Mechanical Engineering
UNIVERSITY OF COLORADO **BOULDER**

Undergraduate Advising Guide for Mechanical Engineering - AY 2017-2018


Department of Mechanical Engineering
UCB 427, ECME Wing
Boulder, CO 80309-0428
http://colorado.edu/mechanical

Claire Colvin, Undergraduate Academic Advisor Student Last Name A-G
Office: ECME 112D Ph. 303-492-8753

Debbie Yeh, Undergraduate Academic Advisor Last Name H - P
Office: ECME 112B Ph. 303-492-9180

Kat McConnell, Undergraduate Academic Advisor Student Last Name Q-Z
Office: ECME 112A Ph. 303-492-8483

Vera Sebulsky, Graduate Academic Advisor BS/MS, MS, PhD Students
Office: ECME 112C Ph. 303-492-7444

Table of Contents

Introduction & Mission Statement 1

Program Educational Objectives 1

Accreditation and Assessment 2

Employment Opportunities for Mechanical Engineering Graduates 2

Academic Advising 3

Transfer Procedures 4

Additional Advising Resources 4
- Career Counseling 5

Graduation Requirements 5

Biomedical, Environmental Tracks and Professionalism Requirement 6-7

Additional Educational Opportunities 8
- Independent Study and Undergraduate Research 8
- Concurrent BS/MS Program 8
- Discovery Learning Apprenticeships 8
- Double Degrees 8
- Minors 9
- Study Abroad 9
- Student Societies 9

MCEN Policy on Academic Integrity 9

MCEN Curriculum and Block Diagrams 10
- MCEN Options 11-12
- MCEN Blue Version 13
- MCEN Yellow Version 14

Introduction and Mission of the Department

The purpose of this guide is to assist undergraduate students majoring in Mechanical Engineering (MCEN) to fulfill the curriculum requirements for the Bachelor of Science (BS) degree. These requirements are structured to comply with College of Engineering and Applied Science rules and to maintain our accreditation, in compliance with the rules of the Engineering Accreditation Commission of ABET (www.abet.org).

Our mission is "to provide the excellent education, research, and service necessary to train the engineer of the new century, to advance the state of the art of engineering science and technology, and to provide advice and counsel to the state, region, nation, and the world."

Through incorporating mathematics, physical science, engineering science, design and manufacturing, and systems engineering with the humanities and social sciences, you will learn how to lead, innovate, understand and interpret the complex world around you.

The student is responsible for adherence to the MCEN curriculum rules and requirements and should be aware that deviation from the planned sequence of courses may result in delayed graduation.

Copies of the curriculum, a course checklist, and a graphical flow chart are contained in this document. Alternatively, you may elect to follow a personalized revision to the curriculum in its entirety. If you decide to follow a revised or customized curriculum, you must inform your academic advisor first.

Program Educational Objectives and Student Outcomes

Mechanical engineering is a broad engineering discipline that incorporates skills and expertise in the areas of design, manufacturing, mechanics and thermal sciences that are essential to most sectors of industry.

Within the first three years after graduation, our alumni will have built on the educational foundation gained through our program by establishing themselves in professional careers and/or pursuing a graduate degree. In addition, within these three years, our alumni should have begun to generate new knowledge and/or exercise leadership in their positions.

Each graduate of the mechanical engineering program is expected to:

1. Apply knowledge of mathematics, science and engineering
2. Design and conduct experiments, including the use of probability and statistics
3. Analyze and interpret data
4. Design systems, components or processes to meet desired needs
5. Function effectively on multidisciplinary teams
6. Identify, formulate and solve engineering problems
7. Demonstrate professional conduct in academic and workplace environment
8. Understand professional and ethical responsibility
9. Demonstrate effective oral and written communication skills
10. Understand the impact of engineering in a global and societal context
11. Engage in lifelong learning
12. Understand contemporary issues in mechanical engineering
13. Use computers to solve engineering problems
14. Use modern instrumentation
15. Understand the processes used to manufacture products

Accreditation and Assessment

The Bachelor of Science degree in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET. Accreditation involves a process of continuous improvement using a series of assessment tools that measure how well the program is achieving its stated outcomes and objectives. As a student, you can expect to take part in the following evaluations during (and after) your academic career at CU:

- **Faculty Course Questionnaire (FCQ)** – You will evaluate and provide feedback in every course you take at CU at the end of every semester.
- **Fundamentals of Engineering (FE) Exam** – This national exam is the first step toward professional registration as an engineer. All MCEN students are required to take the exam prior to graduation, with the exception of those who have taken the GRE, LSAT, MCAT or other professional exam. Most students take the FE exam during their last semester at CU.
- **Senior Exit Survey** – In your last semester, you will be asked to fill out a survey administered by the College that asks how well the outcomes listed above were met, and your overall satisfaction with the program, department, faculty, etc.
- **Alumni Survey** – We will send you a survey five years after graduation to evaluate if we met the program educational objectives.

