Undergraduate Program Guide
2015 - 2016*

*The year of this guide corresponds to the year of regular entry into the program (the year in which a student enters full major status). It will also be the “catalog year” for the student’s major.

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1200 Larimer Street, NC-2204
Denver, Colorado 80217

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# Table of Contents

- **How to use this Guide** | 4
  - Important Acronyms | 4
  - Forms and Policy Documents | 4

- **Equal Opportunity and Non-Discrimination** | 4

- **What is Bioengineering?** | 5

- **Program Description** | 6
  - Student Learning Goals | 6
  - ABET Accreditation | 7

- **One Department – Two Campuses** | 7

- **Expectations** | 7
  - Faculty and Staff | 7
  - Students | 7
  - Email | 8
  - Time Commitment | 8

- **Tuition and Funding** | 8
  - Bioengineering Tuition and Student Fees | 8
  - Medical Services and Health Education | 8
  - Scholarships | 8

- **Admission to the B.S. in Bioengineering** | 8
  - Direct Admission to the University of Colorado Denver | 9
  - Intra-University Transfer | 9
  - Change of Major within the College of Engineering and Applied Science | 9
  - Transfer Credit Evaluation | 10

- **Major Status in the B.S. in Bioengineering** | 10
  - Pre-major Status | 10
  - Major Status | 11
  - Application for Admission to the Major – Fall 2015 | 11

- **Requirements for a B.S. in Bioengineering** | 11
  - CU Denver Core Curriculum Requirements | 12
  - Pre-major Requirements | 12
  - Upper-division Major Requirements | 14
  - Track Electives | 14

- **Academic Policies** | 15
  - Pre-requisites | 15
  - Academic Performance | 15
  - Attendance Regulations | 15
  - Repeat and Withdrawal Policies | 15
  - Academic Misconduct | 15
  - Student Grievance Procedure | 16
  - Preparation for Graduation | 18

- **Student Health and Wellness** | 19
  - The Office of Community Standards & Wellness | 19
Police and Campus Safety  

**Student Support**  
- Bioengineering Undergraduate Affairs Committee  
- Undergraduate Advising  
- Academic Mentoring  
- Internships and Career Planning  
- Research Opportunities  
- The Office of Campus Student Services (Anschutz Medical Campus)  
- University-wide Student Services 

**Department Events**  
- Orientation  
- New Student Welcome  
- Recruitment and Community Events  
- Other Department Events  

**Department Directory**
**How to use this Guide**

This guide is intended to provide information, rules, regulations, policies and procedures for the Bachelor of Science (B.S.) in Bioengineering Program, the College of Engineering and Applied Sciences, and CU Denver. It is recommended that students interested in pursuing the B.S. degree meet with an undergraduate advisor in advance of applying to CU Denver and registering for classes.

A copy of this Student Guide is provided to each student accepted into the B.S. in Bioengineering Program. Each student is responsible for reading, understanding, and complying with all rules, regulations, and policies stated in this publication. The guide is also available to those who are considering applying to CU Denver and/or are pre-majors in the department. Students are expected to be familiar with and abide by all rules and regulations presented in this guide.

A revised copy of this Guide will be provided to each degree-seeking student annually. Addenda to the Guide will be published and distributed as necessary. Issues not covered specifically in this Guide will be dealt with by the Program Directors in consultation with the appropriate individuals, as needed.

CU Denver, the College of Engineering and Applied Sciences, and the B.S. in Bioengineering program reserve the right to revise information, requirements, policies, rules, and regulations at any time. Whenever changes occur, every effort will be made to notify students who may be impacted.

**Important Acronyms**

<table>
<thead>
<tr>
<th>AMC</th>
<th>Anschutz Medical Campus</th>
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<tr>
<td>AY</td>
<td>Academic Year</td>
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<tr>
<td>BIOE</td>
<td>Bioengineering</td>
</tr>
<tr>
<td>BS</td>
<td>Bachelor of Science</td>
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<tr>
<td>BUAC</td>
<td>Bioengineering Undergraduate Affairs Committee</td>
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<tr>
<td>DC</td>
<td>Downtown Campus</td>
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<tr>
<td>GPA</td>
<td>Grade Point Average</td>
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<td>PRBE</td>
<td>Bioengineering Pre-major</td>
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**Forms and Policy Documents**

Throughout this Guide, you will be directed to forms needed to complete certain requirements or achieve certain outcomes. In most cases, copies of such forms are kept in the undergraduate advising office on the Downtown Denver Campus. Students may email the undergraduate advisor for more information.

**Equal Opportunity and Non-Discrimination**

**Notice of Non-Discrimination**

The University of Colorado Denver | Anschutz Medical Campus does not discriminate on the basis of race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. The University takes affirmative action to increase ethnic, cultural, and gender diversity; to employ qualified disabled individuals; and to provide equal opportunity to all students and employees.

Students may report allegations of discrimination or harassment to Melissa Luna, Employment Rights Compliance and Investigation Manager, 303-315-2724, Melissa.luna@ucdenver.edu.
Title IX Notice of Non-Discrimination

The University of Colorado does not discriminate on the basis of sex, gender or sexual orientation in its education programs or activities. Title IX of the Education Amendments of 1972, and certain other federal and state laws, prohibit discrimination on the basis of sex in all education programs and activities operated by the university (both on and off campus). Title IX protects all people regardless of their gender or gender identity from sex discrimination, which includes sexual harassment and sexual assault.

Title IX requires the university to designate a Title IX Coordinator to monitor and oversee overall Title IX compliance. Your campus Title IX Coordinator is available to explain and discuss: your right to file a criminal complaint; the university's complaint process, including the investigation process; how confidentiality is handled; available resources, both on and off campus; and other related matters.

