

THE UNIVERSITY OF WISCONSIN-MILWAUKEE
College of Engineering and Applied Science

FACULTY MEETING

Friday, October 23, 2015

AGENDA

The October 23, 2015 faculty meeting has been canceled due to a lack of business.

AUTOMATIC CONSENT BUSINESS

- A. New Courses and Course Changes – See Attachment 1
- B. Changes to the Electrical Engineering Curriculum – See Attachment 2
- C. Changes to the Computer Engineering Curriculum – See Attachment 3
- D. Changes to the Computer Science Curriculum – See Attachment 4
- E. Change to the Industrial and Manufacturing Engineering Curriculum – See Attachment 5

NOTE TO FACULTY:

CEAS Faculty legislation allows for the approval of Automatic Consent Business in the absence of a regularly scheduled faculty meeting. If there is any objection to the above, consideration will be delayed until the next regularly scheduled faculty meeting.

Objections to approval of the above must be received by the Secretary of the CEAS Faculty in writing before 1:30 p.m., Friday, October 23, 2015.

John R. Reisel, Secretary
CEAS Faculty

JRR
Attachments

ATTACHMENT 1

NEW COURSES

- BME 599 SENIOR THESIS, 1-3 cr., U
Independent research under the direction of a faculty member; submission of a written thesis required. 3 cr total required. May be taken to max of 3 cr.
Prereq: sr st & cons instr.
- BME 699 INDEPENDENT STUDY, 1-3 cr., U
May be retaken to max of 6 cr toward the undergraduate degree.
Prereq: jr st; cons instr.
- CIV ENG 311 INTRODUCTION TO ENERGY, ENVIRONMENT, AND SUSTAINABILITY, 3 cr., U
Energy system and resources; environmental system and resources; global climate change; life cycle assessment; green chemistry and materials; sustainable technologies.
Prereq: junior standing

COURSE CHANGES

- ELECENG 301 ELECTRICAL CIRCUITS I, 3 cr., U
Circuit laws and analysis, resistive circuits, energy storage, AC circuits and power, three-phase circuits, computer-aided analysis.
Prereq: Physics 210 or 220(C)
- had been
- ELECENG 301 ELECTRICAL CIRCUITS I, 3 cr., U
Circuit laws and analysis, resistive circuits, energy storage, AC circuits and power, three-phase circuits, computer-aided analysis.
Prereq: Physics 210(C)
- ELECENG 361 ELECTROMAGNETIC FIELDS, 3 cr., U
Principles of electrostatics and electromagnetics; laws of fields; resistance, inductance, and capacitance; dielectrics; energy storage; Maxwell's field equation.
Prereq: grade C or better in Phys 210 and 215 or Phys 220; ElecEng 234(P); grade C or better in Math 233(P).
- had been
- ELECENG 361 ELECTROMAGNETIC FIELDS, 3 cr., U
Principles of electrostatics and electromagnetics; laws of fields; resistance, inductance, and capacitance; dielectrics; energy storage; Maxwell's field equation.
Prereq: Physics 210(P), ElecEng 234(P), grade C or better in Math 233(P).

University of Wisconsin – Milwaukee
College of Engineering and Applied Science
ELECTRICAL ENGINEERING CURRICULUM

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Electrical Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

Engineering Core Courses (23 17 credits)		Credits	Prerequisite
ElecEng 101	Fundamentals of Electrical Engineering	3	Math 116(C), admis to College of Engineering & Applied Science
EAS 200	Professional Seminar	1	none
CompSci 240	Introduction to Engineering Programming	3	Math Placement Code of 40 or Math 116 (P)
Civ-Eng 201	Statics	3	Math 232 (P)
Civ-Eng 202	Dynamics	3	Civ-Eng 201 (P), Math 233 (C)
MatlEng 201	Engineering Materials	4	Chem 105 (P) or 102 (P) or 117(P)
ElecEng 301	Electrical Circuits I	3	Physic 210 or 220 (C)
MechEng 301	Basic Engineering Thermodynamics	3	Math 233 (P), Physics 209 or 219 (P)

***Electrical Engineering Major (36 credits)**

ElecEng 305	Electrical Circuits II	4	ElecEng 301 (P), ElecEng 234 (P)
ElecEng 310	Signals and Systems	3	ElecEng 305 (P)
ElecEng 330	Electronics I	4	ElecEng 305 (C)
ElecEng 335	Electronics II	4	ElecEng 330 (P), ElecEng 310 (C)
ElecEng 354	Digital Logic	3	CompSci 201 (P) or 240 (P) or 250 (P)
ElecEng 361	Electromagnetic Fields	3	Phys 210 or 220(P), ElecEng 234 (P), grade C or better in Math 233
ElecEng 362	Electromechanical Energy Conversion	4	ElecEng 305 (P), ElecEng 361(P)
ElecEng 367	Introduction to Microprocessors	4	CompSci 240(P) or 250(201)(P) & C or better in ElecEng 354(P)
ElecEng 420	Random Signals and Systems	3	Jr St, ElecEng 310(P)
ElecEng 595	Capstone Design Project	4	Sr St, ElecEng 335 (P), ElecEng 367 (P)