Employment Opportunities for Mechanical Engineering Graduates

Mechanical engineers use the principles of mechanics and energy conservation to design, manufacture and test mechanical devices. We develop power-producing and power-using machines as well as new materials and manufacturing processes. We work in other diverse areas such as medicine, law, management, and sales.

Many mechanical engineers work in various fields of design, research and manufacturing such as, aerospace and automotive industries, design and consulting firms, manufacturing and plant operations, power generation, alternative energy and conservation firms, bioengineering firms, petroleum industry and transportation firms.

With advanced degrees, mechanical engineers can pursue careers in academics, engineering consulting, research laboratories, and technology development in a wide range of engineering disciplines.

Recent employers of CU ME graduates:

- Covidien
- Goodyear Tire
- Hewlett Packard
- Honda
- Ball Aerospace & Technologies
- ABSL Space Products
- Lockheed Martin
- Schlumberger
- National Renewable Energy Laboratory
- National Institute for Standards and Technology

Academic Advising

A) Advising Office Hours: In general, advisors are available between 9 am and 4 pm for individual or drop in advising. Many afternoons, Monday through Friday, 1pm - 4pm will be available for drop-in advising.
   - Appointments with your assigned advisor can also be schedule through MyCuHub: http://www.colorado.edu/mycuhub/ or by emailing your advisor.
   - Drop-in and appointment hours are subject to change and advisors will either notify students via email, or post on their doors any changes to this schedule.

B) The Advisors in mechanical engineering are here to support you and have a true commitment to helping you navigate the department and curriculum to help you succeed. However, you the student are ultimately responsible for ensuring that all graduation requirements have been satisfied, and for seeking out the advice and help you need.

C) **Holds**: **You are required to meet with an advisor every term.** Advising holds will be placed each term prior to the next term's registration. If you have a hold on your account, you need to have that resolved before we can enroll you in a class, or before you can enroll yourself. Advising holds are also place on student accounts in response to academic probation or suspension issues.

D) **E-mail Policy: All e-mails will be sent to your @colorado.edu email account. This is the official form of communication for the university. PLEASE check your CU email frequently.**

E) Petitions: Any exceptions or waivers to departmental or College rules must have prior approval by petition. This petition must be completed and submitted to your advisor for departmental approval and then it will be forwarded to the Dean's Office for approval. Petitions can be used for the following, but not limited to:
   * taking less than 12 credits for any semester
   * enrolling in a course without proper prerequisites
   * to ensure that courses taken elsewhere will count towards degree requirements
   * to use a substitution for a required course

F) There are a number of decisions to be made concerning choice of elective courses. If you have any questions or would like to discuss elective choices, you should consult your academic advisor

G) Block diagrams and graduation planners for each program, as well as the Environmental and Biomedical options, are included in this guide. Each student is responsible for keeping his or her graduation planner up-to-date.

H) Most, but not all courses are offered every semester. Those that are only offered once per year are marked on the block diagrams with an "F" or "Sp" to denote the Fall and/or Spring sequencing.

I) The minimum course load for full time enrollment is 12 credit hours. The maximum course load is 19 credit hours. Variation must be requested by petition to the college. After 18 credit hours, a tuition surcharge is applied.

For more information about departmental policies and procedures, please visit your academic advisor:

- Claire Colvin - ECME 112d; Debbie Yeh – ECME 112b; Kat McConnell - ECME 112a
- Vera Sebulsky – ECME 112c

Transfer Procedures and Advising

The University and College of Engineering have established procedures for admission of transfer students and evaluation of transfer credits. These policies are described on the undergraduate admissions website: http://admissions.colorado.edu/undergraduate/apply/transfer. However, once a student is admitted and transfer credits have been evaluated by the University, the MCEN Department is responsible for the final evaluation of the application of transfer credits to degree requirements and not all credits that transfer to the university are transferrable into the MCEN degree.

The following recommendations are offered:

A) It is the student's responsibility to ensure that transfer credits have been evaluated and approved by the Office of Admissions as well as the MCEN department.
B) Newly admitted transfer students should make an appointment with their respective MCEN academic advisor as soon as possible to obtain final approval of transfer credits. If there is additional information needed, the student will need to follow the department petition process to evaluate individual transfer credits that did not initially apply to his/her degree and supply the appropriate documentation for the petition process in a timely manner.
C) Transfer credit issues can also arise for current students who take one or more courses at other institutions during their academic career, e.g., study abroad programs or summer school at a local community college. Current students who are planning to take courses at another institution should seek preliminary approval of the transfer credits before taking the courses, as the petition and approval process can take a few weeks to fully complete.

Additional Advising Resources

There are many advising resources available at CU-Boulder, but students frequently do not know they exist or hesitate to take advantage of them:

College of Engineering Advising Guides

The College publishes a comprehensive advising expectations document that outlines what you can expect from your academic advisor. This guide is not intended as a substitute for personal interaction between student and advisor, but can be a great way to get answers to many common questions and concerns.

