MATH 1952 - Calculus II	4	MATH 1953 - Calculus III	4
ENGR 1511 - Engineering Connections	1	PHYS 1211 - University Physics I	5	PHYS 1212 - University Physics II	5
ENGR 1611 - Intro Mechanical Sys w/ CAD	4	WRIT 1122 - Academic Writing	4	WRIT 1133 - Writing and Research	4
FSEM 1111 - First Year Seminar	4				
MATH 1951 - Calculus I	4				
17 QH		**17 QH**		**17 QH**	
Second Year					
COMP 1571 - Procedural Programming I	3	ENEE 2012 - Circuits I w/ Lab	4	ENEE 2022 - Circuits II w/ Lab	4
ENCE 2101 - Digital Design	3	ENGR 1572 - Applied MATLAB Programming	3	ENGR 2950 - Engineering Assessment I	0
ENME 2510 – Statics w/Lab	4	ENME 2541 - Mechanics of Materials	3	ENGR 3100 - Inst. and Data Acq.	4
Math/Sci/UCC*	4	MATH 2070 - Intro to Diff. Equations	4	MATH 2080 - Calculus of Several Variables	4
PHYS 1214 - Univ Physics III for Engineers	4	Math/Sci/UCC*	4	Math/Sci/UCC*	4
18 QH		**18 QH**		**16 QH**	
Third Year					
ENCE 3100 - Advanced Digital Design	4	COMP 1672 - Intro to Computer Science II	4	COMP 2300 - Discrete Structures	4
ENEE 2211 - Electronics	4	ENCE 3210 - Microprocessor Systems I	4	ENCE 3220 - Microprocessor Systems II	4
ENEE 3111 - Signals and Systems	4	ENCE 3241 - Comp. Organization & Arch	3	ENCE 3250 - HDL Modeling & Synthesis	3
Math/Sci/UCC*	4	ENGR 2610 - Engineering Integration I	3	ENGR 2620 - Engineering Integration II	3
		ENGR 3650 - Probability and Statistics for Engineers	4	COMP 2673 - Intro to Computer Science III	4
16 QH		**18 QH**		**18 QH**	
Fourth Year					
ENCE 3501 -VLSI Design	3	COMP 2355 - Intro to Systems Programming	4	ASEM 2XXX - Advanced Seminar	4
ENGR 3313 - Engineering Design Project I	2	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
Math/Sci/UCC*	4	LGST XXXX - Legal Studies Elective	4	ENGR 2951 - Engineering Assessment II	0
XXXX - Technical Elective*	4	XXXX - Technical Elective*	4	ENGR 3970 - Engineering Entrepreneurship	4
				XXXX - Technical Elective*	4
13 QH **		**15 QH****		**15 QH****	

Required Total Hours **198 QH**

***NOTES**

UCC – University Common Curricula- These may be taken in any order. They must have 2 courses with attributes of analytical inquiry: society and 2 courses attributes of scientific inquiry: society.

ASEM 2XXX - Advanced Seminar Engineering students are required to take a writing-intensive advanced seminar. Junior standing is also required.

XXXX - Technical Elective. Technical Electives are used to complete specializations for the degree. Only technical courses may be used, and these must carry Upper-Division credit. Prior approval by the advisor is required.

Math/Sci. One (1) math or science course from the approved list (4 credit hours). Note that without prior advisor approval only one approved math or science course may be taken instead of a UCC course in the first two years.

***** These hours can vary based on Technical Electives.***

Approved Math/Sci Courses (subject to participating department course offerings):

Biology

BIOL 1010 Physiological Systems w/ BIOL 1020 Physiological Systems Lab; BIOL 1011 Evolution, Heredity and Biodiversity w/ BIOL 1021 Evolution, Heredity and Biodiversity Lab; BIOL 2450 Human Anatomy; BIOL 2090 Biostatistics; BIOL 2120 Cell Structure and Function w/ BIOL 2121 Cell Structure & Function Lab; BIOL 3250 Human Physiology