****Mathematics (14 -16 credits)**

One of the following Calculus sequences must be completed:			(16 credits typical: Math 231,232,233, ElecEng 234)
Math 231-232-233		12	Math placement score, or previous course with at least "C" grade.
Or Math 221- 222 (Honors)		10	"C" grade.
And ElecEng 234 (Analytical Methods in Engineering)		4	Math 232 (P) with at least "C" grade

****Chemistry (5 credits)**

One of the following courses must be completed:			Chem 100 with "C" grade or Chemistry placement test
Chem 102 or Chem 105			

Physics (8 10 credits)

Physics 219 - 220 (recommended)	10	Physics 209 & 219; Math 232 (C) Phys 210 & 220; Math 233 (C)
Physics 209 - 210 & 214 - 215	10	Physics 214; Physic 209 (C) Physics 215; Physics 210 (C)

General Education Requirements

Distribution Requirements (15 credits)

Art	3	none
Humanities	3	none
Social Science	6	none
English 310 Writing, Speaking and Technoscience in the 21st Century	3	English competency

Cultural Diversity - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.

Free Electives

23

Competency Requirements

***English Composition (0-6 credits)**

The English Composition requirement is satisfied by:

1. Earning a satisfactory score on the English placement test, **or**
2. Earning a grade of C or higher in English 102, **or**
3. Transferring with a grade of C or better in a course (3 credits or more) equivalent to English 102 or higher level expository writing course

Foreign Language (0-8 credits) (for new freshman starting fall 1999)

The foreign language requirement can be completed with one of these options:

1. Two years of a single foreign language in high school
2. Two semesters of a single foreign language in college
3. Demonstrate ability by examination

*** Advancement to Major:** 1. Complete a minimum of 24 credits required for major. (Excludes: general education, prerequisite and orientation courses). 2. Complete Math 232 (or 222) with "C" or better grade. 3. Complete EAS 200 Professional Seminar. 4. Complete the English composition requirement. 5. Obtain a 2.5 GPA in all courses in item 1. **The program may impose major status as a prerequisite for courses numbered 300 or above.**

**** Placement Examinations:** Students without previous college level credits in Math, Chemistry or English may be required to take placement exams. The results of these tests determine the appropriate course in which to register. Background prerequisite courses may be required in addition to the courses listed above.

Technical Electives--Electrical Engineering Major.

The electrical engineering program requires a total of **21-24** credits of technical electives, chosen as follows.

Group A Technical Electives: Select at least **15-18** credits. All non-required Electrical Engineering courses number 400-699 are Group A Technical Electives.

		<u>Credits</u>	<u>Prerequisite</u>
EAS 001	Co-op Work Period	3 ¹	Prior cons co-op dir
EAS 497	Study Abroad	3 ²	Acceptance to Study Abroad Prog; cons CEAS assoc dean
ElecEng 410	Principles of Discrete Systems & Digital Signal Processing	3	Jr St, ElecEng 310(P)
ElecEng 421	Communication Systems	3	ElecEng 335(C)
ElecEng 436	Introduction of Medical Instrumentation	3	Jr St, ElecEng 330(P)
ElecEng 437	Introduction to Biomedical Imaging	3	Sr St, ElecEng 310(P)
ElecEng 451	Introduction to VLSI Design	3	Jr St, ElecEng 330(P), 354(P)
ElecEng 457	Digital Logic Laboratory	3	Jr St, ElecEng 330(P), 354(P)
ElecEng 458	Computer Architecture	3	Jr. St., ElecEng 354(P), CS 315(P) or EE 367(P)
CompSci 459	Fundamentals of Computer Graphics	3	Jr St, CompSci 217(P), CompSci 252(P)
ElecEng 461	Microwave Engineering	3	Jr St, ElecEng 361(P)
ElecEng 462	Antenna Theory	3	Jr St, ElecEng 361(P)
ElecEng 464	Fundamentals of Photonics	3	Jr St, ElecEng 361(P)
ElecEng 465	Broadband Optical Networks	3	Jr St, ElecEng 305(P), 361(P)
ElecEng 471	Electric Power Systems	3	Jr St, ElecEng 362(P)
ElecEng 474	Introduction to Control Systems	4	Jr St, ElecEng 310(P) or CivEng 202 or cons instr
ElecEng 482	Introduction to Nanoelectronics	3	Jr St, ElecEng 330(C), 361(C)
ElecEng 490	Special Topics	1-3	Jr St
CompSci 520	Computer Networks	3	Jr St, CompSci 315(P) or 458(P) or ElecEng 367(P)
CompSci 530	Computer Networks Laboratory	3	Jr St, CompSci 520(P)
ElecEng 541	Integrated Circuits and Systems	3	Jr St, ElecEng 330(P)
ElecEng 545	FPGA Embedded CPUs & Firmware Development	3	Jr St, ElecEng 367(P) & 457(P)
ElecEng 562	Telecommunication Circuits	3	Sr St, ElecEng 330(P)
ElecEng 565	Optical Communication	3	Sr St, ElecEng 361(P), 330(P) or 465(P)
ElecEng 572	Power Electronics	3	Sr St, ElecEng 335(C)
ElecEng 574	Intermediate Control Systems	3	Sr St, ElecEng 474(402)(P) or MechEng 474(P)
ElecEng 575	Analysis of Electric Machines and Motor Drives	3	Jr St, ElecEng 330 (P), 362 (P)
ElecEng 588	Fundamentals of Nanotechnology	3	Jr St, ElecEng 361(P)
ElecEng 599	Senior Thesis	3	Sr St, Cons Instr
ElecEng 699	Independent Study	1-3	Jr St, Cons Instr
Ind Eng 360	Engineering Economic Analysis	3	Jr St
Matl 481	Electronic Materials	3	Jr St, MatlEng 201(P)
MechEng 321	Basic Heat Transfer	4	Jr St, MechEng 301(P)
BusAdm 447	Entrepreneurship	3	Jr St, Bus Adm 350(P)