The following College and University policies can also be found on the College website at http://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies

Academic Honesty
Academic Policies
Academic Probation and Suspension
Classroom and Course-Related Behavior
Confirming Your Major
Four-Year Graduation Guarantee
Grading Policies Grade
Appeal Policy
Graduation Requirements
Humanities & Social Sciences/Writing
Student Conduct Code Policy
Student Honor Code Policy

Career Counseling

Career Services can help students and alumni clarify career interests, values and work-related skills; explore potential careers and employers; and refine job seeking, interviewing, and resume preparation skills. They host Career Fairs and Internship Fairs, sponsor resume writing workshops, and hold mock interview sessions. Career Services is located in the Center for Community (C4C) Room N352, (303) 492-6541, or you may visit their website: http://careerservices.colorado.edu. The College of Engineering and Applied Sciences also has career resources available in the Engineering Center, Room ECST 128.

Graduation Requirements

Failure to complete the requirements listed below will postpone graduation. Any exceptions will require authorization from the MCEN Department and the Dean's Office. Students should meet with their MCEN academic advisor at least each of the last two semesters prior to their planned graduation to review their records. It is the student's responsibility to be certain that all degree requirements have been met, to fill out the on-line diploma card, and to keep their advisor and the Dean's Office informed of any change in graduation plans.

To be eligible to graduate, students must meet the following minimum requirements:

1. The satisfactory completion of the prescribed and elective work in the MCEN BS curriculum. A student must complete a minimum number of 128 semester hours, of which the last 45 shall be earned after admission to the College of Engineering and Applied Science.
2. Maintain minimum Cumulative GPA and major GPA of 2.25 for all courses attempted and for all courses that count toward graduation requirements, excluding P grades for courses taken Pass/Fail. **(Pass/Fail courses do not count for graduation credit.)**
3. Successful completion of all Minimum Academic Preparation Standards (MAPS) requirements.
4. Take the Fundamentals of Engineering (FE) Examination (or aforementioned alternate professional exam - pg 2), fall or spring of the student's senior year is required. Graduation is not contingent upon passing. However, it is beneficial for your career to do so because this exam is the first step toward professional registration.
5. Complete the Professionalism Requirement as dictated by student's requirement term.
6. Submission of a completed Application for Diploma Form, on-line.
7. Complete College of Engineering and Applied Sciences Senior Survey.

Note: Double degree students must obtain approval of **both** designated departments and colleges. The University normally requires that a minimum of an additional 30 semester credit hours be earned for the second degree outside of engineering or 15 credits for a second degree within engineering. However, BOTH degree requirements must be completed. Minor students must provide Engineering Dean's Office with a Minor Completion form to verify minor requirements have been completed.

ME & Technical Elective Requirements

A technical elective is generally a course in engineering or science with technical content, selected in consultation with an advisor or using the approved courses list at the upper (3000+) level. Consult the departmental website for a complete list of eligible courses for the ME program.

Grading Requirements

Beginning with the incoming class of Fall 2015, the minimum passing grade for prerequisite and co-requisite classes in our curriculum is a C. This includes courses completed outside the department (APPM, PHYS, etc.). The minimum passing grade for standalone classes is a D-.

Professionalism Requirement

Initiated in Fall 2009, the Professionalism Institute in the Department of Mechanical Engineering seeks to prepare students to practice engineering as professionals who strive for excellence with integrity and treat others with respect.

Beginning Fall 2013, the requirement consists of an introductory seminar (MCEN2000) as well as a number of supplemental activities. Both the seminar and the supplemental events are made possible by support from Shell, the American Society of Mechanical Engineers, and Career Services.

MCEN2000: ME as a Profession Seminar
The ME as a Profession Seminar serves as a foundation for students in Mechanical Engineering to complete their professionalism requirement. The course material includes three activities (see below) that are specifically required for the ME Buffs Professional Program.
1. Resume
2. Mock Interview
3. Career Advising Session

Additional ME Buffs Professional Requirements
In addition to successfully completing MCEN2000, students are required to participate in four supplemental activities prior to graduation. Approved events will be announced through the mcen-undergrad listserv and posted in the calendar section of the ME Buffs Professional page on D2L.

1. Industry Connections (2) - Events in this category specifically involve interaction with representatives from industry. The goal of the events is to familiarize participants with a variety of different companies/career fields, as well as with the etiquette involved with professional interactions. Examples of approved events would be career fairs, networking nights, and select company info sessions.

2. Professional Development (2) - These events focus on any of a wide range of topics related to professional development. Examples could include presentations related to the environmental impact of technology, workshops focused on developing an effective team, and entrepreneurship events. Because basic job search topics like resume and cover letter writing are already covered in MCEN2000, events focused on those topics will generally not be approved for credit.