Campus Title IX Coordinators:
Downtown Campus:
Raul Cardenas
Associate Vice Chancellor of Student Affairs
303-315-2110
Raul.cardenas@ucdenver.edu

Anschutz Medical Campus:
Regina Kilkenny
Associate Vice Chancellor
Office of Academic Resources and Services
303-724-8070
Regina.kilkenny@ucdenver.edu

Additional information regarding Title IX is available at:
http://www.ucdenver.edu/about/WhoWeAre/Chancellor/ViceChancellors/Provost/StudentAffairs/UniversittyLife/sexualmisconduct/AMCpolicies/Pages/AMCWelcome.aspx

Disability Resources

It is the policy of the University and the Program to provide reasonable accommodations to qualified students with a disability so they are able to meet their program requirements. Whether an accommodation is reasonable is determined on an individual case-by-case basis. Qualified students in need of accommodations must contact the University's Disability Resources and Services Office for eligibility and accommodation determinations. More information may be found on the Disability Resources and Services website located at: http://www.ucdenver.edu/student-services/resources/disability-resources-services/Pages/disability-resources-services.aspx.

What is Bioengineering?

Bioengineering is a highly interdisciplinary field that combines the mathematical and physical sciences with engineering principles to study biology, physiology, medicine, behavior and health. Bioengineering is emerging as the leading discipline at the interface of clinical sciences, basic research, and engineering and maintains focus on catalyzing technology to cure and prevent disease.

The undergraduate program at the University of Colorado Denver | Anschutz Medical Campus (CU Denver) emphasizes the professional competencies of leadership, communication, presentation and critical problem solving. Students will have the opportunity to learn:
• how to design new medical devices and technologies.
• how the body responds to implanted medical devices.
• how to generate solutions for current clinical and research problems using engineering principles.
• how to discuss and present their research and design to a variety of audiences.
• how to convey these results in a precise clinical, academic, or entrepreneurial context.

Program Description

The Department of Bioengineering is the first of its kind in Colorado. Its mission is to improve human health through the application of engineering principles, ideas, methods, and inventions in order to solve important clinical problems.

The consolidation of the Downtown Denver Campus (DC) and the Anschutz Medical Campus (AMC) provides unprecedented instructional resources in bioengineering and research opportunities in health sciences. Students will have the opportunity to learn from clinicians and engineers and to perform research or medical device design in world-class hospitals and clinical research labs.

Student Learning Goals

The B.S. in Bioengineering will prepare students for careers in the biomedical industry, hospital, government, academic research labs, regulatory agencies, and for further education in graduate school or advanced health science programs. The B.S. curriculum is also designed so that students who wish to enter medical school can fulfill pre-med requirements with few additional courses.

The program’s student learning goals are derived from the “Criteria for Accrediting Engineering Programs, 2012-2013” set by the Accreditation Board for Engineering and Technology (ABET). The program will document the eleven student outcomes that define what students should know and be able to do by the time of graduation:

1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to design and conduct experiments as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. An ability to function on multidisciplinary teams
5. An ability to identify, formulate, and solve engineering problems
6. An understanding of professional and ethical responsibility
7. An ability to communicate effectively
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
9. A recognition of the need for, and an ability to engage in life-long learning
10. A knowledge of contemporary issues
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Students achieve all learning goals accumulatively and repeatedly as they progress toward the B.S. in Bioengineering degree. By experiencing a genuine progression with reiterations from basic proficiency in the pre-major coursework to advanced proficiency in the upper-division major courses, graduates should demonstrate a broad range of understanding in mathematics, life science, and engineering as well as the specific mastery of bioengineering competencies.
ABET Accreditation

The ABET accreditation process for new engineering programs begins after at least one student has graduated from the designated program. As such, CU Denver's Department of Bioengineering will apply for accreditation in Spring 2017 and will undergo an on-site visit the following academic year. Retroactive accreditation may be granted to cover students who graduated during the academic year prior to the evaluation visit.

One Department – Two Campuses

The B.S. in Bioengineering offers a unique dual-campus training model. As pre-majors, students will complete their pre-major coursework on the vibrant Downtown Denver Campus before applying for the major. Once full majors, they will study at the renowned Anschutz Medical Campus.

Bioscience 2, the department’s new building on the Anschutz Medical Campus, is slated to open Fall 2015. Bioscience 2 will offer specialized teaching space including a Biomechanics and Bioinstrumentation Lab, Biophotonics Lab, Design and Prototyping Lab, Light Machine Shop, Biomaterials with Cell/Tissue Culture Lab, and a Clinical Simulation and Assistive Technology suite where students will have the opportunity to test their designs with the patients using the technology.

The combination of technical learning, immersive experiences in the clinical and biomedical enterprise beyond the classroom, and out-of-classroom opportunities to learn about cutting-edge patient care and research, is provided by only a handful of universities across the United States.

Expectations

The Bioengineering program strives to create an atmosphere that is respectful and inclusive, with an emphasis on student growth and learning. To create such an environment it is critical that all members of the bioengineering community and degree program understand and aim to meet clearly defined expectations.

Faculty and Staff

All faculty and staff have open-door policies and will communicate office hours. Students unable to meet with departmental representatives during scheduled office hours are encouraged to contact the representative directly to make alternate arrangements. Scheduling a one-on-one meeting is highly recommended to ensure that appropriate time and consideration is given to students’ questions and concerns.

Students

The Bioengineering program expects that all students will conduct themselves with integrity in the categories of academics, research, service and outreach. Regular class attendance and participation are keys to success. In addition to engagement in the classroom, it is expected that students will become an active part of the bioengineering community by participating in out-of-classroom activities and events. These include research and internship opportunities as well as department and college-wide events.

Students who have issues or concerns regarding a class, faculty, staff or another student in the program may address such concerns with the persons involved. If an issue cannot be resolved and/or such an approach is inappropriate or uncomfortable, students may also contact their advisor, the department chair, or a representative on the Bioengineering Undergraduate Affairs Committee (BUAC) for assistance.
Email

Email is the official platform for communication at the university. Students must use their CU Denver email address for all correspondence with university officials including faculty, staff, and administration. Students may expect department faculty and staff to respond to email within 2-3 working days, after which they are encouraged to send a respectful reminder.