Group B Technical Electives: Choose no more than 6 credits from the following list.

Any Mathematics course 400-level or above, or Math 313, Math 321, or Math 322

Any Chemistry course 200-level or above, or Chem 104³

Any Physics course 300-level or above, **or Phy 214, or Phy 215**

Any Biology course 150-level or above

Any Atmospheric Sciences course 100-level or above

Any Computer Science course 200-level or above

¹Students who earn **3 or more** credits of Co-op may use 3 of those credits as approved technical electives.

²Students who earn **3 or more** credits of Study Abroad may use 3 of those credits as approved technical electives.

³Students who take Chem 102 and 104 (equaling a min. of 8 credits) may use up to **3** credits of Chem 104 as Group B technical electives.

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NEW COMPUTER ENGINEERING CURRICULUM

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Computer Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

Engineering Core Courses (12-13 credits)

		<u>Credits</u>	<u>Prerequisite</u>
EAS 200	Professional Seminar	1	None
CompSci 250	Introductory Computer Programming	3	Math 116 (P) or Math 211 (P)
ElecEng 301	Electrical Circuits I	3	Physic 210 (C)
Ind Eng 467	Intro Statistics for Physical Science and Engineering	3	Jr St, Math 233 (P)
MechEng 101	Computational Tools for Engineers	2	Math 231 (C) or 221 (C)
or CompSci 240	Introduction to Engineering Programming	3	Math 116 (P)

Computer Engineering Major (55 credits)

CompSci 251	Intermediate Computer Programming	3	CompSci 250 (P)*, Math 116 (P) or Math 211 (P)
ElecEng 305	Electrical Circuits II	4	ElecEng 301 (P), ElecEng 234 (P)
ElecEng 310	Signals and Systems	3	ElecEng 305 (C)
CompSci 317	Discrete Information Structures	3	CompSci 250 (P)*, Math 231 (P)*
ElecEng 330	Electronics I	4	ElecEng 305 (C)
ElecEng 335	Electronics II	4	ElecEng 330 (P), ElecEng 310 (C)
CompSci 337	Systems Programming	3	CompSci 251 (P)*
CompSci 351	Programming Data Structures	3	CompSci 251 (P)*
ElecEng 354	Digital Logic	3	CompSci 151 (P) or 152 (P) or 153 (P) or 201 (P) or 315 (P)
CompSci 361	Introduction to Software Engineering	3	CompSci 251 (P)*, GER English competency
ElecEng 367	Introduction to Microprocessors	4	ElecEng 354 (P)*, CompSci 240 (P) or 250 (P)
CompSci 395	Social, Professional, and Ethical Issues	3	Soph St
ElecEng 457	Digital Logic Laboratory	3	Jr St, ElecEng 330 (P), 354 (P)
CompSci 458	Computer Architecture	3	Jr St; ElecEng 354 (P), CompSci 315(P) or ElecEng 367 (P)
CompSci 520	Computer Networks	3	Jr St; CompSci 315 (P) or 458 (P) or ElecEng 367(P)
CompSci 535	Data Structures and Algorithms	3	Jr St; CompSci 317 (P)*, 351 (P)*
CompSci 537	Introduction to Operating Systems	3	Jr St; CompSci 458 (P) or ElecEng 458 (P), CompSci 337 (P)

