

THE COLLEGE OF ENGINEERING AND MATHEMATICAL SCIENCES

<http://www.uvm.edu/~cems/>

The College offers stimulating, professionally-oriented programs for students interested in pursuing cutting-edge careers in the fields of engineering, computer science, mathematics, statistics, data science, and physics. Each undergraduate program in the College contains a core curriculum, which prepares students to succeed in an increasingly interdisciplinary, diverse, and innovative global community. Each program offers unique opportunities for students to actively engage in their learning experience and to develop as individuals and as global citizens. In addition to building technical acumen, the core curriculum supports students as they develop competencies in professional ethics, technical communication, teamwork, leadership, and data dexterity. Coursework provides multiple active, project-based, field- and service-learning opportunities. Professional development is offered in the form of elective courses, internships, research experience, and other high-impact practices. Students can expect a well-rounded academic experience, including required courses in the humanities and social sciences, mathematics, and computer programming as well as intensive faculty interaction and a culminating capstone experience.

MAJORS

Biomedical Engineering B.S.BME.

Civil Engineering B.S.CE.

Computer Science B.S.CS.

Computer Science and Information Systems B.S.

Data Science B.S.

Electrical Engineering B.S.EE.

Engineering B.S.E.

Engineering Management B.S.EM.

Environmental Engineering B.S.EV.

Mathematics B.S.MSC.

Mathematics Co-Major

Mechanical Engineering B.S.ME.

Physics B.S.

Statistics B.S.MSC.

MINORS AND CERTIFICATES

Astronomy

Autonomy and Robotics - Undergraduate Certificate

Computer-Aided Engineering Technology - Undergraduate Certificate

Computer Science

Electrical Engineering

Geospatial Technologies

Mathematics: Pure

Physics

Semiconductor Engineering and Physics - Undergraduate Certificate

Statistics

Sustainable Energy Engineering

REQUIREMENTS

LAPTOP REQUIREMENTS AND RECOMMENDATIONS

Engineering Programs and Physics

Engineering is a professional field that leverages mathematics and the sciences to design and implement solutions to societal problems. Along with the fundamentals of math and science, practicing engineers must utilize computational tools to accomplish their tasks. With this reality in mind, all UVM engineering programs and physics require students to have a laptop computer. The engineering laptop is large enough to enable students to design complex CAD models and powerful enough to allow instructors to incorporate computational analysis and numerical examples in the classroom for immediate and powerful praxis of engineering theory.

Mathematics, Statistics, Computer Science and Data Science Programs

The computer is an essential tool for learning and professional work in all CEMS programs, and students utilize computing technologies throughout the CEMS curricula. The laptop requirement in the Mathematics, Statistics, Computer Science or Data Science programs specifies a laptop that is designed to provide ample power and meet a student's needs throughout the duration of their studies.

Laptop specifications are available on the CEMS website.

DEGREE REQUIREMENTS

All students must meet the Degree and University Requirements.

All students must meet the Catamount Core Curriculum Requirements.

CEMS CORE CURRICULUM

The Catamount Core and the CEMS Core Curriculum work in tandem to support the vision and mission of the University of Vermont. General education requirements, including those in

the arts, social sciences and humanities are satisfied through the Catamount Core. The CEMS Core Curriculum provides additional requirements in technical communication, teamwork and leadership, data dexterity, and professional ethics, tailored to the objectives of the various programs in CEMS. Students must also complete the college first year seminar, professional development electives, and a senior capstone experience.

First Year Seminar

The First Year Seminar CEMS 1500 is designed for all first-year students in the college. Students transferring in after the first semester should work with their academic advisor to identify an appropriate substitution as approved for their major. The course used to fulfill the CEMS 1500 requirement cannot be used to fulfill another requirement in the major.

Professional Development

The professional development requirement prepares students for a career in their chosen field through career preparation, internship, research, and other professional elective courses. Students are required to complete one credit of professional development coursework as described in the requirements section for each major.

Senior Capstone Experience

Senior capstone experience courses provide students the opportunity to integrate and apply knowledge gained over the duration of their program, often in the context of a semester-long project. Students must complete three credits of capstone experience. The capstone experience includes courses in Biomedical Engineering (BME 4600 & BME 4650), Electrical and Mechanical Engineering (EE 4100 & EE 4200, ME 4010 & ME 4020), Civil and Environmental Engineering (CEE 4950), Computer Science (CS 3020, CS 3050, CS 3060, CS 3250, CS 3280, CS 3540, CS 3750), Mathematics (MATH 4344, MATH 4788, MATH 4996), and Statistics (STAT 4810, STAT 3996). Students in Physics may fulfill the capstone requirement by completing PHYS 4110 and one of the following courses: PHYS 4991, PHYS 4993, PHYS 4995, PHYS 4996.