Chemistry

CHEM 2011 Analysis Equilibrium Systems w/ CHEM 2041 Analysis Equilibrium Systems Lab; CHEM 2451 Organic Chemistry I w/ CHEM 2461 Organic Chemistry Lab I; CHEM 2452 Organic Chemistry II w/ CHEM 2462 Organic Chemistry Lab II; CHEM 2453 Organic Chemistry III w/ CHEM 2463 Organic Chemistry Lab III; CHEM 3610 Physical Chemistry I; CHEM 3620 Physical Chemistry II

Math

MATH 2060 Elements of Linear Algebra; MATH 3080 Introduction to Probability; MATH 3090 Mathematical Probability; MATH 3851 Functions Complex Variable

Physics

PHYS 2251 Modern Physics I; PHYS 2252 Modern Physics II w/ PHYS 2260 Modern Physics Lab; PHYS 2259 Uncertainty and Error Analysis; PHYS 2300 Physics of the Body; PHYS 2340 Medical Imaging Physics; PHYS 3510 Analytical Mechanics I; PHYS 3711 Optics I; PHYS 2051 Bio-Astronomy of Solar Systems; PHYS 2052 Stellar Physics; PHYS 2053 Galaxies and Cosmology; PHYS 2061 Telescopes and Instrumentation; PHYS 2062 Astronomy with Digital Cameras

BSCpE Specializations

Communications, DSP and Networking

Three of the following

ENCE 3321	Network Design	4 QH
ENCE 3261	Fault Tolerant Computing	3 QH
ENCE 3321	Network Design	4 QH
ENCE 3630	Pattern Recognition	4 QH
ENEE 3130	Principles of Comm Systems	3 QH
ENEE 3141	Digital Communications	3 QH
ENEE 3670	Intro DSP	4 QH

Special Topics or Independent Study as appropriate for this option

Computer Systems Engineering

Three of the following

COMP 2370	Intro to Algorithms	4 QH
COMP 3501	Intro to Artificial Intelligence	4 QH
COMP 3801	Introduction Computer Graphics	4 QH
ENCE 3231	Embedded Systems Programming	4 QH
ENCE 3261	Fault Tolerant Computing	3 QH
ENCE 3321	Network Design	4 QH
ENCE 3610	Multimedia Systems	3 QH
ENCE 3620	Computer Vision	4 QH
ENMT 3220	Mechatronics II	4 QH

Special Topics or Independent Study as appropriate for this option

Robotics, Embedded Systems and Instrumentation

Three of the following

COMP 3501	Intro to Artificial Intelligence	4 QH
COMP 3801	Introduction Computer Graphics	4 QH
ENCE 3231	Embedded Microprocessors	3 QH
ENCE 3261	Fault Tolerant Computing	3 QH
ENCE 3321	Network Design	4 QH
ENCE 3610	Multimedia Systems	3 QH
ENCE 3620	Computer Vision	4 QH
ENCE 3630	Pattern Recognition	4 QH
	Wireless Sensor Networks	
ENGR 3721	Controls	3 QH
ENGR 3730	Robotics	3 QH
ENMT 3220	Mechatronics II	4 QH

Special Topics or Independent Study as appropriate for this option

Individualized Option

Nine quarter hours of upper division technical courses selected with advisor's approval. A letter signed by the student's advisor giving the reason for the courses selected must be on file in the student's records.

Bachelor of Science in Electrical Engineering (BSEE)

Sample Schedule:

Autumn		Winter		Spring	
First Year					
CHEM 1010 - General Chemistry	3	ENGR 1622 - Introduction to Mechatronic Systems I with Multisim and Mathcad	4	ENGR 1632 - Introduction to Mechatronic Systems II with LabView	4
CHEM 1240 - General Chemistry Lab	1	MATH 1952 - Calculus II	4	MATH 1953 - Calculus III	4
ENGR 1511 - Engineering Connections	1	PHYS 1211 - University Physics I	5	PHYS 1212 - University Physics II	5
ENGR 1611 - Intro Mechanical Sys w/ CAD	4	WRIT 1122 - Academic Writing	4	WRIT 1133 - Writing and Research	4
FSEM 1111 - First Year Seminar	4				
MATH 1951 - Calculus I	4				
	17 QH		**17 QH**		**17 QH**
Second Year					
COMP 1571 - Procedural Programming I	3	ENEE 2012 - Circuits I w/ Lab	4	ENEE 2022 - Circuits II w/ Lab	4
ENCE 2101 - Digital Design	3	ENGR 1572 - Applied MATLAB Programming	3	ENGR 2950 - Engineering Assessment I	0
ENME 2510 – Statics w/Lab	4	ENME 2541 - Mechanics of Materials	3	ENGR 3100 - Inst. and Data Acq.	4
UCC*	4	MATH 2070 - Intro to Diff. Equations	4	ENME 2520 Dynamics I w/ Lab	4
PHYS 1214 - Univ Physics III for Engineers	4	UCC*	4	MATH 2080 - Calculus of Several Variables	4
	18 QH		**18 QH**		**16 QH**
Third Year					
ENEE 2211 - Electronics	4	ENCE 3210 - Microprocessor Systems I	4	ENCE 3220 - Microprocessor Systems II	4
ENEE 2611 - Engineering Electromagnetics	4	ENEE 3130 - Principles of Comm Systems	3	ENEE 3011 - Physical Electronics	4
ENEE 3111 - Signals and Systems	4	ENGR 3721 - Controls	3	ENEE 2223 - Advanced Electronics and Lab	4
ENGR 3530 - Intro to Power and Energy Sys	3	ENGR 3722 - Controls Lab	1	ENGR 2620 - Engineering Integration II	3
ENGR 3611 - Engineering Analysis	3	ENGR 2610 - Engineering Integration I	3		
		ENGR 3650 - Probability and Statistics for Engineers	4		
	18 QH		**18 QH**		**15 QH**
Fourth Year					
ENGR 3510 - Renewable and Eff Power Sys	4	ENGR 3323 - Engineering Design Project II	3	ASEM 2XXX - Advanced Seminar*	4
ENGR 3735 - Linear Systems	4	LGST XXXX - Legal Studies Elective	4	ENGR 3333 - Engineering Design Project III	3
ENGR 3313 - Engineering Design Project I	2	UCC*	4	ENGR 2951 - Engineering Assessment II	0
UCC*	4	XXXX - Technical Elective*	4	ENGR 3970 - Engineering Entrepreneurship	4
XXXX - Technical Elective*	4			XXXX - Technical Elective*	4
	18 QH**		**15 QH****		**15 QH****
			Required Total Hours		**202 QH**

***NOTES**

University Common Curriculum- These may be taken in any order. They must have 2 courses with attributes of analytical inquiry: society and 2 courses attributes of scientific inquiry: society.

ASEM 2XXX - Advanced Seminar Engineering students are required to take a writing-intensive advanced seminar. Junior standing is also required.

Technical Elective. Technical Electives are used to complete specializations for the degree. Only technical courses may be used, and these must carry Upper-Division credit. Prior approval by the advisor is required.

BSEE Specializations

An area of specialization is required for the BSEE. The student must complete one of the specializations listed below:

Communications Systems and Digital Signal Processing

Required:

ENEE 3141	Digital Communications	4 QH

And two of the following:

ENCE 3321	Network Design	3 QH
ENEE 3620	Optical Fiber Communications	4 QH
ENEE 3670	Intro DSP	4 QH

Special topics or Independent Study as appropriate for this option

Electronics, Photonics, and Microsystems

At least three of the following:

ENEE 3030	Optoelectronics	4 QH
ENEE 3035	Photonics	4 QH
ENEE 3620	Optical Fiber Communications	4 QH
ENGR 3210	Intro. NEMS	4 QH
ENGR 3520	Intro to Power Electronics	4 QH
ENGR 3525	PE and renewable energy lab	1 QH

Special topics or Independent Study as appropriate for this option

Robotics

Three of the following

ENCE 3100	Advanced Digital Systems Design	4 QH
ENCE 3231	Embedded Systems Programming	3 QH
ENCE 3620	Computer Vision	4 QH
ENGR 3100	Instrumentation & Data Acquis	4 QH
ENGR 3730	Robotics	3 QH
ENME 3545	Mechanisms	4 QH
ENMT 3220	Mechatronics II	4 QH

(Students should note that ENME 2530, Engineering Mechanics III, is a prerequisite for both ENME 3545 and ENME 3555.)