* C or better in prerequisites

**Mathematics (14 - 16 credits)

(16 credits typical: Math 231,232,233, ElecEng 234)

One of the following **Calculus** sequences must be completed:

Math 231-232-233	12	Math Placement or previous course with at least "C" grade
Or Math 221-222 (Honors)	10	
And ElecEng 234 Analytical Methods in Engineering	4	Grade of C or better in Math 232 (P)

**Chemistry (5 - 10 credits)

One of the following sequences must be completed:

Chem 105 (5 cr., Suggested) or Chem 102 -104 (10 cr.)	Chem 100 with "C" grade or Chemistry placement test
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Physics (8 credits)

Physics 209 – 210

General Education Requirements (15 credits)

Distribution Requirements

Art	3	none
Humanities	3	none
Social Science	3	none
Commun 105 Business and Professional Communication	3	none
English 310 Writing, Speaking and Technoscience in the 21st Century	3	English competency

Cultural Diversity - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.

Free Electives 0-1

Competency Requirements

****English Composition (0-6 credits)**

The English Composition requirement is satisfied by:

1. Earning a satisfactory score on the English placement test, or
2. Earning a grade of C or higher in English 102

Foreign Language (0-8 credits) (for new freshman starting fall 1999)

The foreign language requirement can be completed with one of these options:

1. Two years of a single foreign language in high school
2. Two semesters of a single foreign language in college
3. Demonstrate ability by examination

Advancement to Major Requirements

1. Complete a minimum of 24 required credits (Excludes: general education, prerequisite and orientation courses). 2. Complete Math 232 (or 222) with a "C" or better grade. 3. Complete EAS 200 Professional Seminar. 4. Complete the English composition requirement. 5. Obtain a minimum cumulative grade point in all courses in item 1 of a 2.33. Pre-Engineering students may apply for major status with their academic advisor at any time they believe they meet the requirements. Advancement to major is a graduation requirement. Programs may impose major status as a prerequisite for courses numbered 300 or above.

Technical Electives Computer Engineering Major. (16 credits)

Choose from the following lists.

Group A Technical Elective: Select 9 to 12 credits

All Electrical Engineering and Computer Science courses numbered 300-699 that are not explicitly listed as Engineering Core, Computer Engineering Major, Group B Technical Elective, or Group C Technical Electives

