Professional Master’s Degree Program
Embedded Systems Engineering
University of Colorado - Boulder

Introduction

Based on clear demand from industry and from our growing graduate student population, our Department of Electrical, Computing, and Energy Engineering (ECEE) offers a Professional Master’s Degree Program in Embedded Systems Engineering (ESE).

CU-Boulder’s College of Engineering and Applied Science’s Professional Master’s Degree focuses on highly employable disciplines and skills based on industry needs. The ECEE Department has embraced this degree as an ideal opportunity to expand the high quality and technical Embedded Systems Certificate we have long offered into a wide array of courses leading to a full Master’s Degree. Our ESE program’s goal is to produce creative, workforce-ready graduates equipped with versatile embedded systems engineering skills and technical leadership.

Adding several new embedded systems courses to our program now enables greater options for earning the certificate, while also offering plenty of courses to complete a full Master’s Degree principally with embedded systems focus. Students pursuing this degree, as well as non-degree students pursuing a Professional Certificate in Embedded Systems Engineering (ESE), will also have access to many excellent graduate level courses offered by ECEE’s highly reputed faculty in Computer Engineering, Communications, Controls, Optics, RF and Microwave, and more.

Our ESE program expansion continues as a work in progress, with five new courses already added in the 2015-16 academic year, and eight courses being offered concurrently in the spring 2016 semester. We focus admissions on candidates expressing career ambitions in embedded systems, who also possess meaningful embedded systems fundamentals background and strong academic performance.

For details not covered below, further information may be found here on our embedded systems web site. Updates will be posted as the program evolves.

http://ecee.colorado.edu/academics/cert_programs/embedded.html

Frequently Asked Questions and Answers

What is the ESE program?

Our Embedded Systems Engineering (ESE) Professional Master’s Degree Program offers a wide variety of technical embedded systems courses in CU Boulder’s Electrical, Computer, and Energy Engineering Department (ECEE) in the College of Engineering and Applied Science. Curriculum is systemically kept current and strategically comprehensive across essential embedded systems technologies, design engineering techniques, development tools and key trends. Our program will generate creative, workforce-ready graduates equipped with versatile embedded engineering skills and thought leadership stemming from a greater context around organizational and business dimensions as well.
What are the pre-requisites for ESE students?

A Bachelor of Science degree in Electrical Engineering, Electrical and Computer Engineering, or equivalent, is required. In order to be successful in these course, students must have foundational knowledge and experience in embedded systems architecture, components, circuits, C programming and some assembly language, some operating system coursework, use of lab equipment such as oscilloscopes, multimeters, function generators, digital logic analyzers and protocol analyzers, etc. Embedded Systems Engineering courses at CU-Boulder engage high-caliber students from around the world. The courses typically run at a fast pace, often involving intense hands-on projects. Students who enter our program have embedded systems experience through undergraduate projects and internships. Students may be either degree-seeking (i.e. admitted to our Graduate School), or non-degree seeking, often pursuing a Professional Certificate in Embedded Systems Engineering.

Please review course-specifics here, including any prerequisites, and seek clarification as needed with course instructors.

Is a GRE exam required for admission to the ESE program?

Yes, a GRE exam is required for admission to our MS Degree. For those pursuing admission to our Graduate School to obtain a Master’s degree, please refer to details of the application process and requirements here.

What is the tuition cost for ESE program?

For graduate students, Professional Master’s tuition rates are linear per student credit hour and have low differential for non-residents as compared with traditional rates. Please refer to officially published tuition rates from the Bursar’s Office. Non-degree student tuition rates for ESE courses will generally follow the same rates as for graduate students. Tuition rates are administered through the respective enrollment processes for degree and non-degree students (See How and when do I enroll in ESE courses? below). Graduate students may be enrolled in only one Professional Master’s program at a time.

What is the difference between this Professional MS Degree program and the traditional MS degree?

The ESE Professional MS Degree Program is non-thesis, project-based specialization in embedded systems design, to develop a foundation for a career in embedded systems. Upon graduation, the transcript will indicate completion of the sub-plan in Embedded Systems Engineering.

How and when do I apply for a Master’s Degree?

Complete details on the application process (admission requirements, application deadlines, how to apply instructions for both VISA and domestic students) may be found under the Prospective Students section of our ECEE department website.

What is the difference between ME and MS degrees?

The ME degree rules offer greater allowance for non-technical course credit, e.g. EMEN (Engineering Management) or ITP (Interdisciplinary Telecommunications) courses, than do MS degree rules. For more details, link to degree requirements pages through our ECEE prospective graduate student site.
Effective fall 2016, our Embedded Systems Engineering program is offered under the new Professional Master of Science Degree (EEEN-MSEE). The ESE program also remains an option under the Master of Engineering (EEEN-ME) Degree. Graduate students who joined the program under the ME degree prior to fall 2016 may work through our Graduate Advisor for switching to MS, provided they meet MS degree requirements, as previously communicated to current students.

What is the schedule for ESE courses?

Please refer to the ECEE online course schedule under Quick Links for schedule and classroom details for the upcoming semester.

How and when do I enroll in ESE courses?

Graduate students in our Professional Master’s Program with an ESE subplan will receive ESE course enrollment priority over other graduate students. Complete details on the graduate student application process (Admission Requirements, Application Deadlines, How to Apply instructions for both VISA and domestic students) may be found under the Prospective Students section of our ECEE web site.

If you are an existing ECEE graduate student and want to enroll in the ESE program, please contact our Graduate Advisor, Adam Sadoff, adam.sadoff@colorado.edu, (303) 735-0490.