Special topics or Independent Study as appropriate for this option

Power and Energy

One of the following:

ENGR 3525	PE and renewable energy lab	1 QH
ENGR 3535	Electric Power Engineering Lab	1 QH

And two of the following:

ENGR 3520- Intro to Power Electronics	4 QH
ENGR 3540 - Electric Power Systems	4 QH
ENGR 3545 - Electric Power Economy	3 QH

Special topics or Independent Study as appropriate for this option

Individualized Option

Nine quarter hours of upper division technical courses selected with advisor's approval. A letter signed by the student's advisor giving the reason for the courses selected must be on file in the student's records.

BS Electrical Engineering with an Option in Mechatronic Systems Engineering (BSEE-MSE)

Sample Schedule:

Autumn		Winter		Spring	
First Year					
CHEM 1010 - General Chemistry	3	ENGR 1622 - Introduction to Mechatronic Systems I with Multisim and Mathcad	4	ENGR 1632 - Introduction to Mechatronic Systems II with LabView	4
CHEM 1240 - General Chemistry Lab	1	MATH 1952 - Calculus II	4	MATH 1953 - Calculus III	4
ENGR 1511 - Engineering Connections	1	PHYS 1211 - University Physics I	5	PHYS 1212 - University Physics II	5
ENGR 1611 - Intro Mechanical Sys w/ CAD	4	WRIT 1122 - Academic Writing	4	WRIT 1133 - Writing and Research	4
FSEM 1111 - First Year Seminar	4				
MATH 1951 - Calculus I	4				
	17 QH		**17 QH**		**17 QH**
Second Year					
COMP 1571 - Procedural Programming	3	ENEE 2012 - Circuits I w/ Lab	4	ENEE 2022 - Circuits II w/ lab	4
ENCE 2101 - Digital Design	3	ENGR 1572 - Applied MATLAB Programming	3	ENGR 2950 - Engineering Assessment I	0
ENME 2510 – Statics w/Lab	4	ENME 2541 - Mechanics of Materials	3	ENGR 3100 - Inst. and Data Acq.	4
UCC*	4	MATH 2070 - Intro to Diff. Equations	4	ENME 2520 - Dynamics I w/ Lab	4
PHYS 1214 - Univ Physics III for Engineers	4	UCC*	4	MATH 2080 - Calculus of Several Variables	4
	18 QH		**18 QH**		**16 QH**
Third Year					
ENEE 2211 - Electronics	4	ENCE 3210 - Microprocessor Systems I	4	ENCE 3220 - Microprocessor Systems II	4
ENEE 3111 - Signals and Systems	4	ENGR 2610 - Engineering Integration I	3	ENEE 2223 - Advanced Electronics and Lab	4
ENGR 3530 - Intro to Power and En Sys	3	ENGR 3721 - Controls	3	ENGR 2620 - Engineering Integration II	3
ENGR 3611 - Engineering Analysis	3	ENGR 3722 - Controls Lab	1	ENMT 3220 - Mechatronics II	4
ENME 2530 - Dynamics II	3	ENGR 3650 - Probability and Statistics for Engineers	4		
	17 QH		**15 QH**		**15 QH**
Fourth Year					
ENEE 2611 - Engineering Electromagnetics	4	ENGR 3323 - Engineering Design Project II	3	ASEM 2xxx - Advanced Seminar	4
ENGR 3313 - Engineering Design Project I	2	ENGR 3731 - Robotics Lab	1	ENGR 3333 - Engineering Design Project III	3
ENGR 3735 - Linear Systems	4	ENGR 3730 - Robotics	3	ENGR 2951 - Engineering Assessment II	0
UCC*	4	LGST XXXX - Legal Studies Elective	4	ENGR 3970 - Engineering Entrepreneurship	4
XXXX - Technical Elective	4	UCC	4	XXXX - Technical Elective	3
		XXXX - Technical Elective	3		
	18 QH		**18QH**		**14 QH**

Required Total Hours **200 QH**

***NOTES**

University Common Curriculum- These may be taken in any order. They must have 2 courses with attributes of analytical inquiry: society and 2 courses attributes of scientific inquiry: society.