		<u>Credits</u>	<u>Prerequisites</u>
CompSci 315	Intro to Comp Organization & Assembly Language Programming	3	CompSci 250(P); Math 211(P) or 231(P)
ElecEng 361	Electromagnetic Fields	3	Physics 210(P), ElecEng 234(P), Math 233(P)*
ElecEng 362	Electromechanical Energy Conversion	3	ElecEng 305(P), 361(P)
ElecEng 410	Principles of Discrete Systems & Digital Signal Processing	3	Jr St, ElecEng 310(P)
CompSci 417	Introduction to the Theory of Computation	3	CompSci (P) 317*, Math 221(P) or 232(P)
ElecEng 420	Random Signals and Systems	3	Jr St, ElecEng 310 (P)
ElecEng 421	Communication Systems	3	ElecEng 335(C)
CompSci 422	Introduction to Artificial Intelligence	3	CompSci 317(P)*, 351(P)*
CompSci 423	Introduction to Natural Language Processing	3	CompSci 351(P)*
CompSci 425	Introduction to Data Mining	3	Jr St; CompSci 251(P), Math 232(P)
ElecEng 429	Wireless Communication Systems	3	Jr St, ElecEng 234(P)
CompSci 431	Programming Languages Concepts	3	CompSci 351(P)*
ElecEng 436	Introduction of Medical Instrumentation	3	Jr St, ElecEng 330(P)
ElecEng 437	Introduction to Biomedical Imaging	3	Sr St, ElecEng 310 (P)
CompSci 438	Software Engineering Lab	1-3	Jr. St, CompSci 251 (P)*
ElecEng 438	Bioanalytics and Biomedical Diagnostics	3	Sr St; ElecEng 310 (P), 330 (P)
CompSci 444	Intro to Text Retrieval and Its Applications in Biomedicine	3	Jr St; CompSci 351 (P)
ElecEng 451	Introduction to VLSI Design	3	Jr St, ElecEng 330(P), 354(P)
CompSci 459	Fundamentals of Computer Graphics	3	Jr St, CompSci 251 (P), Math 232(P)
ElecEng 461	Microwave Engineering	3	Jr St, ElecEng 361 (P)
ElecEng 462	Antenna Theory	3	Jr St, ElecEng 361(P)
ElecEng 464	Fundamentals of Photonics	3	Jr St, ElecEng 361(P)
ElecEng 465	Broadband optical networks	3	Jr St, ElecEng 305(P), 361(P)
CompSci 469	Introduction to Computer Security	3	CompSci 251(P)*, 317(P)*
ElecEng 474	Introduction to Control Systems	4	Jr St, ElecEng 310(P), Civ Eng 202 or cons instr
ElecEng 482	Introduction to Nanoelectronics	3	Jr st; ElecEng 330 (C) 361(C)
ElecEng 490	Special Topics	1-3	Jr St
CompSci 511	Symbolic Logic	3	Jr St, Phils 212 (P) or 6 cr Math at the 300-level
CompSci 530	Computer Networks Laboratory	3	CompSci 520
CompSci 536	Software Engineering	3	Jr st; CompSci 251 (P)*
ElecEng 537	Fundamentals of Neuroimaging Technology	3	Sr st; ElecEng 437 (P)
ElecEng 539	Introduction to Magnetic Resonance Imaging	3	Jr st, ElecEng 310(P), 361(P)
ElecEng 541	Integrated Circuits and Systems	3	Jr St, ElecEng 330(P)
CompSci 552	Object Oriented Programming	3	CompSci 351(P)*, 361(P)*
CompSci 557	Introduction to Database Systems	3	CompSci 315(P), 251(P)
ElecEng 561	Microwave Solid State Circuit Design	3	Sr St, ElecEng 330(P)
ElecEng 562	Telecommunication Circuits	3	Sr St, ElecEng 330(P)
ElecEng 563	Compound Semiconductor Devices and Circuits	3	Sr St, ElecEng 335(P)
ElecEng 565	Optical Communication	3	Sr St, ElecEng 361(P), 330(P) or 465(P)
ElecEng 572	Power Electronics	3	Sr. St, ElecEng 335(C)
ElecEng 574	Intermediate Control Systems	3	Sr St, MechEng 474 or ElecEng 474
ElecEng 575	Analysis of Electric Machines and Motor Drives	3	Jr St, ElecEng 330(P) & 362(P)
ElecEng 588	Fundamentals of Nanotechnology	3	Jr St, ElecEng 361(P)
CompSci 654	Introduction to Compilers	4	CompSci 431(P), 655 (C)
CompSci 655	Compiler Implementation Laboratory	3	Jr St, CompSci 431 (P), 654 (C) or 754 (C)
CompSci 657	Topics in Computer Science	1-4	variable
CompSci 699	Independent Study	1-3	variable
ElecEng 699	Independent Study	1-3	variable
Ind Eng 475	Simulation Methodology	3	Ind Eng 467(P)
Ind Eng 572	Reliability Engineering	3	Jr St, Ind Eng 467(P)

*C or better in prerequisite.

Group B Technical Elective: Choose 4 credits from the following list.

ElecEng 595	Capstone Design Project	4	Sr. St., ElecEng 335(P), ElecEng 367(P)
CompSci 595	Capstone Design Project	4	Sr. St., CompSci 458(P), 536(P)

Group C Technical Electives: Select 0 to 3 credits from the following list.

CompSci 481	Server-side Internet Programming	3	CompSci 251(P); CompSci 113(P) or 581(P)
CompSci 482	Rich Internet Applications	3	CompSci 251(P); CompSci 113(P) or 581(P)
CompSci 581	Web Languages and Standards	3	CompSci 431(P), 417(P)
CompSci 658	Topics in Applied Computing	3	Jr. St.
ElecEng 471	Electrical Power Systems	3	Jr. St.; ElecEng 362 (C)
ElecEng 472	Intro to Wind Energy	3	Jr. St.
Bio Sci 150	Foundations of Biology I	4	Chem Placement Code 30; or C or better Chem 100 (P)
Bio Sci 152	Foundations of Biology II	4	Bio Sci 150 (P)
Bus Adm 292	Intro to Entrepreneurship and Small Business Foundation	3	Soph. St.
Bus Adm 447	Entrepreneurship	3	Jr. St., Bus Adm 350 (P)
EAS 001	Co-op Work Period	3 ¹	none
EAS 497	Study Abroad	1-3	none
English 206	Technical Writing	3	GER English Composition
Ind Eng 360	Engineering Economic Analysis	3	Jr.St.
MatlEng 201	Engineering Materials	4	Chem 102 or 105
MatlEng 481	Electronic Materials	3	MatlEng 201
MechEng 301	Basic Engineering Thermodynamics	3	Math 233, Physics 209(P)
MechEng 321	Basic Heat Transfer	4	Jr. St., MechEng 301
MechEng 542	Introduction to Technology Entrepreneurship	3	Jr. St., Admission to major
MechEng 543	Introduction to Technology Management and Innovation	3	Jr. St., Admission to major

¹Students who earn 3 or more credits of Co-op may use 3 of those credits as approved technical electives.