REGULATIONS

ACADEMIC STANDARDS

The required minimum semester and cumulative grade point average (GPA) for good academic standing in the College of Engineering & Mathematical Sciences (CEMS) is 2.00. Additional regulations for each CEMS degree are outlined in the individual department, program or degree sections of this catalogue.

Academic performance is reviewed at the end of each regular (fall and spring) semester. CEMS Student Services – a division of the CEMS Dean's Office – is responsible for reviewing academic performance and notifying students who are not in good academic standing. Notification of trial status and dismissal for low scholarship is sent to the student's UVM email account.

Criteria for Placement on Trial

A student earning less than a 2.00 semester or cumulative GPA will be placed on trial.

Criteria for Continuation on Trial

A student who has been on trial for one or more semesters but does not meet the criteria for removal from trial or dismissal for low scholarship (see below) will be continued on trial.

Criteria for Dismissal for Low Scholarship

A student earning less than a 2.00 semester GPA for two successive semesters, or less than 2.00 cumulative GPA for three successive semesters will be dismissed for low scholarship. A student will be dismissed for low scholarship only after the student has been on trial for the preceding graded term of attendance.

Appealing Dismissal for Low Scholarship

A student who has been dismissed for low scholarship normally has the opportunity to appeal the dismissal in writing to the CEMS Studies Committee within the timeframe stipulated in the dismissal letter. As a condition of a student's reinstatement following an initial dismissal, the CEMS Studies Committee may prohibit a future dismissal appeal as specified in the student's reinstatement letter.

Criteria for Removal from Academic Trial

A student who has been placed on trial or continued on trial is removed from trial when both the semester and cumulative GPA are 2.00 or higher.

DISMISSAL FOR LOW SCHOLARSHIP

First Dismissal

A student who is dismissed for low scholarship for the first time is dismissed from CEMS and UVM for a full academic year. If dismissal occurs at the end of fall semester, the student will be suspended from continued enrollment through the end of the following fall semester. If dismissal occurs at the end of spring semester, the student will be suspended from continued enrollment through the end of the following spring semester. (Note: A student dismissed at the end of spring semester is eligible to return in the summer or fall term of the following year).

Second Dismissal

A student who is dismissed for low scholarship for the second time is dismissed from CEMS and UVM for two full academic years.

Third Dismissal

A student who is dismissed for low scholarship for the third time is dismissed from CEMS and UVM. The third dismissal for low scholarship is final.

READMISSION AFTER DISMISSAL

A dismissed student who presents evidence of the ability to perform satisfactorily may be considered for readmission on trial. A student who has been dismissed for low scholarship for a second time will not

be considered for readmission on trial until at least two years have elapsed. A student who has been dismissed for low scholarship for a third time will only be considered for readmission if the student is granted an Academic Reprieve. Further information regarding readmission may be obtained from CEMS Student Services.

A student must earn a minimum 2.00 semester GPA the first semester after readmission. A student must raise the cumulative GPA to at least 2.00 by the end of the second semester after readmission, or earn a minimum semester GPA of 2.50 during the second semester back and all subsequent semesters until the cumulative GPA is 2.00 or higher. A student who fails to meet these academic performance requirements will be dismissed for low scholarship.

For additional information on academic standing and the trial, dismissal and readmission processes, please contact CEMS Student Services.

INTERNAL TRANSFER GUIDELINES

Students currently enrolled in another College or School at UVM who would like to transfer into or pursue a dual degree in CEMS should complete the appropriate form(s) available through the myUVM portal. In order to be admitted for transfer into CEMS, internal transfer applicants must be in good academic standing (not currently "on trial") in their current program(s) of study and have no pending incompletes in current or previous coursework.

Internal transfer inquiries are welcome at any time of the year. Exceptions to the requirements and timeline outlined below may be considered for students with extraordinary circumstances. To discuss the internal transfer process and curriculum matters, please contact CEMS Student Services.