ASEM 2XXX - Advanced Seminar Engineering students are required to take a writing-intensive advanced seminar. Junior standing is also required.

Technical Elective. Technical Electives are used to complete specializations for the degree. Only technical courses may be used, and these must carry Upper-Division credit. Prior approval by the advisor is required.

BSEE with an option in Mechatronic Systems Engineering Specializations

An area of specialization is required for the BSEE-MSE. The student must complete one of the specializations (Mechanical or Computer) listed below. The remaining technical elective course (for a minimum total of 9 QH) must be taken from the other specialization (Computer or Mechanical).

Mechanical Systems

Three of the following:

ENME 2810	Mech Engineering Laboratory I	3QH
ENME 2820	Mech Engineering Laboratory II	3QH
ENME 2545	Mechanisms	4QH
ENME 3511	Machine Design	3QH

Special topics or Independent Study as appropriate for this option

Computer Systems

Must take the following:

ENCE 3231	Embedded System Programming	4 QH
ENCE 3241	Computer Org & Architecture	3 QH
ENCE 3261	Fault Tolerant Computing	3 QH

Special topics or Independent Study as appropriate for this option

Individualized Option

Nine quarter hours of upper division technical courses selected with advisor's approval. A letter signed by the student's advisor giving the reason for the courses selected must be on file in the student's records.

Bachelor of Science in Mechanical Engineering Curriculum (BSME)

Sample Schedule:

Fall		Winter		Spring	
First Year					
CHEM 1010 - General Chemistry	3	ENGR 1622 - Introduction to Mechatronic Systems I with Multisim and Mathcad	4	ENGR 1632 - Introduction to Mechatronic Systems II with LabView	4
CHEM 1240 - General Chemistry Lab	1	MATH 1952 - Calculus II	4	MATH 1953 - Calculus III	4
ENGR 1511 - Engineering Connections	1	PHYS 1211 - University Physics I	5	PHYS 1212 - University Physics II	5
ENGR 1611 - Intro Mechanical Sys w/ CAD	4	WRIT 1122 - Academic Writing	4	WRIT 1133 - Writing and Research	4
FSEM 1111 - First Year Seminar	4				
MATH 1951 - Calculus I	4				
	17 QH		**17 QH**		**17 QH**
Second Year					
COMP 1571 - Procedural Programming	3	ENEE 2012 - Circuits I w/Lab	4	ENGR 2950 - Engineering Assessment I	0
ENCE 2101 - Digital Design	3	ENGR 1572 - Applied MATLAB Programming	3	ENME 2520 - Dynamics I w/ Lab	4
ENME 2510 – Statics w/Lab	4	ENME 2541 - Mechanics of Materials	3	ENME 2710 - Engr. Thermodynamics I	3
Math/Sci/UCC*	4	MATH 2070 - Intro to Differential Equations	4	MATH 2080 - Calculus of Several Variables	4
PHYS 1214 - Univ Physics III for Engineers	4	Math/Sci/UCC*	4	Math/Sci/UCC*	4
	18 QH		**18 QH**		**15 QH**
Third Year					
ENME 2410 - Materials Science I	3	ENGR 2610 - Engineering Integration I	3	ENGR 2620 - Engineering Integration II	3
ENME 2530 - Dynamics II	3	ENME 2421 - Materials Science II w/ Lab	3	ENGR 2910 - Economics for Engineers	3
ENME 2651 - Fluids I	3	ENME 2661 - Fluids II /Heat Transfer I	3	ENME 2540 - System Dynamics	3
ENME 2720 - Engr. Thermodynamics II	3	ENME 3511 - Machine Design	3	ENME 2671 - Heat Transfer II w/ Lab	4
Math/Sci//Tech/Law/UCC*	4	Math/Sci//Tech/Law/UCC*	4	Math/Sci//Tech/Law/UCC*	4
	16 QH		**16 QH**		**17 QH**
Fourth Year					
ASEM 2XXX - Advanced Seminar*	4	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
ENGR 3313 - Engineering Design Project I	2	ENME 2810 - Mech Engr. Laboratory	3	ENGR 2951 - Engineering Assessment II	0
Math/Sci//Tech/Law/UCC*	4	Math/Sci//Tech/Law/UCC*	4	ENME 3810 - Mech Engr Capstone Laboratory	3
Math/Sci//Tech/Law/UCC*	4	Math/Sci//Tech/Law/UCC*	4	Math/Sci//Tech/UCC*	3/4
				OOOO – Open Elective*	4/3
	14 QH		**14 QH**		**13 QH**
			Required Total Hours		**192 QH**

