Engineering for Developing Communities (EDC) Emphasis Within Graduate Studies in Construction Engineering and Management

July 2015

Undergraduate Prerequisites

For entering graduate students who do not have a Bachelor of Science degree in civil and environmental engineering, a number of undergraduate engineering courses may have to be "made up" prior to graduation. We require proficiency in the following undergraduate courses (with equivalent courses at CU-Boulder listed) to ensure a solid foundation for advanced coursework; so that graduating students are prepared to sit for the Fundamentals of Engineering (FE) exam; and that students are eligible to take the Professional Engineer (PE) licensure exam later in their career.

- Calculus, Linear Algebra, and Differential Equations (four semesters); equivalents of APPM 1350, APPM 1360, APPM 2350, and APPM 2360
- Physics (two semesters, Calculus-based, with associated lab); equivalents of PHYS 1110 and PHYS 1120/1140 (lab)
- Analytical Mechanics or “Statics” (one semester); equivalent of CVEN 2121
- Fluid Mechanics (one semester); equivalent of CVEN 3313
- Mechanics of Materials; equivalent of CVEN 3161
- Geotechnical Engineering I; equivalent of CVEN 3708
- Structural Analysis; equivalent of CVEN 3525
- One of the following:
  - Geotechnical Engineering II; equivalent of CVEN 3718
  - Hydraulic Engineering; equivalent of CVEN 3323
  - Upper division Structural Engineering or Mechanics Proficiency; (e.g. equivalent of CVEN 4545 Steel Design, CVEN 4555 Reinforced Concrete, etc.)

Degree Requirements

The MS degree may be obtained via one of two plans.

Plan I: MS thesis
- 4 required core courses, 4 required EDC courses including CVEN 5939 Sustainable Community Development Practicum, and thesis research, including written thesis and oral defense (6 credits)

Plan II: Project-based
- 4 required core courses, 4 required EDC courses including CVEN 5939 Sustainable Community Development Practicum, 1 elective course (3 credits), a research report, including written report and oral defense (3 credits)

Plan II-B: Coursework
- 4 required core courses, 4 required EDC courses including CVEN 5939 Sustainable Community Development Practicum, and 2 elective courses, plus an oral or written defense (determined by faculty)

The PhD degree requires completion of 30 semester credit hours in addition to a doctoral dissertation (30 thesis credits). Per university policy, students may transfer up to 9 credits of post-graduate work to the MS degree and 15-21 credits to a PhD degree, depending on their status. Students are encouraged to speak to their academic advisors to verify transfer credit rules.

All students with an EDC emphasis must complete a field practicum in a developing community. This experience will be developed in conjunction with your academic advisor and the Mortenson Center Practicum Program Coordinator.

Core Requirements
- 12 credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CVEN 5276 Engineering Risk and Decision Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5286 Design of Construction Operations</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5226 Safety and Quality</td>
<td>3</td>
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<tr>
<td>CVEN 5346 Managing Project Orgs.</td>
<td>3</td>
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</table>

EDC Emphasis Requirements*
- 12 credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CVEN 5919 Sustainable Community Development 1 (Fall only)</td>
<td>3</td>
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<tr>
<td>CVEN 5929 Sustainable Community Development 2 (Spr only)</td>
<td>3</td>
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<tr>
<td>CVEN 5939 Sustainable Community Development Practicum</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5565 Life-Cycle Engr. Of Civil Infrastructure Systems or ATLS 5250 Fieldwork Methods for ICTD Practitioners (Spr only)</td>
<td>3</td>
</tr>
</tbody>
</table>

*Students who complete the EDC emphasis requirements (CVEN 5919, 5929, and 5939) and CVEN 5565 or ATLS 5250 will earn the Graduate Certificate in Engineering for Developing Communities.
For specific academic advising, please contact your assigned faculty advisor. Students need to speak with their faculty advisor to determine the best course sequence on a case-by-case basis.

For Information specifically about the EDC Emphasis in Construction Engineering and Management, please contact:

Amy Javernick-Will, Assistant Professor, Construction Engineering and Management
(303-492-6769; amy.javernick@colorado.edu)

Robyn Sandekian, Managing Director, Mortenson Center in Engineering for Developing Communities
(303-735-6708, sandekian@colorado.edu)

MCEDC website:  http://mcedc.colorado.edu

For departmental information please contact:

Pamela Williamson, Graduate Program Coordinator
Department of Civil, Environmental and Architectural Engineering
University of Colorado, Boulder, CO 80309-0428
Telephone: 303-492-7316, Fax: 303-492-7317
Department website:  http://ceae.colorado.edu
**Potential Electives for EDC Students** (this list is not to be considered exhaustive - it's a starting point)