Time Commitment

Bioengineering is a rigorous academic program. Previous students report that a full course load results in 40+ hours of class, homework and study time per week. In addition, many students regularly seek the support of the Learning Resources Center, tutors, and academic mentors throughout the semester. More information regarding the Learning Resources Center can be found at: http://www.ucdenver.edu/life/services/LRC/Pages/default.aspx. Students are encouraged to consider the academic rigor of the program when scheduling off-campus activities such as work, family and personal obligations and keep in mind that the majority of the major specific courses will only be taught during the day and during the traditional academic year (fall and spring terms).

Tuition and Funding

Bioengineering Tuition and Student Fees

Bioengineering pre-majors will pay downtown Denver tuition and appropriate Auraria (Downtown Denver) Campus fees. Once admitted to the major, bioengineering students will continue to pay downtown tuition but be assessed Anschutz Medical Campus student fees. In addition, bioengineering students are responsible for a Bioengineering Program Fee that covers technology and materials costs unique to Bioengineering’s training program. Tuition and fee information can be found on at www.ucdenver.edu/student-services/resources/CostsAndFinancing.

Medical Services and Health Education

The university provides medical and mental health services and health education to students, faculty and staff at an affordable cost. Students are encouraged to explore www.ucdenver.edu/life/Pages/Health-and-Well-being.aspx for more information about the services available (noting that Bioengineering students are considered “Denver Campus Students.”). For more information regarding the CU Denver Downtown Counseling Center, please go to www.ucdenver.edu/life/services/counseling-center. It is also important to note that a number of the clinical opportunities afforded to Bioengineering students will require proof of health insurance.

Scholarships

The Scholarship Resources Office provides information about scholarships and offers guidance in the scholarship application process. Students may visit the Scholarship Resources Office located in the Academic Building on the Downtown Campus or at www.ucdenver.edu/student-services/resources/Scholarships.

Admission to the B.S. in Bioengineering

There is no direct admission to the bioengineering major at CU Denver but there are several ways in which a student can enter the bioengineering program as a pre-major. These include:

• Acceptance to the College of Engineering and Applied Science at the time of admission
• Intra-University Transfer from another college or school within CU Denver
• Change of major from within the College of Engineering and Applied Science

More details about each of these processes and related procedures can be found below.

Admission to the University of Colorado Denver

The University of Colorado Denver's Office of Admissions will receive and review new applications to the College of Engineering and Applied Science, including those who indicate an interest in the bioengineering pre-major. More information about admissions to CU Denver, including the admission requirements for both high school and transfer applicants can be found at http://www.ucdenver.edu/admissions.

Prospective international students should also visit the Office of International Affairs at http://www.ucdenver.edu/academics/InternationalPrograms/OIA/admissions for more information.

Though the Office of Admissions will make decisions regarding those who are admitted as pre-majors, it is critical that prospective students recognize that they will eventually apply for full major status, and that admission to CU Denver's College of Engineering and Applied Science as a bioengineering pre-major does not guarantee admission to the major. Information about the Fall 2015 major application process and eligibility requirements can be found in the Major Status in the B.S. in Bioengineering section of this guide.

Intra-University Transfer

Students in other schools or colleges at the University of Colorado Denver (including pre-engineers in the College of Liberal Arts and Sciences) may not enroll in BIOE 1010, 1020, 2010 or 2020 until they have been admitted to the College of Engineering and Applied Science (CEAS) as a bioengineering pre-major.

CU Denver students interested in a B.S. in Bioengineering, but not enrolled as a CEAS student must request an intra-university transfer (IUT). Those approved for an IUT will be entered into the pre-major program and, as is the case with all bioengineering pre-majors, must complete the pre-major coursework before applying for full major status. Admission to the bioengineering pre-major does not guarantee admission to full-major status. The major application process and requirements will be dictated by the year a student intends to become a full major, not the year they submit their IUT request.

To enter the bioengineering pre-major through the intra-university transfer (IUT) process, students must have earned:

• A 2.75 (or higher) cumulative CU Denver GPA
• A 2.5 (or higher) GPA in Calculus I, Calculus II, and Calculus-based Physics I and the corresponding Lab and no lower than a C- in any one of these courses.
• A C- or higher in all other bioengineering pre-major requirements taken prior to or at the time of the request.

Interested students should contact the undergraduate advisor to discuss the IUT process and pick up relevant forms. Eligibility requirements to enter CEAS as a Bioengineering Pre-major are subject to change.

Change of Major within the College of Engineering and Applied Science

Students currently enrolled in another major within the College of Engineering and Applied Science, including those listed as undecided, may submit a change of major form to the undergraduate advisor. Only those requesting a change to the pre-major will be considered. In addition, students must have a 2.75 cumulative CU Denver GPA and no less than a C- in any pre-major course taken prior to or at the time of request.
Those approved for a change of major will be entered into the pre-major program and, as is the case with all bioengineering pre-majors, must complete the pre-major coursework before applying for full major status. Admission to the bioengineering pre-major does not guarantee admission to full-major status. The major application process and requirements will be dictated by the year a student intends to become a full major, not the year they submit their initial change of major request.

**Transfer Credit Evaluation**

The Department of Bioengineering will adhere to the University of Colorado Denver’s policies and articulation agreements when reviewing transfer credit. Students transferring from a Colorado Community College may see the current Transfer Advising Plan at [www.ucdenver.edu/admissions/Documents/ENGR.pdf](http://www.ucdenver.edu/admissions/Documents/ENGR.pdf). At this time, there are no courses taught in the Colorado Community College system that are equivalent to the lower-division bioengineering courses (*BIOE 1010, 1020, 2010, 2020*). These, and all other upper-division bioengineering courses, must be completed at CU Denver.

