UNIVERSITY *of* DENVER

DANIEL FELIX RITCHIE SCHOOL
OF ENGINEERING & COMPUTER SCIENCE

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

**Academic Year
2014-2015**

Bachelor of Science in Computer Engineering

Bachelor of Science in Electrical Engineering

Bachelor of Science in Electrical Engineering–Mechatronic Systems

Bachelor of Science in Mechanical Engineering

Bachelor of Science in Engineering & Master of Business Administration

Bachelor of Science in Engineering & Master of Science in Engineering

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
		XXXX - Technical Elective	4	XXXX - Technical Elective	4
	16 QH		**18 QH**		**18 QH**
Fourth Year					
COMP 2370 Intro to Algorithms & Data Struct.	4	COMP 3361 - Operating Systems I	4	ASEM 2XXX - Advanced Seminar	4
ENCE 3501 -VLSI Design	3	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
ENGR 3313 - Engineering Design Project I	2	LGST XXXX - Legal Studies Elective	4	ENGR 3951 - Engineering Assessment II	0
Math/Sci/UCC*	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 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 Computer Engineering / MBA
(BSCpE/ MBA)

Sample Schedule:

Autumn		Winter		Spring	
First three years are the same the BSCpE, above.					
Fourth Year					
ACTG 4610 - Financial Accounting	4	COMP 3361 - Operating Systems I	4	ASEM 2xxx - Advanced Seminar	4
COMP 2370 - Intro to Algorithms & Data Struct.	4	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
ENCE 3501 - VLSI Design	3	FIN 4630 - Managerial Finance	4	MGMT 4620 - Organizational Dynamics	4
ENGR 3313 - Engineering Design Project I	2	MKTG 4100 - Marketing Concepts	4	MBA Elective	4
STAT 4610 - Quantitative Methods	4	XXXX - Technical Elective	3		
	17 QH		**18 QH**		**15 QH**
Fifth Year					
ENCE 3xxx - Technical Elective	3	BUS 4620 - Ethics - 21st Century Professional	4	ENGR 3951 - Engineering Assessment II	0
ACTG 4660 - Strategic Cost Management	4	MGMT 4690 - Strategic Management	4	BUS 4630 - Creating Sustainable Enterprise	4
BUS 4610 - The Essence of Enterprise	4	MBA Elective	4	ITEC 4610 - Information Technology Strategy	4
MGMT 4630 - Strategic Human Resources	4	MBA 4610 - Business Law and Public Policy	4	MBA 4690 - Enterprise Solutions	4
				XXXX - Technical Elective	4
	15 QH		**16 QH**		**16 QH**
		Required Total Hours			**248 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. STAT 4610 Business Statistics satisfies the Math/Sci requirement for this degree.

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

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
Math/Sci/UCC*	4	MATH 2070 - Intro to Diff. Equations	4	ENME 2520 Dynamics I w/ Lab	4
PHYS 1214 - Univ Physics III for Engineers	4	Math/Sci/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 3610 - Engineering Analysis	3	ENGR 2610 - Engineering Integration I	3		
		Math/Sci/UCC*	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	Math/Sci/UCC*	4	ENGR 3951 - Engineering Assessment II	0
Math/Sci/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

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.*
*** *If you are going to specialize in Robotics or Power and Energy, you must take Dynamics I and Lab in spring quarter, second year.*

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

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 3215	NEMS Lab	4 QH
ENGR 3220	Intro. MEMS and Microsystems	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.

Bachelor of Science in Electrical Engineering / MBA
(BSEE/MBA)

Sample Schedule:

Autumn		Winter		Spring	
First three years are same as the BSEE, above.					
Fourth Year					
ACTG 4610 - Financial Accounting	4	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
ENGR 3510 - Renewable and Eff Pwr Sys	4	FIN 4630 - Managerial Finance	4	Math/Sci/UCC*	4
ENGR 3725 - Digital Control Systems	4	MKTG 4100 - Marketing Concepts	4	XXXX - MBA Elective*	4
ENGR 3313 - Engineering Design Project I	2	XXXX - Technical Elective*	4	MGMT 4620 - Organizational Dynamics	4
STAT 4610 - Quantitative Methods	4				
	18 QH		**15 QH**		**15 QH**
Fifth Year					
ACTG 4660 - Strategic Cost Management	4	BUS 4620 - Ethics 21st Century Professional	4	ASEM 2XXX- Advanced Seminar	4
BUS 4610 - The Essence of Enterprise	4	MBA 4610 - Business Law & Public Policy	4	BUS 4630 - Creating Sustainable Enterprise	4
MGMT 4630 - Strategic Human Resources	4	XXXX - MBA Elective*	4	ENGR 3951 - Engineering Assessment II	0
XXXX - Technical Elective*	4	MGMT 4690 - Strategic Management	4	ITEC 4610 - Information Technology Strategy	4
				MBA 4690 - Enterprise Solutions	4
	16 QH		**16 QH**		**16 QH**
		Required Total Hours			**248 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. STAT 4610 Business Statistics satisfies the Math/Sci/UCC requirement for this degree

