Course: **Civ-Env 382: Capstone Design: Spring, 2017 Civil Engineering**

**Credits:** 1 unit

**Instructors:** Corr, D., Dowding, C., and Haresh Rao

**Text:** Selected readings posted on Blackboard Course Management System website; interaction with component specific design experts

**Description:** Culminating, team based, design experience in Civil & Environmental Engr. with an overview of the function, design and operation of modern infrastructure systems.

**Prerequisite:** Senior standing in Civil or Environmental Engr or consent of instructor

**Required:** Yes

**Specific Goals for the Course:** By the end of this course, students should be able to

1. Understand that engineering design requires organized team effort and a can-do attitude
2. Learn to integrate subspecialties of civil and environmental engineering during design in a team format
3. Overcome differences in personal operational styles to deliver design in a short time period
4. Appreciate the complexity of cost estimation for design with multiple, interlocking specialties
5. Appreciate spatial relationships and appearance as design constraints and components and should be able to:
6. Explain the basic concepts in management, business, public policy, and leadership in the successful completion of a civil engineering project.
7. Employ various design criteria (calculations, code, regulations, client response, etc) to evaluate possible alternatives (appendices)
8. Gather relevant data and performance criteria from diverse sources such as maps, field sampling, historical data, client files, etc (Depot data files)
9. Communicate in oral, written and graphical form with both technical and non-technical audience (oral presentations, written report)
10. Employ where applicable software and computer techniques for design and communication (3D CAD, AutoCAD, checkable excel, Google Docs/CM)

**Relation of “course specific goals” to programmatic student learning outcome through Course Assessment Table (CAT), which feeds into Program Assessment Table (PAT)**

<table>
<thead>
<tr>
<th>Course Goals</th>
<th>Outcome</th>
<th>Assessment via</th>
<th>Performance Indicator</th>
<th>Assessm’t</th>
<th>Proposed action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,5,6</td>
<td>c Design System to Meet Needs</td>
<td>Final Report Body</td>
<td>Report rubric Faculty</td>
<td>100/65</td>
<td>Use EN’s Appendix as benchmark for ENVISION</td>
</tr>
<tr>
<td>1,3</td>
<td>d Function on Teams</td>
<td>Team Standards</td>
<td>Team Std. rubric</td>
<td>100/65</td>
<td></td>
</tr>
<tr>
<td>2,8</td>
<td>e Solve Engineering Problems</td>
<td>Final Report Appendix</td>
<td>Report rubric DE’s</td>
<td>82/65</td>
<td>Develop explicit requirement for cost analysis of alternative in body</td>
</tr>
<tr>
<td>9</td>
<td>g Communication</td>
<td>Final Report Body Final report Appendix</td>
<td>Report rubric Faculty Report rubric DE’s</td>
<td>100/65 88/65</td>
<td>More discussion on graphical illustrations</td>
</tr>
<tr>
<td>7</td>
<td>h Impact of Engineering Solutions</td>
<td>Alternate Analysis – 2nd Oral Report</td>
<td>2nd Oral rubric (2)</td>
<td>100/65</td>
<td>Include life cycle energy cost in construction cost</td>
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<tr>
<td>10</td>
<td>k Modern Engineering Tools</td>
<td>File Sharing Manag’t CAD/Revit – 2D &amp; 3D Excel/professional software</td>
<td>yes/no yes/no yes/no</td>
<td>84/Y 100/Y 100/Y</td>
<td>If have component teams create Google Doc files for all</td>
</tr>
</tbody>
</table>
Course Instructors:
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H. Rao A130 harish.rao@northwestern.edu

Grades
- Individual Products/Responsibilities (Total 50%):
  - First Technical Design Memo – 5%
  - Second Technical Design Memo – 5%
  - Final design of your component (appendix) – 20%
  - Evaluation of your teamwork and contributions to the team products by your teammates and instructors – 15%
  - Evaluation of your interaction with your component’s design expert – 5%
- Team Products (Total 50%):
  - Team Standards and Schedule – 2.5%
  - File sharing/management – 2.5%
  - First Oral Team Progress Report – 5%
  - Second Oral Team Progress Report – 5%
  - Final Presentation – 10%
  - Final Report – 25%