The Office of Admissions will review transcripts from other institutions for credit and initial course equivalencies. Once credit is awarded and at the student’s request, the CU Denver home department may also review transfer credit for course equivalencies (for example the Biology department may review a Biology course). Students should speak with the Department of Bioengineering’s undergraduate advisor for more information and to pick up relevant forms. The Bioengineering Undergraduate Affairs Committee will make final decisions regarding transfer credit applicability toward all degree requirements.

The Department of Bioengineering will not automatically apply credit older than five years toward the Pre-major and/or Major requirements. Students receiving CU Denver credit and course equivalents for transfer courses older than five years (at the time of matriculation) may submit a *Petition for Exception to Policy* to the Bioengineering Undergraduate Affairs Committee for further consideration.

### Major Status in the B.S. in Bioengineering

#### Pre-major Status

There is no direct admission to the bioengineering major at CU Denver. All interested applicants, including freshmen, internal and external transfer students, and students looking to change their major must select “Bioengineering (Pre-major)” as their intended program of study.

Only those admitted as pre-majors and who have met the appropriate course pre-requisites are permitted to enroll in *BIOE 1010, 1020, 2010* and *2020*. As such, all students, regardless of earned credit, should expect to graduate no sooner than eight academic (fall/spring) semesters from the time they enroll in *BIOE 1010*. Bioengineering third and fourth year courses (*3000* and *4000-level*) are only open to students who have completed all pre-major coursework and been admitted to full-major status.
Pre-majors are strongly encouraged to meet with the undergraduate advisor one semester prior to enrollment to outline a course of study that will prepare them to apply for full major status in a timely manner.

**Major Status**

Admission to the bioengineering pre-major does not guarantee admission to full-major status. Admission to the major is granted by faculty of the Department of Bioengineering to a select group of bioengineering pre-majors. The department will accept applications to the major each February (the Fall 2015 deadline is February 16, 2015). One semester of pre-major coursework may be in progress at the time of application.

**Application for Admission to the Major – Fall 2015**

*The Department of Bioengineering will only accept applications in the spring term. Those not yet eligible to apply for major status in Spring 2015 must wait to apply the following year. Note that all requirements, including minimum grade and GPA requirements, are subject to change.*

The Fall 2015 application to the major will be begin in Spring 2015. To apply for the major students must have:

- No more than one semester of pre-major coursework in progress at the time of application
- Earned a 2.0 cumulative CU Denver GPA*
- Earned a C- or higher in all required pre-major coursework*

Eligible students should also be prepared to demonstrate their proficiency in the disciplines offered as part of their pre-major coursework and articulate their interest in specific bioengineering fields.

*Transfer GPAs will not be taken into consideration, however individual grades will be reviewed if transferred courses are used toward the pre-major requirements.

*Repeated Courses and the Application to the Major: If students take a pre-major course more than once, the bioengineering faculty will consider the highest grade earned for the purpose of the major application. However, the University considers all repeated courses (taken at CU Denver) when calculating the GPA.*

**Requirements for a B.S. in Bioengineering**

The B.S. in Bioengineering will provide students a rigorous multi-disciplinary education through a curriculum that integrates the three foundational disciplines of bioengineering:

1. Biological, Chemical, and Physical Sciences
2. Engineering, Science, and Math
3. Clinical Medicine

Graduates of this program are expected to become leaders and innovators in the bioengineering profession.

The B.S. in Bioengineering is granted upon successful completion of a minimum of 128 semester hours to include the following requirements:

1. CU Denver Core Curriculum Requirements
2. Pre-major Requirements
3. Upper-division Major Requirements
4. Track Electives
CU Denver Core Curriculum Requirements

The University of Colorado Denver faculty has established a core curriculum for undergraduate students. Bioengineering students must satisfy the College of Engineering and Applied Science's Core Curriculum Requirements by taking 8 courses (24 credits) distinct from Math and Science. These courses will be selected from the Intellectual Competencies, Knowledge, International Perspectives, and Cultural Diversity Areas found in the CU Denver Catalog at catalog.ucdenver.edu.

Though students are not required to have completed their CU Denver Core Curriculum requirements when applying for full major status, it is highly recommended that students satisfy the majority of these requirements prior to beginning upper-division coursework. At this time, CU Denver Core Curriculum courses are not taught at Anschutz Medical Campus.

Pre-major Requirements

Students will complete all pre-major courses prior to entrance into the bioengineering major and prior to taking upper-division coursework in the department. Credit for some pre-major coursework may be achieved through Advanced Placement (AP) and International Baccalaureate (IB) coursework and exams or transferred from other institutions. However, it is important that students intending to use AP, IB or transfer credit toward these requirements speak with the undergraduate advisor before moving forward. In some cases, it may be beneficial for students (i.e. those intending to apply to medical school) to re-take certain courses in the college classroom. Additional information about how CU Denver awards credit for Advanced Placement (AP) and International Baccalaureate (IB) coursework can be found at: www.ucdenver.edu/admissions/bachelors/freshman/getReady/Pages/APIB-Credit.aspx.

Though the required math, biology, chemistry and physics courses below are open to all CU Denver students who have met course pre-requisites, only those students admitted to the College of Engineering and Applied Science as bioengineering pre-majors may enroll in the bioengineering courses seen below.

Mathematics (16 credit hours)
MATH 1401: Calculus I
MATH 2411: Calculus II
MATH 2421: Calculus III
MATH 3195: Linear Algebra and Differential Equations

Biology (8 credit hours)*
BIOL 2051: General Biology I
BIOL 2071: General Biology Laboratory I
BIOL 2061: General Biology II
BIOL 2081: General Biology Laboratory II
*CU Denver's Biology Honors Sequence may also be used toward these requirements. Please see the Biology department for placement information.