***NOTES**

UCC – University Common Curriculum. These may be taken in any order. They must have 2 courses with attributes of analytical inquiry: society and 2 courses attributes of scientific inquiry: society (16 credit hours).

ASEM 2XXX - Advanced Seminar. Required writing-intensive advanced seminar. Junior or Senior standing is required (4 credit hours)

OOOO - Open Elective. May be any course at the 1000 level or above (3 or 4 credit hours as needed to reach 192 total QH).

Math/Sci/Tech/Law. 3- 3000 or higher engineering courses (ENGR, ENME, ENEE, ENCE, ENBI, ENMT, or MTSC), which are not required for the major (12 credit hours). 2-4 math or science courses from the approved list (10 credit hours). 1 math or science or technical or computer science or law school course (3 or 4 credit hours). Note that without prior advisor approval only one approved math or science course may be taken instead of a UCC course in the first two years.

Approved * Math/Sci/Law Courses (subject to participating department course offerings):

Biology

BIOL 1010 Physiological Systems w/ BIOL 1020 Physiological Systems Lab; BIOL 1011 Evolution, Heredity and Biodiversity w/ BIOL 1021 Evolution, Heredity and Biodiversity Lab; BIOL 2450 Human Anatomy; BIOL 2090 Biostatistics; BIOL 2120 Cell Structure and Function w/ BIOL 2121 Cell Structure & Function Lab; BIOL 3250 Human Physiology

Chemistry

CHEM 2011 Analysis Equilibrium Systems w/ CHEM 2041 Analysis Equilibrium Systems Lab; CHEM 2451 Organic Chemistry I w/ CHEM 2461 Organic Chemistry Lab I; CHEM 2452 Organic Chemistry II w/ CHEM 2462 Organic Chemistry Lab II; CHEM 2453 Organic Chemistry III w/ CHEM 2463 Organic Chemistry Lab III; CHEM 3610 Physical Chemistry I; CHEM 3620 Physical Chemistry II

Math

MATH 2060 Elements of Linear Algebra; MATH 3080 Introduction to Probability; MATH 3090 Mathematical Probability; MATH 3851 Functions Complex Variable

Physics

PHYS 2251 Modern Physics I; PHYS 2252 Modern Physics II w/ PHYS 2260 Modern Physics Lab; PHYS 2259 Uncertainty and Error Analysis; PHYS 2300 Physics of the Body; PHYS 2340 Medical Imaging Physics; PHYS 3510 Analytical Mechanics I; PHYS 3711 Optics I; PHYS 2051 Bio-Astronomy of Solar Systems; PHYS 2052 Stellar Physics; PHYS 2053 Galaxies and Cosmology; PHYS 2061 Telescopes and Instrumentation; PHYS 2062 Astronomy with Digital Cameras

Law School

LAW L4310 Introduction to Intellectual Property; LAW L4471 Patent Law; LAW L4220 Environmental Law

***Note: Other course offerings may be allowed; see your advisor for courses not on this list.**