MAJOR(S)	MINIMUM GPA (cumulative & semester)	ADDITIONAL GPA RESTRICTIONS	PREREQUISITE COURSES/ GRADES
Engineering (All)	2.0	Minimum 2.0 in Engineering, Mathematics, Statistics, Physics, Chemistry and Computer Science coursework	MATH 1234 w/ B- or higher OR MATH 1212 w/ B or higher; lab science course w/ C or higher
Computer Science; Computer Science & Information Systems	2.0	Minimum 2.0 in all courses with CS prefix	One of CS 1080, CS 1210 w/ C or higher

Mathematics; Statistics	2.0	None	MATH 1234 w/ C or higher OR MATH 1212 w/ B or higher
Data Science	2.0	None	MATH 1234 w/ C or higher OR MATH 1212 w/ B or higher & one of CS 1080, CS 1210 w/ C or higher
Physics	2.0	None	None

TRANSFER APPLICATION TIMELINE

Fall Transfers

Students who wish to begin a CEMS major at the start of the fall semester are strongly encouraged to complete the application process by July 1st. CEMS cannot guarantee consideration of applications submitted during the fall add/drop period until after the close of the fall semester. All internal transfer requests submitted after the fall add/drop period will be considered after the close of the fall semester.

Spring Transfers

Students who wish to begin a CEMS major at the start of the spring semester are strongly encouraged to complete the application process by January 1st. CEMS cannot guarantee consideration of applications submitted during the spring add/drop period until after the close of the spring semester. All internal transfer requests submitted after the spring add/drop period will be considered after the close of the spring semester.

POLICY ON INTERNSHIPS FOR ACADEMIC CREDIT

Rationale for a Policy

Internships provide CEMS students the opportunity to gain practical, hands-on experience in their disciplines. Students are able to apply what they learn in the classroom within a real-world setting and, in turn, bring knowledge and skills gained in the field back to the classroom. When combined with related academic coursework, internship experiences are valuable educational experiences.

Policy Provisions

- Academic credit for internships within the College of Engineering & Mathematical Sciences (CEMS) is offered in accordance with the University's Academic Internships Policy.
- All internships for credit are overseen and facilitated by the CEMS Career Readiness Program. This enables CEMS to:
 - Appropriately advise students on the academic implications of internship credit.
 - In collaboration with the Office of International Education, appropriately advise international students on internship credit as it relates to their visa requirements.

- c. Hold students accountable for establishing goals and objectives that relate to their curricula.
 - d. Work with employers to ensure that the internship experience aligns with college and program objectives.
 - e. Collect, track and report data on the internship experiences of students and employers.
 - f. Establish a feedback loop for continuous process improvement.
3. Determinations of the applicability of internship credits toward degree requirements are determined by each department and/or program within CEMS. Each credit requires a minimum of 40 hours per semester. For example, 3 credits require a minimum of 120 hours, or at least 8 hours per week during a 15-week semester or 10 hours per week during 12 weeks in the summer.
 4. Students are responsible for confirming with their academic advisor that internship credits will count toward their degree plan before the beginning of the semester of their internship.
 5. Instructor permission overrides are required for registration and overrides will be processed only after a completed Learning Agreement with signatures from the internship supervisor and the student are emailed to the CEMS 2991 Instructor.
 6. The Internship Learning Agreement must be submitted by the add/drop deadline for the semester the internship will be completed.
 7. CEMS Internships for credit are allowed during fall, spring, and summer terms and are not allowed during winter break.
 8. International students are required to meet with the Office of International Education to understand how immigration status impacts paid internship opportunities before requesting a registration override into SINT or CEMS 2991.
 9. All CEMS internships for credit will be graded S/U.

INTERNSHIP COURSE APPLICABILITY BY DEGREE

CEMS 2991 counts toward up to 3 credits of free electives for the following degrees:

Civil Engineering B.S.
 Computer Science B.S.
 Computer Science and Information Systems B.S.
 Data Science B.S.
 Electrical Engineering B.S.
 Engineering B.S.
 Engineering Management B.S.
 Environmental Engineering B.S.
 Mathematical Sciences - Mathematics B.S.
 Mathematical Sciences - Statistics B.S.

CEMS 2991 does not count toward the following degrees:

Biomedical Engineering B.S.
 Mechanical Engineering B.S.

UVM PATRICK LEAHY HONORS COLLEGE

CEMS students who are co-enrolled in the University's Honors College must follow the requirements outlined in the Honors College section of this catalogue. Specific PLHC coursework is required for first year students and sophomores. CEMS students must follow the steps outlined on the PLHC website while writing their Honors College thesis. Note that prescribed deadlines are based upon a standard eight semester path to graduation in which students enroll in thesis credits during the fall and spring semesters of a single academic year. Deadlines will be appropriately adjusted for students following an alternate path. Such students are expected to work closely with the Honors Thesis Advisor to designate deadlines.

