



The University of Vermont
COLLEGE OF ENGINEERING
& MATHEMATICAL SCIENCES

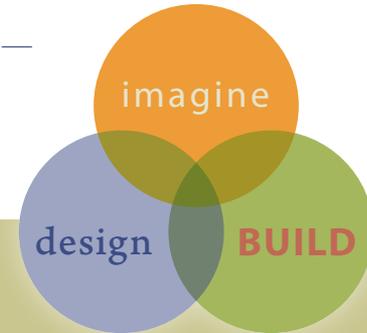


UNDERGRADUATE STUDIES 2016-2017

We imagine
design and build **A BETTER FUTURE**



CEMS is a vibrant collection of outstanding departments and programs and home to **one school** — **the School of Engineering** — **and two departments** — **the Department of Computer Science** and **the Department of Mathematics and Statistics**.



WE IMAGINE, DESIGN AND BUILD A BETTER FUTURE.

The College of Engineering and Mathematical Sciences (CEMS) is creating real-world solutions to the increasingly complex challenges our society faces. In everything we do, our focus is on innovation, interdisciplinary problem solving, critical thinking and sophisticated quantitative skills, all of which prepare our students for success in an increasingly specialized and globalized work force. Our graduates are in high demand.

CEMS' programs include fields where student and faculty research is making an impact:

- **Civil Engineering:** plan, design, construct, preserve and rehabilitate safe and resilient infrastructure such as bridges, highways, buildings, dams, and smart transportation, water supply, energy and waste networks. Play an integral role in creating a sustainable world and enhancing the global quality of life.
- **Electrical Engineering:** design and implement alternative energy solutions, including a smarter grid; create the latest silicon chips used in smartphones; build mobile wireless computing platforms; develop electronic control systems that enable drones and self-driving cars; and work on biomedical electronics and sensors.
- **Mechanical Engineering:** design a lunar bot and space habitation facility for space exploration; push the boundaries of aerospace and ground transportation technologies to reduce pollution; improve sustainable energy systems such as wind power and solar energy; develop new materials and sensors to improve health care; design 3D printing technologies to address the emerging needs of manufacturing.
- **Environmental Engineering:** integrate quantitative methods with sustainable design and process understanding to solve contemporary environmental problems and protect public health. Address climate adaptation and mitigation, natural resource depletion, air pollution, water and wastewater management, groundwater contamination, alternative energy sources and community development.
- **Computer Science:** create innovative mobile and web apps with user-friendly interfaces. Develop efficient and intelligent algorithms to solve a variety of problems, such as finding useful patterns in big data and creating adaptive robots through simulated evolution. Engineer the software of the future in this Digital Age.
- **Mathematics & Statistics:** develop critical thinking, hone problem-solving skills and gain the tools necessary to analyze data. Learn to navigate a data-centric world where mathematical modeling and statistical analyses are integral to finance, medicine, climate, engineering and the world's most monumental challenges.

Join our vibrant CEMS community to:

- **Study with veteran and emerging teachers and researchers.** Many CEMS professors are top researchers who have been recognized for unique and groundbreaking contributions in their fields. CEMS is fortunate to have numerous faculty members who are winners of early career awards --highly competitive, prestigious national awards for research contributions made early in one's career.
- **Learn-by-doing** in your first-year introductory design courses, then continue to conduct hands-on research throughout your undergraduate years by joining student teams and individual faculty members to work on socially relevant projects.
- **Gain hands-on internship and cooperative experience** that can be applied to an exciting career in a STEM field.
- **Earn a Bachelor's and Master's** in five years through CEMS' Accelerated Master's Program.
- **Participate in a club or association** such as the award-winning Alternative Energy Racing Organization (AERO); the Society of Women Engineers (SWE); the Society of Women in Computer Science (SWICS); CS Crew; American Society of Mechanical Engineers; American Society of Civil Engineers; and others.
- **Succeed in national and international competitions** such as the Society of Automotive Engineers/Institute of Electrical and Electronics Engineers Formula Hybrid International Competition; American Institute of Steel Construction/American Society of Civil Engineering National Steel Bridge Competition; and NASA's Great Moonbuggy Race.
- **Join UVM alumni** who have been accepted into graduate schools at Columbia, MIT, Stanford and other respected institutions.
- **Begin your career** at companies including Google, Amazon, IBM, Chrysler, NASA, General Dynamics, General Electric, Ford Motor Co., Mariner Petrochemical and others.
- **Start your own business**, following UVM alumni who have founded Microstrain and BioTek Instruments.