University of Wisconsin – Milwaukee

College of Engineering and Applied Science

CURRENT COMPUTER ENGINEERING CURRICULUM

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Computer Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

Engineering Core Courses (10 credits)

		<u>Credits</u>	<u>Prerequisite</u>
EAS 200	Professional Seminar	1	None
CompSci 201	Introductory Computer Programming	3	Math 116 (C) or Math 211 (C)
ElecEng 301	Electrical Circuits I	3	Physic 210 (C)
IndEng 360	Engineering Economic Analysis	3	Jr St

Computer Engineering Major (55 credits)

CompSci 251	Intermediate Computer Programming	3	CompSci 201 (P)*, Math 116 (P)
ElecEng 305	Electrical Circuits II	4	ElecEng 301 (P), ElecEng 234 (P)
ElecEng 310	Signals and Systems	3	ElecEng 305 (C)
CompSci 317	Discrete Information Structures	3	CompSci 201 (P)*, Math 231 (P)*
ElecEng 330	Electronics I	4	ElecEng 305 (C)
ElecEng 335	Electronics II	4	ElecEng 330 (P), ElecEng 310 (C)
CompSci 337	Systems Programming	3	CompSci 251 (P)*
CompSci 351	Programming Data Structures	3	CompSci 251 (P)*
ElecEng 354	Digital Logic	3	CompSci 151 (P) or 152 (P) or 153 (P) or 201 (P) or 315 (P)
CompSci 361	Introduction to Software Engineering	3	CompSci 251 (P)*, GER English competency
ElecEng 367	Introduction to Microprocessors	4	ElecEng 354 (P)*, CompSci 151 (P) or 201 (P)
CompSci 395	Social, Professional, and Ethical Issues	3	Soph St
ElecEng 457	Digital Logic Laboratory	3	Jr St, ElecEng 330 (P), 354 (P)
CompSci 458	Computer Architecture	3	Jr St; ElecEng 354 (P), CompSci 315(P) or ElecEng 367 (P)
CompSci 520	Computer Networks	3	Jr St; CompSci 315 (P) or 458 (P) or ElecEng 367(P)
CompSci 535	Data Structures and Algorithms	3	Jr St; CompSci 317 (P)*, 351 (P)*
CompSci 537	Introduction to Operating Systems	3	Jr St; CompSci 458 (P) or ElecEng 458 (P), CompSci 337 (P)

* C or better in prerequisites

**Mathematics (14 - 16 credits)

One of the following Calculus sequences must be completed:		(16 credits typical: Math 231,232,233, ElecEng 234)
Math 231-232-233	12	Math Placement or previous course with at least "C" grade
Or Math 221-222 (Honors)	10	
And ElecEng 234 Analytical Methods in Engineering	4	Grade of C or better in Math 232 (P)

**Chemistry (5 - 10 credits)

One of the following sequences must be completed:	
Chem 105 (5 cr., Suggested) or Chem 102 -104 (10 cr.)	Chem 100 with "C" grade or Chemistry placement test

Physics (8 credits)

Physics 209 – 210

General Education Requirements (15 credits)

Distribution Requirements

Art	3	none
Humanities	3	none
Social Science	6	none
English 310 Writing, Speaking and Technoscience in the 21st Century	3	English competency

Cultural Diversity - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.

Free Electives 3

Competency Requirements

****English Composition (0-6 credits)**

The English Composition requirement is satisfied by:

- Earning a satisfactory score on the English placement test, or
- Earning a grade of C or higher in English 102

Foreign Language (0-8 credits) (for new freshman starting fall 1999)

The foreign language requirement can be completed with one of these options:

- Two years of a single foreign language in high school
- Two semesters of a single foreign language in college
- Demonstrate ability by examination

Advancement to Major Requirements

1. Complete a minimum of 24 required credits (Excludes: general education, prerequisite and orientation courses). 2. Complete Math 232 (or 222) with a "C" or better grade. 3. Complete EAS 200 Professional Seminar. 4. Complete the English composition requirement. 5. Obtain a minimum cumulative grade point in all courses in item 1 of a 2.33. Pre-Engineering students may apply for major status with their academic advisor at any time they believe they meet the requirements. Advancement to major is a graduation requirement. Programs may impose major status as a prerequisite for courses numbered 300 or above.

Technical Electives Computer Engineering Major. (16 credits)

Choose from the following lists.