Chemistry (14 credit hours)*
CHEM 2031: General Chemistry I
CHEM 2038: General Chemistry Laboratory I
CHEM 2061: General Chemistry II
CHEM 2068: General Chemistry Laboratory II
CHEM 3411: Organic Chemistry I
CHEM 3418: Organic Chemistry Laboratory I

*CU Denver’s Chemistry Honors Sequence may also be used toward these requirements. Please see the Chemistry department for placement information.

Physics (10 credit hours)

PHYS 2311: General Physics I (calculus-based)
PHYS 2321: General Physics I Laboratory
PHYS 2331: General Physics II (calculus-based)
PHYS 2341: General Physics Laboratory II

Bioengineering (8 credit hours)

BIOE 1010: Bioengineering Prototyping and Design I
BIOE 1020: Bioengineering Prototyping and Design II
BIOE 2010: Introduction to Programming for Bioengineers
BIOE 2020: Introduction to Computational Methods for Bioengineers

Students applying for full-major status in Spring 2015 must have earned a C- or higher in all pre-major courses. Those not yet eligible to apply for major status in Spring 2015 must refer to the Undergraduate Guide for the year in which they intend to apply for updates. Application requirements (including minimum grade and GPA requirements) are subject to change.

Pre-major Coursework (A sample plan)

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<th>FALL II</th>
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<tr>
<td>MATH 1401</td>
<td>MATH 2411</td>
<td>MATH 2421</td>
<td>MATH 3195</td>
</tr>
<tr>
<td>BIOL 2051</td>
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<tr>
<td>BIOE 1010</td>
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The above plan is an example of how bioengineering pre-majors might complete their pre-major coursework. It is a plan few students follow exactly but it can serve as a useful starting point. The best order of classes will depend on the needs of the student. Please review the following notes for additional considerations.

Notes regarding the Sample Plan

1. This plan only includes the bioengineering pre-major coursework. It does not include the CU Denver Core Curriculum, upper-division major or track elective requirements.

2. Though it is not required that they have completed their CU Denver Core Curriculum requirements when applying to the major, it is highly recommended that the majority of the CU Denver Core Curriculum is complete before students take upper-division bioengineering courses at the Anschutz Medical Campus. CU Denver Core Curriculum courses are not offered at Anschutz.

3. BIOE 1010 and 2010 are only taught in the Fall term. BIOE 1020 and 2020 are only taught in the Spring term.
Students may not register for MATH 1401 (Calculus I) without having first met the pre-requisite and/or taking a placement exam. Newly admitted students should reach out to the undergraduate advisor to discuss math placement.

Students that do not place into Calculus I in the first semester will need to take math during the summer terms in order to apply for full-major status in a timely fashion.

Those wishing to maintain a lighter course-load are encouraged to take courses during the summer. Many of the math, science and CU Denver Core Curriculum courses are taught during the summer term.

Once students have been admitted to full-major status, they will work with their faculty advisor and the undergraduate advisor to design a plan to complete the degree.

**Upper-division Major Requirements**

Students admitted into the bioengineering major will take 36 credit hours of required upper-division coursework in bioengineering. These courses will likely include an introduction to Cell Biology and Tissue Engineering, Physiology, Biomechanics, Biomaterials, and Biomedical Instrumentation. It will also include a Statistics and Measurements course for Bioengineers and a year-long laboratory course. Upper-division courses will be taught at the Anschutz Medical Campus and will culminate in a Senior Design Project. Additional course numbers and descriptions will be listed in the 2015-2016 CU Denver Catalog.

**Track Electives**

The goal of the Track Electives Requirement is to provide students with more advanced understanding of specialized areas in bioengineering. Students must take a minimum of 12 credit hours to meet the bioengineering track elective requirements. Of these twelve credits, a minimum of 6 credits must be upper-division (3000 or 4000-level) and taught within the Department of Bioengineering.

Bioengineering track options and course offerings are under development and subject to change, however the Department of Bioengineering anticipates offering the following tracks:

1. Biomedical Devices and Biomechanics
2. Imaging Instrumentation and Diagnostics

**Biomedical Devices and Biomechanics Track**

Though courses are still under development, the Biomedical Devices and Biomechanics Track may include the study of Advanced Biomechanics; Biotransport and Heat Transfer; Finite Element Analysis; Advanced Biomaterials, Mass Transports in Physiological Systems; Neural interfaces and Biomechanics; Advanced Matlab; Animal Methods and Biofluid Dynamics.

**Imaging Instrumentation and Diagnostics Track**

Though courses are still under development, the Imaging Instrumentation and Diagnostics Track may include the study of Biomedical Signals and Systems; Biomedical Electronics; Biomedical Imaging; Biophotonics; Advanced Matlab; Biomedical Optics; Animal Methods; and Acquisition and Analysis of Physiological Systems.

**Additional Track Options**

The Department of Bioengineering aims to provide opportunities for students to meet individual academic, research and/or career goals. As such, students may submit a track proposal to the Bioengineering Undergraduate Affairs Committee (BUAC) for approval.
Academic Policies

Pre-requisites

A pre-requisite is any course that must be completed prior to taking a subsequent course. The College of Engineering and Applied Science requires that all students receive a C- or higher in engineering courses to move on to the next level. Students must repeat a pre-requisite course in which a grade of D+ or lower was earned before moving on to the subsequent course. If students do not receive a C- or higher in an engineering class on the second attempt, they must obtain written approval from their major department to enroll in the course for a third time.

Academic Performance

The Department of Bioengineering will adhere to University probation and suspension policies. Visit http://catalog.ucdenver.edu/content.php?catoid=10&navoid=1340 for more information regarding these policies.

Expectations of the bioengineering pre-major

In addition to remaining in good academic standing at the University of Colorado Denver, bioengineering pre-majors should receive no less than C- or above in all pre-major coursework and stay abreast of changing major application processes and guidelines.

Students who (as a result of their grades) are not eligible to apply for full-major status or who are not admitted to the major, may consult with the undergraduate advisor regarding alternatives. These students may need to extend their time of study to complete an alternate baccalaureate degree.