Up to 6 credit hours of 4000-level coursework taken outside the department can be applied to the MS degree. Note that some of these courses may have prerequisites (as indicated with an *) and in those cases, enrollment will require instructor permission. All courses are not taught every semester, so students are encouraged to plan ahead.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ANTH 5780</td>
<td>Core Course in Cultural Anthropology</td>
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<tr>
<td>ANTH 5020</td>
<td>Explorations in Anthropology (topics differ by section &amp; semester)</td>
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<tr>
<td>ANTH 4/5500</td>
<td>Cross-Cultural Aspects of Socioeconomic Development</td>
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<tr>
<td>ATLS 4/5519</td>
<td>Adv. Special Topics in Technology, Arts, and Media (topics differ by section &amp; semester)</td>
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<tr>
<td>CVEN 5276</td>
<td>Engineering Risk &amp; Decision Analysis</td>
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<tr>
<td>CVEN 5323</td>
<td>Applied Stream Ecology</td>
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<td>CVEN 5393</td>
<td>Water Resources System and Management</td>
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<tr>
<td>CVEN 5474</td>
<td>Hazardous &amp; Industrial Waste Management</td>
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<tr>
<td>CVEN 5484</td>
<td>Introduction to Environmental Microbiology</td>
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<tr>
<td>CVEN 5514</td>
<td>Bioremediation</td>
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<tr>
<td>CVEN 5524</td>
<td>Drinking Water Treatment</td>
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<tr>
<td>CVEN 5534</td>
<td>Wastewater Treatment – fall only</td>
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<tr>
<td>CVEN 5594</td>
<td>Water Reuse and Reclamation</td>
</tr>
<tr>
<td>CVEN 5822</td>
<td>Geographical Information Systems for Civil and Environmental Systems</td>
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<tr>
<td>CVEN 5836</td>
<td>Construction Engineering and Management Fundamentals</td>
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<tr>
<td>ECON 4535</td>
<td>Natural Resource Economics</td>
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<tr>
<td>ECON 4545</td>
<td>Environmental Economics</td>
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<tr>
<td>ECON 4774</td>
<td>Topics in Economic Development, History, and Political Economy</td>
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<tr>
<td>ECON 4774</td>
<td>Economic Reform in Developing Countries</td>
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<tr>
<td>ECON 8774</td>
<td>Economic Development: Seminar in Transition Economies*</td>
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<tr>
<td>ECON 8784</td>
<td>Economic Development*</td>
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<tr>
<td>EBIOS 4030/5030</td>
<td>Limnology</td>
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<tr>
<td>EBIOS 4160</td>
<td>Introduction to Biogeochemistry</td>
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<tr>
<td>EMEN 5051</td>
<td>Tech Ventures and Leadership</td>
</tr>
<tr>
<td>ENVS 5100</td>
<td>seek approval of topic from EDC/faculty advisor prior to enrollment</td>
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<tr>
<td>ENVS 5810</td>
<td>Water Resources and Environmental Sustainability</td>
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<tr>
<td>ENVS 5820</td>
<td>Renewable Energy Policy</td>
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<tr>
<td>GEOG 4/5292</td>
<td>Migration, Immigrant Adaptation, and Development</td>
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<tr>
<td>GEOG 4/5682</td>
<td>Development Geography</td>
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<tr>
<td>GEOG 4/5732</td>
<td>Population Geography</td>
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<tr>
<td>GEOG 4/5852</td>
<td>Health and Medical Geography</td>
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<tr>
<td>GEOG 5100</td>
<td>seek approval of topic from EDC/faculty advisor prior to enrollment</td>
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<tr>
<td>GEOG 5782</td>
<td>Sustainable Development: Critique</td>
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<tr>
<td>GEOG 6402</td>
<td>Seminar: Political Ecology</td>
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<tr>
<td>GEOLO 4716</td>
<td>Environmental Field Geochemistry (2 credits)</td>
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<tr>
<td>JOUR 6211</td>
<td>Communication and International Development</td>
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<tr>
<td>MBAX 6140</td>
<td>Social Entrepreneurship in Emerging Markets (formerly MBAX 6845)</td>
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<tr>
<td>MGMT/CESR 4130</td>
<td>Sustainable Operations (was MGMT 4080)</td>
</tr>
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Other courses are allowable with prior approval by Construction Engineering and Management EDC emphasis faculty advisor.

For those students who are interested in studying the concept of development in more depth than what can be integrated into the graduate programs in Civil Engineering, the Geography Department offers a 12-credit hour Certificate in Development Studies. That certificate provides interdisciplinary training in development studies to graduate students with coursework on issues such as agrarian change, labor migration, new social movements, industrial growth, urban planning, and natural resource use. Students For details, see the Graduate Certificate in Development Studies website at [http://geography.colorado.edu/grad_program/certificates](http://geography.colorado.edu/grad_program/certificates).

*Updated July 15, 2015*