Students are strongly encouraged to do a semester of paid research experience for undergraduates by the fall of junior year or participate in a summer research experience.

The College offers PLHC seminars each semester (about 2 / semester). Students are required to participate in at least three over the course of their sophomore and junior year.

Thesis Prep

CEMS Honors College students must do the following during the junior year:

1. Enroll in CEMS 2010 (1 credit - fall semester). This course introduces students to a variety of careers through industry and faculty speakers. It also provides examples of prior thesis work. Students choose an advisor by the end of the course.
2. Enroll in CEMS 2020 (1 credit - spring semester). Students learn research methods and work with their advisors to finish a thesis proposal.
3. Identify an Honors Thesis Advisor and an Honors Thesis Committee. The Committee is comprised of two members, including the advisor. At least one Committee member must be in the student's major department.

Thesis Proposal

In CEMS 2020, CEMS/PLHC students prepare a five-page thesis proposal, which should include sections on background, related literature, a specific work plan, and the anticipated format of the final thesis. This proposal should be submitted to the student's Honors Thesis Committee during CEMS 2020; The student's advisor will notify the appropriate CEMS PLHC Representative that a thesis project has been approved. Students that have already developed a thesis proposal by their junior year may request a course substitution or waiver for CEMS 2020 with approval of the instructor and their academic advisor.

Thesis

CEMS Honors College students must enroll in a two-semester, six-credit Honors Thesis Course sequence. Course sequences vary by department. The following options exist:

1. The College Honors thesis credits can be taken in the fall and spring of the senior year. This is the most common option, and the thesis must be defended by April 15.
2. With proper planning students can complete their proposal in the fall of the junior year and do their thesis in the spring of junior year and fall of senior year.
3. 3 credit industry internship for credit (CEMS 2991 or 2991 in the major) followed by 3 credit thesis credits in the same topic. This would require coordination with industry partners & the supporting faculty member. This would be for summer of junior year and fall of senior year.
4. 3 credit PLHC Undergraduate Research Experience (REU) in the spring of junior year followed by paid summer research and 3 credits of thesis in the fall of senior year. Or, 3 credits PLHC REU in the summer followed by 3 credits of thesis in the fall of senior year.

In cases 2 and 3, the thesis is submitted in the fall of the senior year and must be defended by November 10. Coordination with industry requires prior planning to ensure that the industry project is consistent with the thesis proposal.

Students who defend a thesis are required to participate in either the CEMS undergraduate research conference or the UVM undergraduate research conference.

When thesis credits are spread across two semesters, students making satisfactory progress towards completion of the thesis during the first semester are awarded a grade of Satisfactory Progress (SP) for a semester of thesis research, and course credit is awarded. Students not making satisfactory progress toward the thesis earn a grade of Unsatisfactory Progress (UP), and no credit is awarded. When the student finishes the second semester and earns a final grade, the instructor assigns that grade for the second semester, and changes the grade of SP that had been entered for the previous semester to match the final grade. The temporary SP grade does not affect a student's GPA. Once the final grade is entered and the SP is converted to a standard letter grade, that letter grade is calculated as part of the GPA.

Timing of specific thesis progress reports is at the discretion of the student's Honors Thesis Advisor and the student's Honors Thesis Committee, and should be consistent with the approved thesis proposal, as described above. The thesis is due to the student's Honors Thesis Committee by April 1 of the senior year.

Thesis Defense

Students must give some public oral presentation of the thesis, within two weeks following the initial thesis submission, and no later than April 15 of the senior year. The presentation should be about thirty minutes long, and must be attended by the Honors Thesis Committee and announced publicly at least one week prior to the presentation date. No formal evaluation is associated with the presentation, which should serve as a discussion of the thesis, with the goal of providing constructive suggestions towards improving the final manuscript. A final grade for the thesis is assigned by the thesis

advisor, who also makes the determination as to whether or not the thesis work warrants honors designation. All revisions are due by April 30.

DEPARTMENTS AND PROGRAMS

Civil and Environmental Engineering

Electrical and Biomedical Engineering

Mechanical Engineering

Interdisciplinary Engineering Programs

Computer Science

Mathematics and Statistics

Physics