Group A Technical Elective: Select 9 to 12 credits

All Electrical Engineering and Computer Science courses numbered 300-699 that are not explicitly listed as Engineering Core, Computer Engineering Major, Group B Technical Elective, or Group C Technical Electives

		<u>Credits</u>	<u>Prerequisites</u>
CompSci 315	Intro to Comp Organization & Assembly Language Programming	3	CompSci 151(P) or 201(P); Math 211(P) or 231(P)
ElecEng 361	Electromagnetic Fields	3	Physics 210(P), ElecEng 234(P), Math 233(P)*
ElecEng 362	Electromechanical Energy Conversion	3	ElecEng 305(P), 361(P)
ElecEng 410	Principles of Discrete Systems & Digital Signal Processing	3	Jr St, ElecEng 310(P)
CompSci 417	Introduction to the Theory of Computation	3	CompSci (P) 317*, Math 221(P) or 232(P)
ElecEng 420	Random Signals and Systems	3	Jr St, ElecEng 310 (P)
ElecEng 421	Communication Systems	3	ElecEng 335(C)
CompSci 422	Introduction to Artificial Intelligence	3	CompSci 317(P)*, 351(P)*
CompSci 423	Introduction to Natural Language Processing	3	CompSci 351(P)*
CompSci 425	Introduction to Data Mining	3	Jr St; CompSci 251(P), Math 232(P)
ElecEng 429	Wireless Communication Systems	3	Jr St, ElecEng 234(P)
CompSci 431	Programming Languages Concepts	3	CompSci 351(P)*
ElecEng 436	Introduction of Medical Instrumentation	3	Jr St, ElecEng 330(P)
ElecEng 437	Introduction to Biomedical Imaging	3	Sr St, ElecEng 310 (P)
CompSci 438	Software Engineering Lab	1-3	Jr. St, CompSci 251 (P)*
ElecEng 438	Bioanalytics and Biomedical Diagnostics	3	Sr St; ElecEng 310 (P), 330 (P)
CompSci 444	Intro to Text Retrieval and Its Applications in Biomedicine	3	Jr St; CompSci 351 (P)
ElecEng 451	Introduction to VLSI Design	3	Jr St, ElecEng 330(P), 354(P)
CompSci 459	Fundamentals of Computer Graphics	3	Jr St, CompSci 251 (P), Math 232(P)
ElecEng 461	Microwave Engineering	3	Jr St, ElecEng 361(P)
ElecEng 462	Antenna Theory	3	Jr St, ElecEng 361(P)
ElecEng 464	Fundamentals of Photonics	3	Jr St, ElecEng 361(P)
ElecEng 465	Broadband optical networks	3	Jr St, ElecEng 305(P), 361(P)
CompSci 469	Introduction to Computer Security	3	CompSci 201(P)*, 317(P)*
ElecEng 474	Introduction to Control Systems	4	Jr St, ElecEng 310(P), Civ Eng 202 or cons instr
ElecEng 482	Introduction to Nanoelectronics	3	Jr st; ElecEng 330 (C) 361(C)
ElecEng 490	Special Topics	1-3	Jr St
CompSci 511	Symbolic Logic	3	Jr St, Phils 212 (P) or 6 cr Math at the 300-level
CompSci 530	Computer Networks Laboratory	3	CompSci 520
CompSci 536	Software Engineering	3	Jr st; CompSci 251 (P)*
ElecEng 537	Fundamentals of Neuroimaging Technology	3	Sr st; ElecEng 437 (P)
ElecEng 539	Introduction to Magnetic Resonance Imaging	3	Jr st, ElecEng 310(P), 361(P)
ElecEng 541	Integrated Circuits and Systems	3	Jr St, ElecEng 330(P)
CompSci 552	Object Oriented Programming	3	CompSci 351(P)*, 361(P)*
CompSci 557	Introduction to Database Systems	3	CompSci 315(P), 251(P)
ElecEng 561	Microwave Solid State Circuit Design	3	Sr St, ElecEng 330(P)
ElecEng 562	Telecommunication Circuits	3	Sr St, ElecEng 330(P)
ElecEng 563	Compound Semiconductor Devices and Circuits	3	Sr St, ElecEng 335(P)
ElecEng 565	Optical Communication	3	Sr St, ElecEng 361(P), 330(P) or 465(P)
ElecEng 572	Power Electronics	3	Sr. St, ElecEng 335(C)
ElecEng 574	Intermediate Control Systems	3	Sr St, MechEng 474 or ElecEng 474
ElecEng 575	Analysis of Electric Machines and Motor Drives	3	Jr St, ElecEng 330(P) & 362(P)
ElecEng 588	Fundamentals of Nanotechnology	3	Jr St, ElecEng 361(P)
CompSci 654	Introduction to Compilers	4	CompSci 431(P), 655 (C)
CompSci 655	Compiler Implementation Laboratory	3	Jr St, CompSci 431 (P), 654 (C) or 754 (C)
CompSci 657	Topics in Computer Science	1-4	variable
CompSci 699	Independent Study	1-3	variable
ElecEng 699	Independent Study	1-3	variable
Ind Eng 475	Simulation Methodology	3	Ind Eng 467(P)
Ind Eng 572	Reliability Engineering	3	Jr St, Ind Eng 467(P)

*C or better in prerequisite.