Dean's Welcome

CEMS is a uniquely structured, STEM-oriented college within a comprehensive university setting. The College is set up to provide you with excellent professional preparation along with a holistic undergraduate experience. Within CEMS, you will enjoy a cross-pollination of ideas among engineers, computer scientists, mathematicians, and statisticians. Our College is the ideal laboratory to prepare you for the modern multidisciplinary work environment.

It is a particularly exciting time to join CEMS. Society is looking to a well-educated Science, Technology, Engineering & Mathematics (STEM) workforce to expand energy options, develop clean water sources, advance transportation and communication systems, aid medical discoveries and

participate in a host of other challenging opportunities that are shaping a better world. Through our uniquely supportive, holistic and rigorous educational approach, we hope to support you in becoming not just a problem solver, but also a problem definer. I look forward to welcoming you to CEMS and having you join our close-knit community and realize your academic and personal potential.

Sincerely,

Luis Garcia, Ph.D.

Dean and Barrett Foundation Professor
College of Engineering and Mathematical Sciences



What's new in CEMS?

UVM BREAKS GROUND ON STEM COMPLEX

CEMS students and faculty will reap the benefits from UVM's \$104 million Science, Technology, Engineering and Mathematics (STEM) complex, the university's largest-ever capital project. Expected to be completed by June 2018, the complex will include 191,000 square feet of new construction, as well as the renovation of CEMS' Votey Hall.

BURLINGTON: AN EMERGING TECH CENTER

Burlington is making headlines as an entrepreneurial, high-tech center where creative minds mingle. In 2015, *Forbes* listed Vermont's largest city as one of the country's top 10 most innovative tech hubs. A recent *Atlantic Monthly* story called Burlington a "Silicon Valley in Vermont." The Kauffman Foundation ranked the state of Vermont No. 5 in the U.S. for business start-ups. The UVM-based Vermont Center for Emerging Technology was ranked by the University Business Indicator Index as the 11th best university- and college-oriented business incubator globally and the 5th best nationally.



RICHARD BARRETT SCHOLARSHIPS

Barrett Scholars conduct inquiry and investigations that make original intellectual or creative contributions to the engineering discipline. The program provides prestigious, competitive awards to outstanding undergraduate engineers who wish to pursue a specific research project under the mentorship of a faculty member.



CEMS INTERNSHIPS

The college's new internship coordinator, Alicia Ellis, is revamping the internship program to ensure more students benefit. Last summer, several students in CEMS' competitive paid internship program worked in fields ranging from Environmental Engineering at Casella Waste Systems Inc. in Vermont to IT development at State Street in Massachusetts. In 2016, many more students will win competitive placements. Beyond the competitive program there are even more opportunities for students to land jobs and paid internships, network with potential employers and attend resume workshops.

Jessie Johnson
Civil Engineering major
Class of 2015
[Shelburne, Vermont]



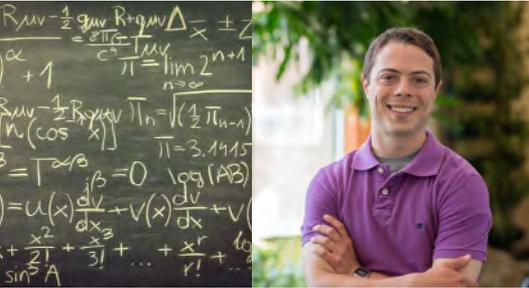
“Try everything...you’d be amazed at how fast four years goes by.”