Non-degree students, for example those in industry pursuing a Professional Certificate in Embedded Systems Engineering, may also enroll in ESE courses through the Division of Continuing Education (conted.colorado.edu or 303-492-5148). The process begins here. Our Continuing Education division works closely with Be Boulder Anywhere (BBA), which is our overarching division for distance learning. BBA focuses on distance, degree-seeking students, while Continuing Education handles non-degree students. Most (except first run) ESE courses offer distance learning options to provide flexibility for those in industry or non-local graduate students. Please refer to Be Boulder Anywhere (BBA) embedded program and BBA FAQs for further information.

Refer to the campus Academic Calendar for important deadline dates.

Can I take ESE courses online?

For current semester, see the “BBA” column of the ECEE online course schedule under Quick Links for distance course designations. You may also reference the Electrical Engineering section of the BeBoulderAnywhere (BBA) site here. The ESE program and ECEE department offer many course options for completing a Master’s degree online.

How much space is available in ESE courses?

When registering for courses through MyCUInfo, you will see the number of currently available slots for the appropriate course section based on your student type. A number of seats in ESE courses are also reserved for ESE student priority enrollment. ESE courses have on-campus sections for students who attend class in person (degree and non-degree), and most ESE courses (after first run) also include distance sections, offered for degree-seeking and non-degree-seeking students without consistent access to main campus.
Are there any TA, RA, GA or GPTI opportunities in the ESE program?

Students enrolled in Professional Master’s Degrees are eligible for an hourly appointment or fellowship, but are not eligible for TA, RA, GA or GPTI roles with a tuition waiver. Instead, Professional Master’s tuition rates effectively have a tuition waiver built in with low differential non-resident rates.

Does the ESE program exist under a designated STEM degree?

Yes. The ECEE Department’s ESE program resides under the MS degree, the CIP code is 14.1001.01 with a CIP description of Electrical and Electronics Engineering. The base CIP code is listed on ICE website as a STEM-designated degree program, http://www.ice.gov/sites/default/files/documents/Document/2014/stem-list.pdf.

What is the course structure for the ESE program?

The ESE program requirements consist of 4 core ESE courses and 6 electives, comprising 30 credit hours. The ESE certificate requirements consist of 2 core ESE courses and 1 elective, comprising 9 credit hours. With ESE program expansion, core curriculum centers mainly on essential embedded technologies, while ESE electives generally steer more towards applications. Students may also access a wide selection of ECEE graduate courses in many disciplines to fulfill their electives and customize their career preparation.

Does the ESE program include research or thesis?

No. Our ESE program is a Professional Master of Science (MSP) Degree and does not include research or thesis components as requirements. The main objective of the ESE program is workforce preparation around industry-driven highly employable engineering skills. As such, most ESE courses will involve hands-on projects and course assignment-related research around new technologies and applications.

What is the expected timeline for completing a master’s degree through the ESE program?

The ESE program offers great flexibility. Now with an expanded number of ESE courses, we typically offer 5-8 courses per semester, with all core ESE courses being offered twice per academic year. Full-time students typically complete a master’s degree in 2 years or less, taking 2 or 3 courses per semester and sometimes taking summer courses as well. Part-time students should complete a degree within 5 years.

What ECEE courses are available for credit under the ESE program? From other departments as well?

Required ESE course options as well as recommended electives are provided on our embedded systems web site. Further ESE program requirements and guidelines are posted there as well. Please also refer to the currently posted ECEE course schedule linked from our ECEE home page for further detail.

In the past, some embedded courses have been offered with less regularity as they require updating to meet our standards. Now with our expanded ESE program, we offer updated versions of our best courses along with new courses that provide wider coverage of embedded systems technologies and applications.

Credit for courses taken from other departments is subject to degree requirements. Please consult MS degree requirement details here as well as in the Graduate Studies Guide.
Can I still take Computer Engineering graduate courses in the ECEE department?

While our ESE program focuses on embedded-specific courses, electives under the 30-credit hours required to complete the Master’s degree may include other 5000-level graduate courses in our department, from which there are many to choose. Enrolling in the ESE program provides access to the best of both worlds.

We believe there is significant industry and student demand for embedded systems engineering education. Our ESE program is essentially a spinoff from our Computer Engineering curriculum (expanding our embedded systems design certificate) into a more practical, industry-driven professional master’s degree. While ECEE Computer Engineering courses may be taken as electives under the ESE program to access broader subject matter, our embedded-centric courses may be preferred to ESE students as more become available.

Will the Professional MS Degree in ESE be recognized by industry?

Employers will recognize relevant demonstrated and proven skills of our students, and benefit immediately from inherent versatility of our program graduates. In turn, program graduates will access more opportunities from which to choose, many of higher quality enabled by our ESE Program.

Thus far, our Professional Certificate in Embedded Design has been in high demand, and is a key reason behind our decision to accelerate ESE program expansion.

What are some prospective career paths I may pursue with an ESE certificate or Master’s Degree?

Example career roles targeted by this program are (not limited to):

- Firmware Engineer
- Design Engineer
- Solutions Architect
- Embedded Systems Architect
- Software Engineer
- Embedded Software Engineer
- Systems Engineer
- (Field) Applications Engineer
- Embedded Software/Hardware Developer
- Technical Project Manager
- Product Engineer

Is there a Graduate Advisor for the ESE program?

Yes. For further inquiries or assistance, please contact our ECEE Graduate Advisor, Adam Sadoff, adam.sadoff@colorado.edu, (303) 735-0490.