In addition to the events posted on D2L, you can request professionalism credit for non-department events by submitting a description to your Academic Advisor for review. The specific events that we are likely to approve include:

- Professional Conferences – presenting a poster/paper, serving on a panel, or attending professionalism related seminar or networking event
- Engineering Student Group Involvement – substantive leadership role
- New Venture Challenge – present a business idea at pitch night
- ROTC – summer trainings can substitute for both of your industry connections events
- Other events unique to your interests that focus on the topics described above

Biomedical Option – detailed courses on pg 11

Biomedical Engineering is the application of engineering technology to medical research and equipment. Contributions to this important and growing area by mechanical engineers include the design and manufacture of biomedical devices ranging from prostheses to micromechanical blood flow sensors and artificial heart valves. Application of mechanical engineering fundamentals to questions in biophysics also contributes to improvements in medical diagnosis and treatment.

The Biomedical Engineering Option consists of the normal requirements for an M.E. bachelor's degree, with the four Technical Electives focused in biomedical engineering. Students interested in pursuing the Biomedical Option must submit a "Change of Major" form detailing their request and will receive a notation on their transcript upon completing the program. Courses not listed on the approved course sheet (detailed further in this document) may be approved by Professor Ginger Ferguson.

Environmental Option – detailed courses on pg 12

The Environmental Option within the Department of Mechanical Engineering focuses on topic areas including pollution detection/control/prevention and environmental aspects of energy conversion. Potential applications of a degree that emphasizes both Environmental and Mechanical Engineering include designing detection equipment, devising clean-up strategies, and improving manufacturing processes.

The Environmental Option consists of the normal requirements for an M.E. bachelor's degree, with Organic Chemistry in place of Physics 3 and the four Technical Electives selected to focus specifically on Environmental Engineering. Students interested in pursuing the Environmental Option must submit a "Change of Major" form detailing their request and will receive a notation on their transcript upon completing the program. Courses not listed below may be approved by Professor Jana Milford.

**Note: both of these options are not a mandatory part of the ME curriculum, rather an option to enhance the BS degree in each specialized field.*

Additional Educational Opportunities

Independent Study and Undergraduate Research

Undergraduates can participate in ongoing research through independent study projects, the Undergraduate Research Opportunities Program (UROP), and as research assistants for sponsored projects. These opportunities promote individual contact with faculty and graduate students, and they provide an educational experience that cannot be obtained in the normal classroom setting.

Up to six (6) semester credit hours of Independent Study is acceptable for Technical Electives.

An Independent Study is normally supervised by a MCEN faculty member. An approved Independent Study supervised by a faculty member outside of the department may also be applied to curriculum requirements as an out-of-department technical elective.

To pursue an independent study, an Independent Study Agreement Form must be completed and signed by both the student and the sponsor of the Independent Study or Undergraduate Research (which includes a written Statement of Work). These forms are available through the College of Engineering Advising webpage or the MCEN Undergraduate academic advisors.

Concurrent BS/MS Program

Mechanical Engineering students who plan to continue their education to obtain a graduate degree after completing the requirements for their BS will usually find it advantageous to apply for admission to the concurrent BS/MS degree program. This program allows students who qualify (a 3.25 cumulative GPA is required) to plan a graduate program from the beginning of their junior year rather than from their first year of graduate study. Up to six (6) credit hours of appropriate 5000 level technical elective courses may be applied to both the BS and MS degree, subject to GPA restriction. Interested students should discuss this option with their advisor and obtain additional information from the ME Graduate Advisor.

The tuition rate for students in this program will be at the undergraduate rate until the student reaches 145 credit hours. This may convert before or after completing the BS requirements.

Discovery Learning Apprenticeships

As a way to encourage undergraduate students to experience research, the College invites applications annually for a number of a Discovery Learning Apprenticeships. Students can earn an hourly wage while engaging in research with college faculty and graduate students. Positions are announced in April for the following fall term and spring term. Students must apply and selection for positions is competitive. For more information, an application and a list of current discovery learning projects, visit: http://www.colorado.edu/activelearningprogram/

Double Degrees

It is possible to obtain double degrees in two engineering disciplines or one degree in engineering and a second degree from a department in another college or school of the University. Students must satisfy curricula for both programs and should consult with their respective academic advisor. In some cases, it may be preferable to pursue an MS degree rather than two undergraduate degrees.

Minors

Numerous minor opportunities exist that would satisfy humanities/social science electives and/or technical electives. Many require no additional course work beyond the minimum BS requirements. For more information on minor opportunities and requirements, visit:
http://www.colorado.edu/advising/programs-requirements
http://www.colorado.edu/engineering/academics/guide-degrees-certificates/minors
Again, as a note, please discuss any major/minor changes with your academic advisor.

Study Abroad

Study abroad, usually taken the sophomore year (usually summer), can be an enriching experience. Information about this unique opportunity can be obtained from the University Study Abroad Office, Center for Community (C4C) Suite S355, 303-492-7741. In order to guarantee that the courses taken abroad will count toward the CU degree, the student must get the planned program approved by their MCEN advisor to avoid credits from not being transferred or accepted correctly.

Student Societies

Students have excellent opportunities to become involved in discipline-related activities outside of the classroom. The department has active chapters in a number of major student societies including American Society of Mechanical Engineers (ASME) and Engineers without Borders (EWB-CU).