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

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
Math/Sci/UCC*	4	MATH 2070 - Intro to Diff. Equations	4	ENME 2520 - Dynamics I w/ Lab	4
PHYS 1214 - Univ Physics III for Engineers	4	Math/Sci/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 3610 - Engineering Analysis	3	ENGR 3722 - Controls Lab	1	ENMT 3220 - Mechatronics II	4
ENME 2530 - Dynamics II	3	Math/Sci/UCC*	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 3951 - Engineering Assessment II	0
Math/Sci/UCC*	4	LGST XXXX - Legal Studies Elective	4	ENGR 3970 - Engineering Entrepreneurship	4
XXXX - Technical Elective	4	Math/Sci/UCC	4	XXXX - Technical Elective	3
		XXXX - Technical Elective	3		
	18 QH		**18QH**		**14 QH**
				Required Total Hours	**200 QH**

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

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.

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

Sample Schedule:

Autumn		Winter		Spring	
First three years are the same as the BSEE-MSE, above.					
Fourth Year					
ACTG 4610 - Financial Accounting	4	ENGR 3323 - Engineering Design Project II	3	ASEM 2XXX - Advanced Seminar	4
ENGR 3313 - Engineering Design Project I	2	ENGR 3730 - Robotics	3	ENGR 3333 - Engineering Design Project III	3
ENGR 3735 - Linear Systems	4	ENGR 3731 - Robotics Lab	1	XXXX - MBA Elective	4
STAT 4610 - Quantitative Methods	4	FIN 4630 - Managerial Finance	4	MGMT 4620 - Organizational Dynamics	4
XXXX - Technical Elective	3	MKTG 4100 - Marketing Concepts	4	XXXX - Technical Elective	3
	17 QH		**15 QH**		**18 QH**
Fifth Year					
ACTG 4660 - Strategic Cost Management	4	BUS 4620 - Ethics - 21st Century Professional	4	BUS 4630 - Creating Sustainable Enterprise	4
BUS 4610 - The Essence of Enterprise	4	MBA 4610 - Business Law and Public Policy	4	ENGR 3951 - Engineering Assessment II	0
Math/Sci/UCC*	4	XXXX - MBA Elective	4	ITEC 4610 - Information Technology Strategy	4
MGMT 4630 - Strategic Human Resources	4	MGMT - 4690 Strategic Management	4	MBA 4690 - Enterprise Solutions	4
				XXXX - Technical Elective	4
	16 QH		**16 QH**		**16 QH**

Required Total Hours   **250 QH**

*NOTES

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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. STAT 4610 Business Statistics satisfies the Math/Sci requirement for this degree

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

Bachelor of Science in Mechanical Engineering Curriculum
(BSME)

Sample Schedule:

Fall		Winter		Spring	
First Year					
FSEM 1111 - First Year Seminar	4	WRIT 1122 - Academic Writing	4	WRIT 1133 - Writing and Research	4
MATH 1951 - Calculus I	4	MATH 1952 - Calculus II	4	MATH 1953 - Calculus III	4
CHEM 1010 - General Chemistry	3	PHYS 1211 - University Physics I	5	PHYS 1212 - University Physics II	5
CHEM 1240 - General Chemistry Lab	1	ENGR 1622 - Introduction to Mechatronic Systems I with Multisim and Mathcad	4	ENGR 1632- Intro Mechatronic Sys II with LabView	4
ENGR 1511 - Engineering Connections	1				
ENGR 1611 - Intro Mechanical Sys w/ CAD	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 3951 - 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 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 (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 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

Bachelor of Science in Mechanical Engineering / MBA
(BSME / MBA)

Sample Schedule:

Fall		Winter		Spring	
First two years are the same as the BSME, above.					
Third Year					
Math/Sci//Tech/UCC*	4	Math/Sci//Tech/UCC*	4	Math/Sci//Tech/UCC*	3
ENME 2651 - Fluids I	3	ENGR 2610 - Engineering Integration I	3	Math/Sci//Tech/UCC*	3
ENME 2410 - Materials Science I	3	ENME 2421 - Materials Science II w/ Lab	3	ENGR 2620 - Engineering Integration II	3
ENME 2530 - Dynamics II	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
	16 QH		**16 QH**		**16 QH**
Fourth Year					
ASEM 2XXX - Advanced Seminar*	4	ENME 2810 - Mech Engr Laboratory	3	ENME 3810 - Mech Engr Capstone Lab	3
ENGR 3313 - Engineering Design Project I	2	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
ACTG 4610 - Financial Accounting	4	FIN 4630 - Managerial Finance	4	MGMT 4620 - Organizational Dynamics	4
STAT 4610 - Quantitative Methods	4	MKTG 4100 - Marketing Concepts	4	MBAX - MBA Elective*	4
	14 QH		**14 QH**		**14 QH**
Fifth Year					
BUS 4610 - The Essence of Enterprise	4	Math/Sci//Tech/UCC*	4	Math/Sci//Tech/UCC*	4
ACTG 4660 - Strategic Cost Management	4	BUS 4620 - Ethics 21st Century Professional	4	ENGR 3951 - Engineering Assessment II	0
MGMT 4630 - Strategic Human Resources	4	MBA 4610 - Business Law and Public Policy	4	BUS 4630 - Creating Sustainable Enterprise	4
MBAX - MBA Elective*	4	MGMT 4690 - Strategic Management	4	ITEC 4610 - Information Tech. Strategy	4
				MBA 4690 - Enterprise Solutions	4
	16 QH		**16 QH**		**16 QH**

Required Total Hours   **240 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 (16 credit hours).