Group B Technical Elective: Choose 4 credits from the following list.

ElecEng 595	Capstone Design Project	4	Sr. St., ElecEng 335(P), ElecEng 367(P)
CompSci 595	Capstone Design Project	4	Sr. St., CompSci 458(P), 536(P)

Group C Technical Electives: Select 0 to 3 credits from the following list.

CompSci 481	Server-side Internet Programming	3	CompSci 251(P); CompSci 113(P) or 581(P)
CompSci 482	Rich Internet Applications	3	CompSci 251(P); CompSci 113(P) or 581(P)
CompSci 581	Web Languages and Standards	3	CompSci 431(P), 417(P)
CompSci 658	Topics in Applied Computing	3	Jr. St.
ElecEng 471	Electrical Power Systems	3	Jr. St.; ElecEng 362 (C)
ElecEng 472	Intro to Wind Energy	3	Jr. St
Bio Sci 150	Foundations of Biology I	4	Chem Placement Code 30; or C or better Chem 100 (P)
Bio Sci 152	Foundations of Biology II	4	Bio Sci 150 (P)
Bus Adm 292	Intro to Entrepreneurship and Small Business Foundation	3	Soph. St.
Bus Adm 447	Entrepreneurship	3	Jr. St., Bus Adm 350 (P)
EAS 001	Co-op Work Period	3 ¹	none
EAS 497	Study Abroad	1-3	none
English 206	Technical Writing	3	GER English Composition
Ind Eng 467	Intro Statistics for Phy Sci and Engineering	3	Jr.St., Math 233 (P)
MatlEng 201	Engineering Materials	4	Chem 102 or 105
MatlEng 481	Electronic Materials	3	MatlEng 201
MechEng 301	Basic Engineering Thermodynamics	3	Math 233, Physics 209(P)
MechEng 321	Basic Heat Transfer	4	Jr. St., MechEng 301

¹Students who earn 3 or more credits of Co-op may use 3 of those credits as approved technical electives.

Action **CHANGE**
Major **Computer Science**

UW-MILWAUKEE ONLINE PROGRAM CHANGE FORM

I. Current

Applied Mathematics Electives (Select 6 credits from the following list.)

Math 233	Calculus and Analytic Geometry III	4
ElecEng 234	Analytical Methods in Engineering	4
Math 337	Introduction to Number Theory	3
Math 431	Modern Algebra with Applications	3
Math 451	Axiomatic Geometry	3
MthStat 361	Introduction to Mathematical Statistics I	3
Ind Eng 467	Introductory Statistics for Physical Sciences and Engineering Students	3
Math 234	(Alternative to ElecEng 234)	4
Math 467	(Equivalent to Ind Eng 467)	3

May not include both Math 234 and ElecEng 234.

II. Proposed Change Summary

Add new options Math 240 and Math 320
Remove non-existent course Math 337.

III. Effects

Additional Faculty Required

Four-Year Faculty Needs

Library Resources

Required Additional Facilities and Equipment

Program Costs

Resource Reallocation

IV. Justification

Math 234 covers two topics: linear algebra and differential equations. Math 240 teaches just the first (linear algebra) and Math 320 teaches the second (differential equations). Math 240 has recently been resuscitated and has a low pre-requisite. Its topic, linear algebra, is important for most CompSci students. Some students could also use differential equations, so we would like to add Math 320 as another possible elective. (Students are not allowed to take both Math 240 and Math 234.)

V. New Copy

Applied Mathematics Electives (Select 6 credits from the following list.)

Math 233	Calculus and Analytic Geometry III	4
ElecEng 234	Analytical Methods in Engineering	4
Math 240	Matrices and Applications	3
Math 320	Introduction to Differential Equations	3

Math 431	Modern Algebra with Applications	3
Math 451	Axiomatic Geometry	3
MthStat 361	Introduction to Mathematical Statistics I	3
Ind Eng 467	Introductory Statistics for Physical Sciences and Engineering Students	3
Math 234	(Alternative to ElecEng 234)	4
Math 467	(Equivalent to Ind Eng 467)	3
May include only one of Math 240, Math 234 and ElecEng 234.		
May include only one of Math 320, Math 234 and ElecEng 234.		

VI. Proposed Effective Date **Spring 2016**

VII. Comment

**The effective date is early because Math would like to teach
Math 240 in Spring.**

VIII. Approval

Vice Chancellor's Signature _____

Date _____

Industrial and Manufacturing Engineering Curriculum Change

The Industrial and Manufacturing Engineering department has approved to replace COMPSCI 250 with COMPSCI 240-Introduction to Engineering Programming in the IME Curriculum.

Rationale:

This is necessary due to course changes in Computer Science Department.