Academic Integrity

The Mechanical Engineering Department follows the expectations that are in accordance with the University of Colorado Boulder Honor Code http://honorcode.colorado.edu/ but this policy is intended to provide more specific guidelines for all undergraduate and graduate students in MCEN. All incidents of academic misconduct will be reported to the Honor Code Council. Non- academic sanctions are the purview of the Honor Code Council.

Any activity that could give you an unfair advantage over other students may be cheating. Specific examples of actions that are considered to be cheating and therefore violations of academic integrity:

- Plagiarizing a homework, lab report, or problem set. On assignments that require you to use supplemental materials, you must properly document the sources of information that you used. If you are uncertain about allowable reference materials or how to document your sources, ask your instructor in advance. Specific examples of plagiarism include:
    - copying from a solution manual
    - copying from Internet sites
    - copying directly from classmates
    - copying lab data that you yourself did not participate in collecting
- Plagiarizing content in a paper, report, thesis, or dissertation, by copying material from a published sources or the internet, without appropriate citation format and attribution
- Using unapproved information during a closed-book test or quiz (such as a reference sheet, information stored in a calculator, iPhone, information written on your skin)
- Copying from another student during a quiz, exam, or test
- Working in groups on web based quizzes, exams, or tests
- Working in groups on take-home quizzes, exams, or tests
- The list above is not exhaustive; other violations are possible

Academic Plan and Curriculum Details

Mechanical Engineering 2016-2017 Curriculum – 128 Credits to graduate

Freshman Year	Credits		Credits
Fall Semester	**15**	**Spring Semester**	**15**
MCEN 1025 Computer-Aided Design	4	APPM 1360 Calculus for Engineers 2	4
APPM 1350 Calculus for Engineers 1	4	PHYS 1110 General Physics 1	4
MCEN 1024 Chemistry for ME/MatE	4	CSCI 1320 Intro to Engr Computing	4
GEEN 1400 Engineering Projects	3	HSS Elective*	3

Sophomore Year	Credits		Credits
Fall Semester	**16**	**Spring Semester**	**18**
APPM 2350 Calculus for Engineers 3	4	MCEN 2024 Materials Science	3
PHYS 1120 General Physics 2	4	PHYS 2130 General Physics 3	3
PHYS 1140 Experimental Physics	1	APPM 2360 Diff Eqns with Lin. Alg.	4
HSS Elective*	3	MCEN 2023 Statics and Structures	3
MCEN 2000 Professionalism Sem.	1	HSS Elective*	3
Free Elective*	3	Free Elective*	2

Junior Year	Credits		Credits
Fall Semester	**18**	**Spring Semester**	**15**
MCEN 3012 Thermodynamics	3	MCEN 3022 Heat Transfer	3
MCEN 3021 Fluid Mechanics	3	MCEN 3025 Component Design	3
ECEN 3010 Circuits & Electronics	3	MCEN 3030 Computational Methods	3
MCEN 2063 Mechanics of Solids	3	MCEN 3032 Thermodynamics 2	3
MCEN 2043 Dynamics	3	Writing Course	3
Upper Division HSS Elective*	3		

Senior Year	Credits		Credits
Fall Semester	**16**	**Spring Semester**	**15**
MCEN 4045 ME Design Project I	3	MCEN 4085 ME Design Project II	3
MCEN 4026 Mfg Processes & Sys.	3	MCEN Technical Elective	3
MCEN 3047 Data Analysis/Meas.	4	General Technical Elective	3
MCEN 4043 System Dynamics	3	General Technical Elective	3
MCEN Technical Elective	3	Upper Division HSS Elective*	3

Biomedical Engineering Option

Part 1: ME Technical Electives

Choose two classes from the following list, for a total of 6 credits:

- MCEN 4117: A&P for Engineers
- MCEN 4133: Biomechanics of Solids
- MCEN 4137: A&P for Engineers 2
- MCEN 4141: Indoor Air Pollution
- MCEN 4154: Biocolloids & Biomembranes
- MCEN 4173: Finite Elements Analysis
- MCEN 4183: Mechanics of Composites
- MCEN 4127: Biomedical Ultrasound
- MCEN 4228: Materials in Medicine
- MCEN 4228: Mechanical Behavior of Biological Materials
- MCEN 4228: Mechanics of Soft Matter
- MCEN 4228: Micro-Electro-Mechanical Systems (MEMS 1)
- MCEN 4228: Molecular Biology & Micro/Nano-Scale Engineering
- MCEN 4228: Surface Forces in Biology
- MCEN 4848: Independent Study w/Biomedical Focus

Part 2: General Technical Electives

Choose two classes from EITHER the following list or the list above, for a total of 6 credits:

- ASEN 3116: Introduction to Biomedical Engineering
- CHEN 4820: Biochemical Separations
- CVEN 4484: Introduction to Environmental Microbiology
- ECEN 4021: Engineering Application in Medicine
- MCDB 4550: Cells, Molecules and Tissues
- IPHY 3410: Introduction to Human Anatomy
- IPHY 4730: Integrative Motor Control
- IPHY 3430: Human Physiology: Prereqs - IPHY3410
- CHEM 3311 and/or 3331: Organic Chemistry 1 & 2: Prereqs - CHEM 1131 or CHEM 1133/1134 or CHEM 1271 or CHEM 1371 or CHEN 1211/CHEM 1221 (NOTE: MCEN 1024 IS NOT APPROVED AS A PREREQ)
- CHEM 4411 and/or 4431: Physical Chem with Biochemistry Applications 1 & 2: Prereqs - CHEM 3311 or 3351, PHYS 1110 or 2010, MATH 2400 or APPM 2350
- CHEM 4711 and/or 4731: General Biochemistry 1 & 2: Prereqs - CHEM 3331 or 3371
- EBIO 3400: Microbiology: Prereqs - EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060
- MCDB 3280: Molecular Cell Physiology: Prereqs - MCDB 3120 and CHEM 1133

Environmental Engineering Option

Required Substitution: CHEM 3311-4 / 3321-1: Organic Chemistry 1 w/Lab replaces PHYS 2130: Physics 3

- Prerequisite for CHEM 3311/3321 is CHEM 1131 or CHEM 1133/1134 or CHEM 1271 or CHEM 1371 or CHEN 1211/CHEM 1221
- NOTE: MCEN 1024 IS NOT APPROVED AS A PREREQ

Part 1 ME Technical Electives

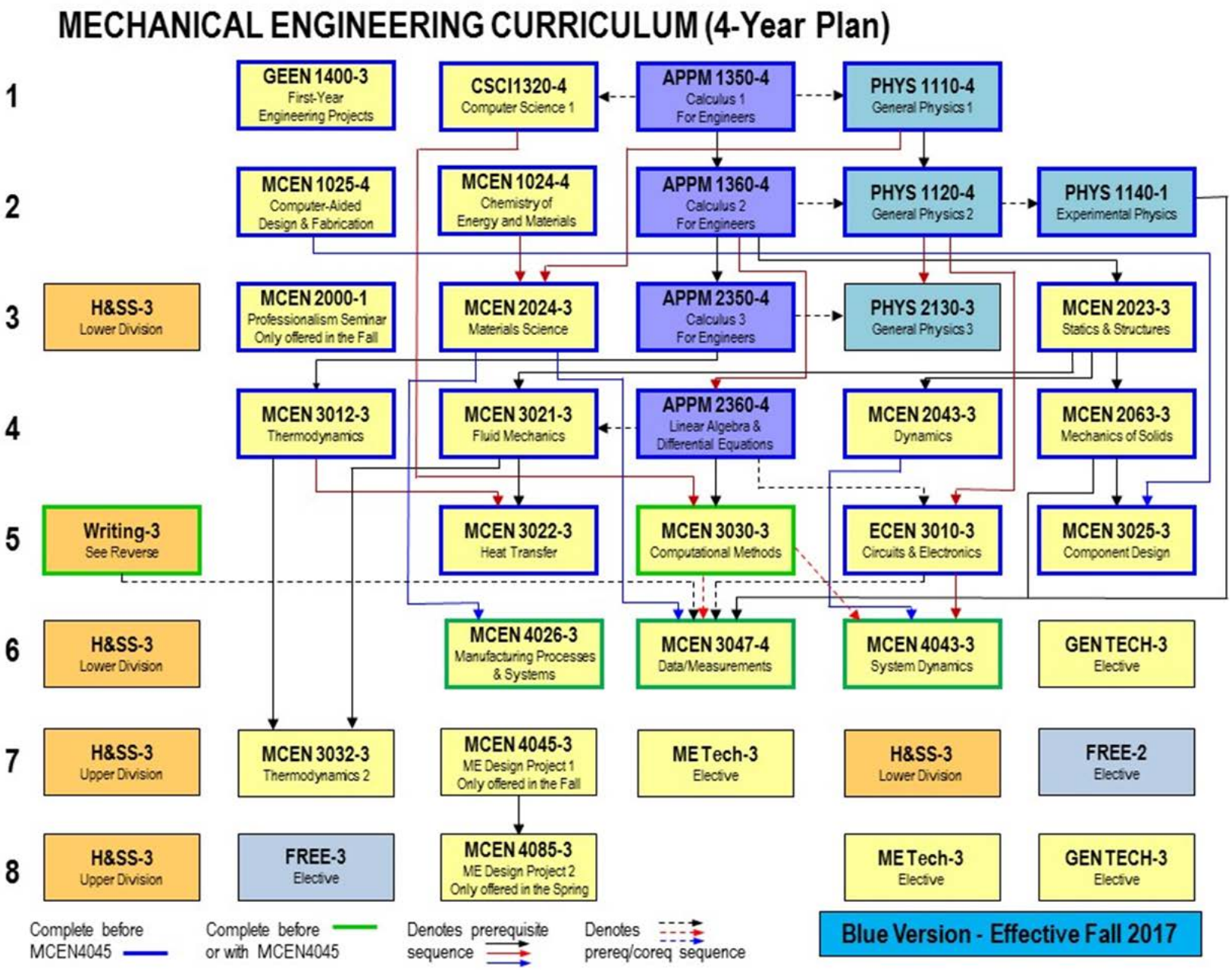
Choose two to four from the following list:

- MCEN 4131: Air Pollution Control Engineering
- MCEN 4141: Indoor Air Pollution
- MCEN 4194: Energy Conversion and Storage
- MCEN 4135 Wind Energy & Wind Turbine Design?
- MCEN 4032: Sustainable Energy
- MCEN 4228: Air Quality Measurements
- MCEN 4057: Environmental Modeling
- MCEN 4848: Independent Study w/Environmental Focus

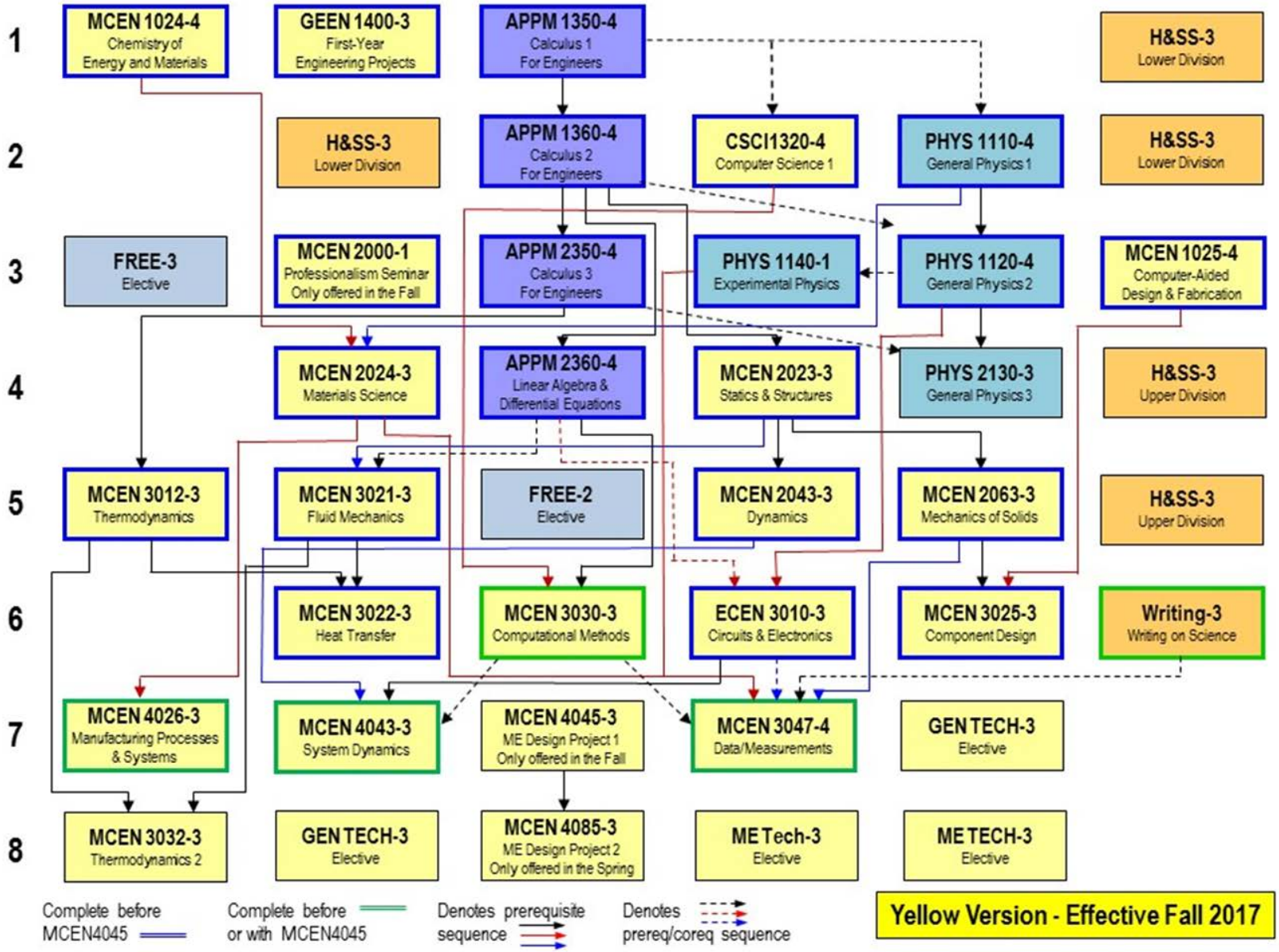
Part 2 General Technical Electives

- Choose no more than two from the following list:
- ATOC 3500 Air Chemistry and Pollution
- ATOC 4720 Introduction to Atmospheric Physics and Dynamics
- CVEN 3414 Fundamentals of Environmental Engineering
- CVEN 3424 Water and Wastewater Treatment
- CVEN 4404 Water Chemistry
- CVEN 4424 Environmental Organic Chemistry
- CVEN 4474 Hazardous and Industrial Waste Management
- CHEM 3331 Organic Chemistry II
- CHEN 3220 Chemical Engineering Separations and Mass Transfer
- MCEN 4131: Air Pollution Control Engineering