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

Math/Sci/Tech. 2 3000 or higher engineering courses (ENGR, ENME, ENEE, ENCE, ENBI, ENMT, or MTSC) which are not required for the major (8 credit hours). 2-4 math or science courses from the approved list (10 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.

MBAX – MBA Elective. Must be an upper-division business course (8 credit hours).

MBA courses can be started as early as winter quarter third year. Talk to your advisor regarding this option.

Study Abroad Option – BSME/MBA students may participate in study abroad. See next page for the study abroad program plan.

Bachelor of Science in Mechanical Engineering Curriculum
(BSME / MBA / Study Abroad)

Sample Schedule:

Fall		Winter		Spring	
First two years are the same as the BSME					
Third Year					
Math/Sci/Tech/UCC*	4	Math/Sci/Tech/UCC*/ACTG4610/STAT4610	4	Math/Sci/Tech/UCC*/ACTG4610/STAT4610	4
ENME 2651 – Fluids I	3	ENGR 2610 - Engineering Integration I	3	ACTG4610/STAT4610	4
ENME 2410 - Materials Science I	3	ENME 2421 - Materials Science II w/ Lab	3	ENGR 2620 - Engineering Integration II	3
ENME 2530 – Dynamics II	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
	16 QH		**16 QH**		**18 QH**
Fourth Year					
Math/Sci/Tech/UCC/ASEM*	4	Math/Sci/Tech/UCC/ASEM*	4	Math/Sci/Tech/UCC/ASEM*	4
ENGR 3313 - Engineering Design Project I	2	ENGR 3323 - Engineering Design Project II	3	ENGR 3333 - Engineering Design Project III	3
Abroad	12	ENME 2810 - Mech Engr Laboratory	3	ENME 3810 - Mech Engr Capstone Lab	3
		FIN 4630 – Managerial Finance	4	MGMT 4620 – Organizational Dynamics	4
		MKTG 4100 – Marketing Concepts	4	MBAX – MBA Elective*	4
	18 QH		**18 QH**		**18 QH**
Fifth Year					
BUS 4610 - The Essence of Enterprise	4	Math/Sci/Tech/UCC*	3	Math/Sci/Tech*	3
ACTG 4660 - Strategic Cost Management	4	BUS 4620 - Ethics 21st Cent Prof	4	ENGR 3951 - Engineering Assessment II	0
MGMT 4630 - Strategic Human Res	4	MBA 4610 - Bus Law and Pub Policy	4	BUS 4630 - Creating Sustainable Ent	4
MBAX – MBA Elective*	4	MGMT 4690 - Strategic Management	4	ITEC 4610 - Information Tech Strategy	4
				MBA 4690 - Enterprise Solutions	4
	16 QH		**15 QH**		**15 QH**

Required Total Hours   **240 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 (16 credit hours).

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

Math/Sci/Tech. 2 3000 or higher engineering courses (ENGR, ENME, ENEE, ENCE, ENBI, ENMT, or MTSC) which are not required for the major (8 credit hours). 2-4 math or science courses from the approved list (10 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.

MBAX – MBA Elective. Must be an upper-division business course (8 credit hours).

For this combination of BSME/MBA/Abroad to work, one Math/Sci/Tech/UCC/ASEM course needs to be taken while abroad, or during an interterm or summer session. Alternatively, such credit may already have been earned during the first two years.

Approved Math/Sci Courses:

Biology

BIOL 1010 Concepts: Physiological Systems w/ BIOL 1020 Lab; BIOL 1011 Concepts: Cellular and Molecular Biology w/ BIOL 1021 Lab; BIOL 2450 Human Anatomy; BIOL 2090 Biostatistics; BIOL 2120 Cell Structure and Function w/ BIOL 2121 Lab; BIOL 3250 Human Physiology

Chemistry

CHEM 2011 Analysis Equilibrium Systems w/ CHEM 2041 Lab; CHEM 2451 Organic Chemistry I w/ CHEM 2461 Lab; CHEM 2452 Organic Chemistry II w/ CHEM 2462 Lab; CHEM 2453 Organic Chemistry III w/ CHEM 2463 Lab; CHEM 3610 Physical Chemistry I; CHEM 3620 Physical Chemistry II; CHEM 3630 Physical Chemistry III

Math

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

Physics

PHYS 2251 Introduction to Modern Physics; PHYS 2252 Modern Physics II w/ PHYS 2260 Lab; PHYS 2259 Uncertainty and Error Analysis; PHYS 2300 Physics of the Body; PHYS 2340 Medical Imaging Physics; PHYS 3510 Analytical Mechanics; PHYS 3711 Optics I; PHYS 3712 Optics II; PHYS 3781 Spectroscopy