Expectations of the bioengineering major

Once admitted to the major, bioengineering students must maintain a CU Denver cumulative GPA of a 2.0 and a 2.0 average GPA in all required coursework and all courses taken within the Department of Bioengineering.

Attendance Regulations

Successful work in the College of Engineering and Applied Science is dependent upon regular attendance in all classes. Students should always refer to their course syllabi for individual instructors’ policies regarding attendance and missed work.

Repeat and Withdrawal Policies

Undergraduate students may not register for credit in a course in which they already have received a grade of C- or higher. An F grade in a required course necessitates subsequent satisfactory completion of the course. Students must repeat a prerequisite course to another required course in which a grade of D+ or lower was earned before moving on to the subsequent course. If students do not receive a C- or higher in an engineering class on the second attempt, they must obtain written approval from their major department to enroll for the course for the third time. Re-enrollment approval will be subject to the discretion of the CEAS. When a course is retaken because of a D or F grade, both grades will appear on the transcript and both will be averaged into the GPA.

Academic Misconduct

Student Honor Code

The Honor Code outlined below is the College of Engineering and Applied Science statement on academic integrity. The Code articulates the College’s expectations of its students and faculty in establishing and
maintaining the highest standards in academic work.

Honor Code Text
The Honor Code of the College of Engineering and Applied Science is a statement of its students, individually and collectively:

- Students will not give or receive aid during examinations.
- Students will not use any prohibited electronic devices during examinations.
- Students will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading.
- Students will uphold the spirit and letter of the Honor Code and they will take an active role to ensure that others uphold the Honor Code and if they observe violations of the Honor Code they must report violations to their Department Chair.
- The Faculty of the College will do its part to ensure its confidence in the honor of its students. Faculty must ensure that precautions are in place to prevent the forms of dishonesty mentioned above. Faculty will also avoid, as far as practical, academic procedures that create temptations to violate the Honor Code. Faculty alone has the right and obligation to set academic requirements. However, the students and faculty will work together to establish optimal conditions for honorable academic work.

Violations of the Honor Code
Examples of conduct that will be regarded as being in violation of the Honor Code include:

- Copying from another’s examination paper or allowing another to copy from one’s own paper.
- Plagiarism in any shape or form. Plagiarism is defined as the use, without giving reasonable and appropriate credit to or acknowledging the author or source, of another person’s original work, whether such work is made up of code, formulas, ideas, language, research, strategies, writing or other form(s).
- Giving or receiving unpermitted aid either in person or via electronic devices.
- Engaging in unauthorized collaboration on academic assignments or examinations.
- Representing as one’s own work the work of another.

Penalties for Violating the Honor Code
Most student disciplinary cases have involved Honor Code violations. Of these, most cases arise when a student submits another’s work as his or her own, gives or receives unpermitted aid, or engages in unauthorized collaboration. If a violation occurs during a quiz or on a homework assignment, the student will receive a zero for that quiz or assignment. If a violation occurs on an examination, the student will receive a failing grade for the course. The standard penalty for a first offense may include suspension from the College of Engineering and Applied Science for a severe infraction of the Honor Code. The penalty for a second violation will be expulsion from the College of Engineering and Applied Science. It is the responsibility of the student to seek clarification from the instructor when in doubt about these guidelines.

College of Engineering and Applied Science Student Grievance Procedure
Introduction
The College of Engineering and Applied Science (CEAS) of the University of Colorado Denver Student Grievance Procedure is intended to provide a process for the resolution of disputes between students and faculty of the College, as well as procedures for handling student disciplinary matters. The following categories of disputes or disciplinary matters are provided for in the sections indicated below. Any question about these procedures should be directed to the Assistant Dean for Academic Program Development.
**Procedure**

The objective of this Student Grievance Policy and Procedure is to provide students with a mechanism to request a review of decisions and actions within the CEAS. There are a number of policies within the College and the University of Colorado Denver that address specific concerns and it is important that those matters are referred to the appropriate office or individual. For example, sexual harassment and gender or age discrimination are thoroughly addressed in the Equal Opportunity/Affirmative Action Policy, while others concerns may relate to the Academic Honor and Conduct Code or the Academic Progression policy. The Student Grievance Policy outlined below is designed to cover those issues that fall outside of existing policies in the College.

As part of their professional education, students sometimes must engage in and thus learn conflict resolution skills whenever they perceive a problem with a faculty member. These problems can be quite varied and range from a grade received or from the attitude of their instructors towards them. The first step for students in dealing with a perceived problem is to talk with the involved faculty member about the problem. The discussion should be done privately, for example, in the faculty member's office or in some other agreed upon location. This dialogue, which should occur within 30 calendar days of the incident, may shed light on the issue or provide the student with an adequate rationale for the event involving the faculty member. This type of informal dialogue between the parties involved can often resolve the issue. If students are hesitant to bring an issue to the attention of a faculty member, the College recommends that the student ask their advisor to be present when meeting with the faculty member. The Ombuds Office, a University resource available to all members of the University community to provide impartial and confidential discussion for individuals seeking to review options for informal resolutions of differences, is available to assist with this step if requested by the student.

If the issue between the faculty member and student cannot be resolved, the student may escalate the issue to the Chair of the Department where the faculty member resides. The conflict resolution meeting between the student and the faculty member and the Department Chair should occur as expeditiously as possible, but no later than 30 calendar days after the initial meeting with the faculty member.

In the event that either party is unavailable to meet within the 30-day requirement, the Assistant Dean for Academic Program Development may be contacted by the Department Chair to facilitate the scheduling of the meeting. If the problem is resolved through informal discussion, no further action is required. If the student, faculty member and Chair do not resolve the problem presented, the student then may wish to file a formal grievance. A formal grievance consists of two steps:

Step I is the Grievance/Formal Review Request. Step II consists of the Formal Resolution of the Grievance.