Please note that many of the classes above have prerequisites that you will need to complete prior to registration. CVEN 3414 is one of the most common prerequisites for the higher level course options and can be taken at any point after General Chemistry 1 and Calculus 2.


MECHANICAL ENGINEERING CURRICULUM (4-Year Plan)
1
GEEN 1400-3
First-Year Engineering Projects
CSCI1320-4
Computer Science 1
APPM 1350-4
Calculus 1 For Engineers
PHYS 1110-4
General Physics 1
2
MCEN 1025-4
Computer-Aided Design & Fabrication
MCEN 1024-4
Chemistry of Energy and Materials
APPM 1360-4
Calculus 2 For Engineers
PHYS 1120-4
General Physics 2
PHYS 1140-1
Experimental Physics
3
H&SS-3
Lower Division
MCEN 2000-1
Professionalism Seminar Only offered in the Fall
MCEN 2024-3
Materials Science
APPM 2350-4
Calculus 3 For Engineers
PHYS 2130-3
General Physics 3
MCEN 2023-3
Statics & Structures
4
MCEN 3012-3
Thermodynamics
MCEN 3021-3
Fluid Mechanics
APPM 2360-4
Linear Algebra & Differential Equations
MCEN 2043-3
Dynamics
MCEN 2063-3
Mechanics of Solids
5
Writing-3
See Reverse
MCEN 3022-3
Heat Transfer
MCEN 3030-3
Computational Methods
ECEN 3010-3
Circuits & Electronics
MCEN 3025-3
Component Design
6
H&SS-3
Lower Division
MCEN 4026-3
Manufacturing Processes & Systems
MCEN 3047-4
Data/Measurements
MCEN 4043-3
System Dynamics
GEN TECH-3
Elective
7
H&SS-3
Upper Division
MCEN 3032-3
Thermodynamics 2
MCEN 4045-3
ME Design Project 1 Only offered in the Fall
ME Tech-3
Elective
H&SS-3
Lower Division
FREE-2
Elective
8
H&SS-3
Upper Division
FREE-3
Elective
MCEN 4085-3
ME Design Project 2 Only offered in the Spring
ME Tech-3
Elective
GEN TECH-3
Elective
Complete before MCEN4045
Complete before or with MCEN4045
Denotes prerequisite sequence
Denotes prereq/coreq sequence
Blue Version - Effective Fall 2017

MECHANICAL ENGINEERING CURRICULUM (4-Year Plan)



Standard Course Substitutions

CSCI1320 – ECEN1310, or CSCI 1300 (Note: COEN1300 and GEEN1300 are also accepted, if completed prior to Fall 2015)

GEEN1400 – ASEN1400, COEN1400, COEN1410, ECEN1400, GEEN2400, or GEEN3400

MCEN1024 – CHEM1113&1114 or CHEN1211&CHEM1221

PHYS2130 – PHYS2170, CHEM3311&3321, APPM3310, or CSCI2270

Writing Requirement

The Writing Requirement can be fulfilled by HUEN1010 (freshmen only), HUEN3100, WRTG3035, or WRTG3030.

Humanities & Social Science Electives

Please see http://www.colorado.edu/engineering/node/288/ .

General Technical Electives

3000 and 4000 level courses in the following subjects are considered to be General Technical Electives: APPM, AREN, ASEN, ASTR, ATOC, CHEM, CHEN, CSCI, CVEN, EBIO, ECEN, EVEN, EMEN, GEOL, IPHY, MATH, MCDB, MCEN, and PHYS. In addition, GEEN3400 and NAVR3030 have been approved to fulfill the requirement.

ME Technical Electives

4000 level MCEN courses not otherwise required for the major are considered to be ME Technical Electives. BS/MS students have the same course options, but should complete the classes at the 5000 level.

Tech Elective Exceptions

You may use one of the following courses as an ME Tech Elective, provided your second ME Tech Elective is completed within Mechanical Engineering: APPM4350, ASEN4123, GEEN3400, EMEN4030, EMEN4050, EMEN4100, EMEN4200, EMEN4800, EMEN4825, EMEN4830

Grade Requirements

Beginning with the incoming class of Fall 2015, the minimum passing grade for prerequisite and corequisite classes in our curriculum is a C. This includes courses completed outside the department (APPM, PHYS, etc.). The minimum passing grade for standalone classes is a D-. In addition, students need to have a cumulative and major GPA of at least 2.25 in order to graduate from the College of Engineering.