At UVM, Jessie has enjoyed learning by trying new things. She put that into practice early on when she switched her major from Biology to Civil Engineering. While she finishes her degree, she is working as field office engineer for PC Construction, which is building UVM’s new STEM complex. “I’m very interested in green engineering, sustainable construction practices and energy efficiency, so hopefully I’ll figure out a way to get a permanent job in that field,” she says. Jessie’s involvement with groups and activities has been a highlight of her time at UVM. She’s a founding member of CEMS’ peer mentoring club and has held officer positions in her sorority, Delta Delta Delta, in addition to working as a group fitness instructor at local gyms. “I have learned from these experiences that leadership is something I absolutely love. Leadership challenges me and helps me grow by pushing me to become more self-sufficient and curious,” she says. Jessie also spent a full year in Wales during her junior year. “I didn’t want to be a tourist, I wanted to be a part of a community. It was the best educational decision I have made.”



While studying abroad in Wales,
Jessie traveled the Amalfi Coast.





Nick Strayer
 Statistics major
 Class of 2015
 [Chelsea, Michigan]

After graduating from CEMS in May of 2015 with a Statistics major, Nick was accepted into the biostatistics doctoral program at Vanderbilt University School of Medicine on a fellowship. “After my Ph.D., I hope to find a faculty position that will allow me to give the same fantastic research and teaching experiences I’ve had at UVM to my own students,” he says. Nick had many resume-building experiences at UVM. In addition to attending and presenting his research at academic conferences, he developed a winning project for UVM’s Computer Science Fair: a way to teach sign language using gesture recognition and 3-D graphics. “This taught me how to bring a product from idea to fruition that is attractive and useful to others,” he says. It also generated multiple internship offers from companies. Among many memorable CEMS professors, Richard Single introduced Nick to biostatistics. “He showed me how my propensity for the quantitative could be channeled into something that has the ability to truly help people and make a difference.”

“UVM faculty knew not only my name but my story, and that is absolutely invaluable.”

Diane Brown
Environmental Engineering major
Class of 2016
[Elkridge, Maryland]



*“People are here to help
you and want to see
you be successful.”*

A big reason Diane wanted to attend UVM was to be part of the varsity swimming and diving team, for which she swims the sprint freestyle. A big reason she has been satisfied in CEMS is the faculty, students and staff. “People are so friendly, accepting and versatile,” she says. “Everyone really gets involved in the UVM community.” Diane’s major, Environmental Engineering, is a field in great demand to address the global challenges of climate change, energy sustainability and other environmental concerns. “I was most interested in the new technology involved in the environmental movement,” she says. Among the faculty Diane has been most impressed by are Alison Pechenick and Huijie Lu. Pechenick “made MATLAB coding not seem so scary to someone who has never programmed before,” Diane says, and with Lu, “Everything you do seems directly related to working in the field.”







Michelle Marin

Computer Science and Information Systems major

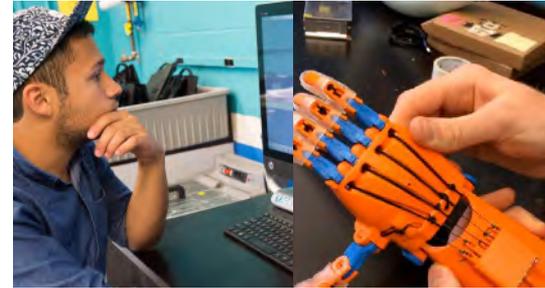
Class of 2017

[Montreal, Quebec]

Michelle has found her home in the CEMS Computer Science department. With inspiring professors and helpful peers, it's a tight-knit group. "Our teachers know us, and we all know each other, and we try to help each other out. We are all in it together," she says. "The awesome part about the department is how all the teachers are very supportive. They really care about their students and push us to do better." Michelle is president of the Society of Women in Computer Science (SWICS). "That has helped me learn a lot about what it means to be a leader. One of the most important things -- and it applies everywhere -- is to not be afraid to ask for help," she says. Michelle encourages new students to get involved in activities early on. "It doesn't really matter what you join. There are so many things to do at UVM, you're sure to find something you'll like."

"I'm encouraged by the Computer Science department to take leadership in my field. Through this leadership I find valuable opportunities that advance my educational goals and career prospects."