**STEP I: Statement of Grievance/Formal Review Request**

If the student and faculty member and Department Chair are unable to achieve a satisfactory resolution, the student may wish to initiate a formal review of the complaint. If that is the case, the student should complete the a Grievance/Formal Review Request Form and submit it to the Assistant Dean for Academic Program Development in the Office of the Dean of CEAS.

The submission of a Grievance/Formal Request Form initiates the formal grievance process. The student shall submit the written request to the Assistant Dean for Academic Program Development to initiate a formal review. The statement must include the course name and catalog number, the student(s)/faculty involved, a summary stating the specific policies or procedures involved and the specific actions upon which the grievance is based. The College recommends that this summary be kept to one typewritten page. Supplemental materials relevant to the complaint may be attached to support the grievance.

Students may obtain the Grievance/Formal Request Form from the Office of the Dean of CEAS or from the Department in which the student is housed.
STEP II: Formal Resolution of Grievance
During the formal review process, all parties involved may have a peer colleague of their choice present with them if any meetings are called. While that colleague may not formally participate in the meetings, they may provide advice and support.

The written grievance must be submitted within 10 calendar days after the informal meeting between the student, faculty member and the Department Chair has occurred. The Assistant Dean for Academic Program Development will then form a faculty committee that will be composed of two faculty members chosen from the five academic departments within CEAS and the Assistant Dean for Academic Program Development. No faculty member from the grieved department shall serve on the Grievance Committee. The Assistant Dean or his/her designee and the Grievance Committee will conduct an appropriate investigation into the matter and take whatever steps are appropriate.

The Assistant Dean for Academic Program Development or his/her designee will issue a written statement of resolution within 10 calendar days of close of the investigation. The decision of the Assistant Dean for Academic Program Development shall be final.

Preparation for Graduation

To become eligible for a Bachelor of Science (B.S.) in Bioengineering in the College of Engineering and Applied Science, a student, in addition to being in good standing in the university, must meet the following minimum requirements:

- **Courses:** The prescribed and elective work in the curriculum as determined by the bioengineering department must be completed satisfactorily.
- **Hours:** A minimum of 128 semester hours
- **Hours in Residence:** At least 30 semester hours of course work applicable to a Bachelor of Science degree in engineering must be taken at CU Denver while a declared student in good standing at the College of Engineering and Applied Science. Students must be enrolled in the college for at least the final two semesters of the degree prior to graduation.
- **Transfer Credit:** All requests for consideration of transfer credit and its application toward a degree in Engineering and Applied Science must be submitted prior to the student’s last two semesters at the Denver campus.
- **Grade Point Average (GPA):** A minimum cumulative GPA of 2.0 is required for all courses attempted (CU Denver GPA), for all required courses (program GPA) and for all courses taken within the student’s major department (department GPA).
- **Faculty Recommendation:** The recommendation of the faculty of the department offering the degree and the approval of the faculty of the College of Engineering and Applied Science is required.
- **Incompletes and Correspondence Courses:** It is the student’s responsibility to ensure that all incompletes and correspondence courses are officially completed before the 10th week of the student’s final semester in school.
- **Simultaneous Conferring of Degrees:** For any double degree program, both bachelor’s degrees must be conferred at the same commencement.
- **Commencement Exercises:** Commencement exercises are held in December and May. A student finishing in August is encouraged to attend commencement the following December.
Student Health and Wellness

All University of Colorado Denver students must adhere to the Code of Student Conduct. The Code serves to outline student rights and responsibilities as well as behavioral expectations. The Code of Student Conduct can be found at the Office of Student Conduct and Community Standards.

The Office of Student Conduct and Community Standards

The Office of Student Conduct and Community Standards serves as a resource to the entire University community through its efforts to meet the developmental and educational needs of students related to community expectations, civility and respect for self and others. A list of resources can be obtained at the Tivoli Student Union, Suite #277 or at http://www.ucdenver.edu/life/services/standards.

Police and Campus Safety

The University of Colorado Denver and the Anschutz Medical Campus is committed to the safety and security of our students, faculty, staff and visitors. Emergency personnel are available on both the downtown Denver Campus and Anschutz Medical Campus. Contact information is below.

Denver Campus:
Auraria Campus Police Department
1201 5th Street, Auraria Campus Administration Building (1st floor)
From Cell Phone: 303-556-5000
From Campus Phone: 9-1-1

The Phoenix Center of Auraria
The Phoenix Center at Auraria (PCA) serves the Auraria Campus. The Center provides free and confidential resources and assistance to survivors of interpersonal violence and their friends and families. Visit www.thepca.org/ for more information.

Anschutz Medical Campus:
The University Police Department, Anschutz Medical Campus
Building U-09, 12454 E. 19th Place.
For an emergency, dial 911.
For police dispatch and non-emergencies, dial 303-724-4444.

Student Support

The Department of Bioengineering's faculty and staff are committed to student success both in and out of the classroom and as such welcome student feedback.

Bioengineering Undergraduate Affairs Committee

The Bioengineering Undergraduate Affairs Committee (BUAC) is responsible for developing undergraduate procedures within the Department of Bioengineering. Students may speak with the undergraduate advisor regarding the BUAC's agenda.

Undergraduate Advising

The Department of Bioengineering is committed to providing excellent and personalized undergraduate advising and student support. The role of the undergraduate advisor is to:
- Assist students in identifying their short and long-term academic and career goals and create an educational plan that supports those goals.
- Facilitate appropriate course selection and registration.
- Help students navigate the dual-campus environment and refer to appropriate resources as needed.
- Facilitate faculty, student, industry and community networking opportunities.
- Help students engage in department and university-wide undergraduate experiences that will enhance their in-classroom work.
- Create “high-impact” out-of-classroom activities to support student engagement and success.

In addition to undergraduate advising, both pre-major and major students are encouraged to work with faculty and academic mentors to develop academic and career plans that meet their personal goals.

