EMBEDDED SYSTEMS ENGINEERING - GRADUATE CERTIFICATE

Most of us will casually encounter dozens of embedded systems by mid-morning each day throughout our residences, roadways and workplaces. Fundamentally, an embedded system is some combination of hardware and software that is designed for a particular function. It senses a real-world condition, does some computing, then produces output data or control of some kind.

These intelligent machines are a permanent part of our global landscape, and are continuously being expanded and upgraded by a world of forward-thinking engineers and entrepreneurs. Application domains include aerospace and defense, energy, industrial automation, medical, networking and communication, security, transportation, and more. Also expected to fuel much more growth is an overarching megatrend referred to as the Internet of Things (IoT), which involves connecting more embedded systems to the internet, enabling countless human-to-machine and machine-to-machine applications ranging from home automation to security and many beyond.

Fueled largely by new internet protocols and wireless technology convergence, industry-wide estimates of 20 to 30 billion connected devices by 2020 are common among major technology research companies. Of course, this trend ushers in greater hardware and software design challenges of effectively managing and securing connected devices, as well as capturing and harnessing the vast amounts of data the devices are meant to produce around their associated services.

The embedded systems engineering certificate, which is offered by the Department of Electrical, Computer and Energy Engineering, offers students the hardware and software knowledge and skills needed to design and implement these systems.

For more information, visit the department's Embedded Systems Engineering [website](http://www.colorado.edu/ecee/graduate-program/degrees/embedded-systems).

Distance Education Option

Students can take individual courses toward a master’s degree or graduate certificate through distance education (online). For more information, connect with the graduate program advisor or visit the Graduate School’s Distance Education [website](https://www.colorado.edu/graduateschool/distance-education) webpage.

Requirements

Application Requirements

Applicants for the certificate program must have been or currently be enrolled for a baccalaureate degree from an accredited institution and have satisfied the prerequisites for each course through course work or work experience. They need not be enrolled in a degree-granting program at CU Boulder.

Graduate students pursuing an ESE certificate are not required to matriculate into the ESE program subplan through a master’s degree, although degree-seeking students enrolled in the ESE program will be given ESE course registration priority.

Admission to the Graduate School is not required for students pursuing only the certificate.

Program Requirements

The embedded systems engineering (ESE) certificate curriculum consists of two core courses and one elective course from an approved list, totaling at least 9 credit hours. A grade of B- or better is required for each course applied toward the certificate.

ESE certificate credit hours may be applied towards a full master’s degree, provided the student is admitted to the Graduate School. However, credit hours may not count towards both a BS and a master’s degree.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN 5613</td>
<td>Embedded System Design</td>
<td>6</td>
</tr>
<tr>
<td>ECEN 5623</td>
<td>Real-Time Embedded Systems</td>
<td></td>
</tr>
<tr>
<td>ECEN 5803</td>
<td>Mastering Embedded Systems Architecture</td>
<td></td>
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</tbody>
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| Elective | Choose one course from the approved list. | 3 |

Total Credit Hours 9

1. Students may complete the certificate by taking all three core courses, rather than taking two core courses and an ESE elective.