Alex Hoffman
Mechanical Engineering major
Class of 2016
[Demarest, New Jersey]

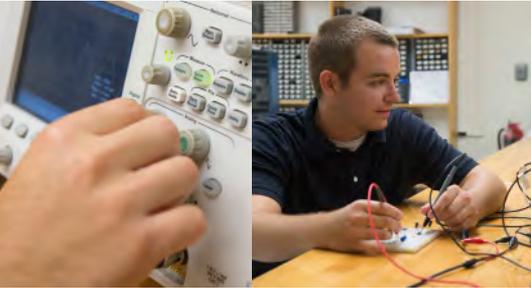


“Burlington is super attractive because of the quality of life, the food and art scene and the proximity to the lake and mountains for outdoor activities.”

Alex’s Mechanical Engineering experience has diverse applications. And he’s keeping his career options wide open, maybe hybrid-electric vehicle power-train systems, space or nuclear technology. His CEMS professors have inspired him to explore varied opportunities. “William Louisos has helped me make a ton of interdisciplinary connections through his insanely thought-provoking lectures. Yves Dubief highlighted the importance of Computer Science in engineering. Both started at the fundamental level explaining the underlying phenomena, then built upon the concepts until we could solve real-world problems. Neither coddled the students,” he says. Alex, assistant outreach coordinator for the UVM Society of Women Engineers student chapter, appreciates the friendliness of CEMS faculty and staff. His friendly advice for incoming CEMS students is this: “Don’t blow off the introductory classes, learn computer programming, be organized, talk to the professors. Ask questions and make friends in your major,” he says.







Nick Medor

Electrical Engineering major

Class of 2017

[Swanton, Vermont]

As a native Vermonter whose brother graduated from UVM's Grossman School of Business, it's no surprise Nick chose UVM. He has taken advantage of hands-on opportunities as he explores career options in Electrical Engineering. An internship last summer with the Rutland-based Vermont Electric Power Company (VELCO) gave him invaluable exposure to power systems and the power industry. In VELCO's System Protection Department, his duties included basic wiring, interpreting plans and labeling equipment. "I was fortunate to be given incredibly meaningful work that will help me determine whether I want a career in power engineering." A highlight was touring the headquarters of ISO New England, which controls the region's power grid. Nick is a member of UVM's Institute of Electrical and Electronics Engineers (IEEE) and is an avid broomball player. "IEEE is great for professional development, and broomball is a good complement to my serious and rigorous academic program," he says. "Some teams take broomball to the next level, but we're out there to have fun."

"Don't be afraid to branch out and get involved in a club or two, but also don't let your academics take a back seat."

Blake Colyer
Math major
Class of 2016
[Scotia, New York]



“The students, professors and campus exude a positive energy that I was immediately drawn to.”

The learning environment at UVM has given Blake all the support she has needed—and all the stimulation. She cites CEMS faculty members Kenneth Golden and Richard Foote as being among her mentors. “Their wealth of knowledge and passion for the subject is obvious from the moment you step into the classroom. Their constant enthusiasm and willingness to aid you in reaching that ‘aha’ moment greatly eased the pain of endless mathematical proofs. My own passion for Mathematics certainly burned brighter after a semester with these great professors,” Blake says. She put the computer and analytical skills she gained through her coursework to use in her Summer 2015 internship at software developer IXIS, and is looking forward to doing the same as she begins her career. Blake’s advice for new students is, “Don’t be afraid to be afraid. You have come to a wonderful place full of like-minded people, so don’t be scared to put yourself out there. There is a wonderful amount of open-mindedness and it is very easy to be yourself here.”



THE SOCIETY OF WOMEN IN COMPUTER SCIENCE (SWICS)

The goal of the Society of Women in Computer Science is to create an environment where women support each other, share ideas and offer advice so that they can excel in the field of CS. The society's mission includes providing opportunities for professional and social development in the CS field and mentorship and support for women entering the field. Group activities include supporting informational and social networks and funding participation in educational and professional conferences. Every year the group chooses a local community project.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

The American Society of Civil Engineers (ASCE) is a club dedicated to the professional development of student members. The club's goals are to integrate the student chapter into the professional engineering society; to provide a productive and fun environment by offering site visits, guest speakers, social activities, involvement in engineering competitions; and to seek opportunities to work on engineering projects for the betterment of the community. ASCE members compete in one of the biggest and most renowned engineering competitions in the nation: the AISC/ASCE National Student Steel Bridge Competition.