**Academic Mentoring**

The Department of Bioengineering makes a concerted effort to ensure that the undergraduate student body has the support and guidance they need to reach their academic potential. To meet this goal, the Department has established an academic mentoring program. Upper-division and/or graduate students within the department hold open office hours on the downtown campus and are available to discuss concerns and/or offer academic support on an as-needed basis.

**Internships and Career Planning**

The Department of Bioengineering strongly encourages students to participate in internships during their course of study. CU Denver's Experiential Learning Center is available to support such efforts, offering students workshops and activities to prepare them for both the job search and ‘on the job’ experiences. In addition, the Department of Bioengineering is actively developing partnerships with local and national industry professionals, in an effort to create a network of internship and mentoring opportunities for undergraduates. Students interested in pursuing internships should begin a conversation with the undergraduate advisor early in their college career.

**Research Opportunities**

Students interested in research experience should consider applying to the University of Colorado Denver's Undergraduate Research Opportunity Program (UROP). Information about UROP can be found at www.ucdenver.edu/student-services/resources/ue/UROP. The Department of Bioengineering faculty is highly supportive of students applying for UROP and welcome student requests for mentorship and advising. Interested students should speak with the undergraduate advisor for more information.

**The Office of Campus Student Services (Anschutz Medical Campus)**

The Office of Campus Student Services' mission is to enhance student life at the Anschutz Medical Campus of the University of Colorado Denver by providing excellence in specific non-academic and academic student services. They are located on the Anschutz Medical Campus in Education II North – Third Floor Suite, 3123.

**University-wide Student Services**

The University of Colorado Denver supports students in all aspects of their personal and academic lives. The Office of Student Life, The Learning Resources Center and the Student and Community Counseling Center are just a few of such resources. Undergraduate Advising within the Department of
Bioengineering is prepared to help students navigate the university environment and identify the services best suited to meet their needs.

**Department Events**

To foster a sense of community, the department holds several events each year.

**Orientation**

This campus-wide event is required for undergraduate students admitted as new freshmen. In addition to learning more about CU Denver, students will have an opportunity to meet with the undergraduate advisor or another representative of the bioengineering program to discuss course selection and registration.

**New Student Welcome**

All students new to the Department of Bioengineering (freshmen, transfers, major changers etc.) are invited to attend the annual New Student Welcome on the Anschutz Medical Campus. The Welcome will provide students an opportunity to meet their classmates, speak to continuing students, hear from faculty and learn more about the department’s culture, opportunities and resources.

**Recruitment and Community Events**

As part of the bioengineering community, students may be asked to participate in recruitment and community events sponsored by the department. These may include open houses, high school visits, laboratory tours, conferences etc.

**Other Department Events**

Historically, the department hosts a holiday party in December and an end-of-year celebration in May. Special events such as going-away parties and department outings may also occur.
Department Directory

Bioengineering Staff

Karen Gilbert, Grants and Development Coordinator
Phone: 303.724.7296 · Email: karen.gilbert@ucdenver.edu · Office: RC2 6011
*Go to for:* undergraduate research support, Industrial Advisor Committee (IAC)

Kate Hoch, Department Administrator for Finance and Administration
Phone: 303.724.6280 · Email: kate.hoch@ucdenver.edu · Office: RC2 6012
*Go to for:* budget, spending, hiring approval

Dr. Shawna McMahon, Graduate Program Coordinator
Phone: 303.724.5893 · Email: shawna.mcmahon@ucdenver.edu · Office: RC2 6018
*Go to for:* all things graduate program, room reservations, purchasing, meeting scheduling (especially with Dr. Shandas), payroll, badge

Angela VanDijk, Undergraduate Program Coordinator and Advisor
DC Phone: 303.556.5849 · Email: angela.vandijk@ucdenver.edu · DC Office: North Classroom 2204
AMC Phone: 303.724.9972 · AMC Office: RC2 6011
*Go to for:* undergraduate admissions and curriculum information, advising, student services and support

Bioengineering Faculty

Dr. Robin Shandas, Professor, Department Chair & Program Director
Phone: 303.724.4196 · Email: robin.shandas@ucdenver.edu · Office: RC2 6111
*Go to for:* director approval, feedback on program, significant grievances

Dr. Richard KP Benninger, Assistant Professor
Phone: 303.724.6388 · Email: richard.benninger@ucdenver.edu · Office: Barbara Davis Center 4306-D
*Go to for:* imaging questions, tech questions, diabetes *questions*, rotation questions, curriculum concerns

Dr. Cathy Bodine, Associate Professor
Phone: 303.315.1281 · Email: cathy.bodine@ucdenver.edu · Office: Assistive Technology Partners
601 East 18th Avenue, Suite 130, Denver CO 80203
*Go to for:* assistive technology questions, rehabilitation questions

Dr. Emily Gibson, Assistant Professor
Phone: 303.724.3678 · Email: emily.gibson@ucdenver.edu · Office: RC2 8112
*Go to for:* quantitative questions, imaging questions, cellular biophysics questions

Dr. Kendall Hunter, Assistant Professor
Phone: 303.724.4197 · Email: kendall.hunter@ucdenver.edu · Office: RC2 6018
*Go to for:* quantitative modeling questions, admissions questions

Craig Lanning, Research Instructor
Phone: 303.777.8472 · Email: craig.lanning@ucdenver.edu · Classroom: North Classroom 2206
*Go to for:* 3D modeling questions, MatLab questions, 3D printing questions

Dr. Daewon Park, Assistant Professor
Phone: 303.724.6947 · Email: daewon.park@ucdenver.edu · Office: RC1 North 4118
*Go to for:* polymer questions, drug delivery questions, Graduate Committee questions
Dr. Richard Weir, Research Associate Professor
Cell: 847.912.1032 • Email: richard.weir@ucdenver.edu • Office: A01 2519
Go to for: prosthetic questions, 3D printing questions