Student Clubs

ALTERNATIVE ENERGY RACING ORGANIZATION (AERO)

The Alternative Energy Racing Organization (AERO) is a student run club that competes in the SAE Formula Hybrid competition. This is an international

competition to test a team's ability to design and compete with hybrid and electric race cars. AERO has been a competitor since 2007, most recently earning the 'GM Best Engineered Hybrid System' award with its current car and 4th generation GreenSpeed4. Looking to the future a more refined drivetrain is in the works for the 2016 competition and a whole new car for the 2017 event.

INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS (IEEE)

The UVM IEEE Club engages students in skill-building activities, both technical and career-developing, to prepare them for the professional working environment. IEEE holds various workshops throughout the year based on member input and participates in IEEE competitions like Micro-Mouse and the IEEE Ethics Competition. IEEE is currently working on building an octo-copter to complement their recently acquired quad-, tri-, and hexa-copters.

THE SOCIETY OF WOMEN ENGINEERS (SWE)

The Society of Women Engineers (SWE) is a global organization created to provide women engineers the resources and support to achieve their full potential as leaders in their profession. The student and professional chapters of SWE work together in hosting networking events, resume workshops, and other activities to strengthen professional profiles. Other events include fun events such as the annual Pi Day bake sale and in previous years, the Engineering and Math Ball. They also work on engineering projects. Membership is open to students of all engineering, science, math, and technology disciplines.

TAU BETA PI

Founded in 1885, Tau Beta Pi is the nation's oldest and largest engineering honor society. Membership in Tau Beta Pi recognizes exceptional engineers and students who have exemplary character and also offers unique and valuable opportunities. Tau Beta Pi seeks to broaden the collegiate experience of its members, thereby enhancing the engineering educational experience. Interests in non-technical fields, civic responsibility, and other human and cultural areas are encouraged through the various social and service activities of the chapter.

BAJA

Baja is an international collegiate competition series hosted by the Society of Automotive Engineers. Each event consists of several competitive trials which are tailored to challenge college teams to build the best, quickest, most affordable and safest off-road vehicle.



QUESTIONS?

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ENGINEERS WITHOUT BORDERS (EWB)

The University of Vermont chapter of Engineers Without Borders (EWB) is one of many chapters in the United States. Engineers Without Borders USA supports community-driven development programs worldwide by collaborating with local partners to design

and implement sustainable engineering projects, while creating transformative experiences and responsible leaders. EWB's goal is to use engineering knowledge and creativity to work with developing communities to overcome barriers that prevent them from obtaining basic needs.



CS CREW

CS Crew is a student-led community of individuals studying or interested in Computer Science at the University of Vermont. CS Crew provides a community for students to further their knowledge and skills in CS related concepts and applications. The crew room is located in Votey 332 and members welcome anyone who wants to come in to work on projects, get help during office hours, study, and network.

QUESTIONS? PLEASE CONTACT US:

College of Engineering and Mathematical Sciences

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Programs that you can pursue in the College of Engineering and Mathematical Sciences

School of Engineering (SoE)

ABET-Accredited Programs:

BS, Civil Engineering

BS, Electrical Engineering

BS, Environmental Engineering

BS, Mechanical Engineering

Interdisciplinary Programs:

BA, Engineering

BS, Engineering

BS, Engineering Management

Department of Mathematics & Statistics

BS, Mathematics

BS, Mathematics, Major in Statistics

CEMS' Accelerated Master's Program (AMP) allows talented undergraduates to complete a Master of Science degree in one additional year in the following areas:

Biostatistics

Civil & Environmental Engineering

Computer Science

Electrical Engineering

Mechanical Engineering

Mathematics

Statistics

Department of Computer Science

BS, Computer Science

BS, Major in Computer Science & Information Systems

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