Overview

Civil Engineering has been incorporating new materials into infrastructure for thousands of years. The human race has been building using natural materials such as wood and stone ever since we formed into societies. Over time, new building materials were formed by combining various natural resources, such as brick, concrete, cast iron, and steel. In the past several decades, innovations in material science have been brought to market at an astonishing rate and are being incorporated into the repair and construction of infrastructure across the world.

As part of the CIVE.3100 Engineering Materials course, you will write a research paper that provides an overview of a “new” (a.k.a. recent) material or material testing method used in Civil Engineering. “New” is defined as something that has not yet gained widespread acceptance in general Civil Engineering practice and/or has been introduced or significantly modified within the last 30 years. As you will see when you enter industry, the Civil Engineering profession is slow on the adoption of new technologies and techniques. The Instructor will be the final arbiter of what is considered “new”. The research paper is the final part of a research project that will count as 20% of your course grade. Note that the research project is an individual assignment.

Potential Topics:

Topics for this research paper include but are not limited to the following:

- Thermal Integrity Profiling (TIP) of Cast-In-Place Foundations
- Recycled shredded tires as lightweight backfill
- Self-Compacting Concrete (SCC)
- Long-Term Monitoring of Pavements
- Accelerated Pavement Testing
- Structural Health Monitoring
- Advances in the detection of micropollutants in sewage treatment systems
- Advances (or Recent Innovations) in Roadway Safety Materials

It is recommended that you find a topic that interests you in the specific field of civil and environmental engineering that you plan to work in once you graduate. For students that are undergraduate research assistants to faculty within or associated with the College of Engineering, you may present your research if approved by the Instructor. Students associated with the Civil and Environmental Engineering Department Competition Teams (i.e. the Concrete Canoe or Steel Bridge) or the various UMass Lowell American Society of Civil Engineers (ASCE) Student Chapter service projects (e.g. town of Lexington Stormwater Monitoring Project) may be able to select a project topic that will assist them in these endeavors. Contact the Instructor for further details.
Project Details:
Your research paper will be divided into five (5) submittals. The following time schedule will be used for project submittals:

<table>
<thead>
<tr>
<th>Submittal No.</th>
<th>Submittal Description</th>
<th>Date &amp; Time</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Topic Submittal &amp; Acceptance. Select a topic and discuss its acceptability with the Instructor. Send a summary email of this discussion to the Instructor. Write CIVE.3100-[Section Number] Research Paper Topic Submittal&quot; in the email subject line.</td>
<td>9/18/17 @ 12pm</td>
</tr>
<tr>
<td>2</td>
<td>Title &amp; Short Description Submittal. Submit a title for your project with a short description of the subject and the intended extent of your work.</td>
<td>9/25/17 @ 12pm</td>
</tr>
<tr>
<td>3</td>
<td>Preliminary Abstract Submittal. Submit a preliminary abstract, headings for the subjects, and a list of references.</td>
<td>10/16/17 @ Start of Class</td>
</tr>
<tr>
<td>4</td>
<td>Completed Paper Submittal. Completed papers due. Each student will be assigned another student’s paper for review.</td>
<td>11/27/17 @ Start of Class</td>
</tr>
<tr>
<td>5</td>
<td>Student Review Submittal. Submittal of the student review grading rubric and marked comments of submitted paper.</td>
<td>12/04/17 @ Start of Class</td>
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Note that Mrs. Margaret Manion, the Librarian Chair for Lydon Library, will be presenting to both sections on Friday, October 6, 2017 on how to effectively use the vast UMass Library resources at your disposal. It is recommended that you attend this presentation.

Submittal Formats and References:
During the first two (2) weeks of class, you will select your topic and discuss it with the Instructor to determine its acceptability. This discussion should not take more than a couple of minutes and can be done before or after class or during the Instructor’s office hours. Once your topic is approved, you will send a summary email of your discussion to the Instructor as detailed in the above table. This email is Submittal 1.

All other submittals will be on printed paper. You will prepare these submittals paper in accordance with the guidelines for conference proceeding papers outlined by the American Society for Civil Engineers (ASCE) and modified by the Instructor. A Microsoft Word template detailing the formatting instructions and paper guidelines can be found on the course website. Submittal 2 includes your draft research paper title and a short description of what your paper will be about. This submittal should be no more than one (1) page. Place this description in the abstract’s location on the template. Submittal 3 will consist of your title, preliminary abstract, a summary of your paper’s sections, and a preliminary list of references (a.k.a. bibliography). This submittal should be no more than two (2) pages in length. Submittal 4 will consist of a printed copy of
your completed paper. Submittal 5 will consist of you submitting the copy of the paper you were assigned to review, marked as appropriate from your review, and your completed grading rubric of this paper.

You must cite and acknowledge all people and sources used in your work. Students submitting academic work for an individual grade are individually held to not plagiarize. Plagiarism is defined as representing the words or ideas of another as one’s own work in any academic exercise. Materials from outside sources must be documented using the American Society of Civil Engineers (ASCE) Author-Date format. This reference system can be found within the ASCE E-Books Publishing in ASCE Journals: A Guide for Authors (http://ascelibrary.org/doi/book/10.1061/9780784479018) or Publishing Books with ASCE: A Guide for Authors, Editors, and Committees http://ascelibrary.org/doi/book/10.1061/9780784478998).

**Basis of Project Grade and Grading:**
The grading breakdown for your research paper is as follows:

<table>
<thead>
<tr>
<th>Submittal No.</th>
<th>Submittal Description (Late Submittal Penalty)</th>
<th>Percent of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Topic Submittal &amp; Acceptance (-1% for each day beyond deadline. <em>No extensions</em>).</td>
<td>2%</td>
</tr>
<tr>
<td>2</td>
<td>Title &amp; Short Description Submittal (-1% for each day beyond deadline. <em>No extensions</em>).</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>Preliminary Abstract Submittal (-1% for each day beyond deadline. <em>No extensions</em>).</td>
<td>8%</td>
</tr>
<tr>
<td>4</td>
<td>Completed Paper Submittal (-5% for each day beyond deadline. <em>No extensions</em>).</td>
<td>75%</td>
</tr>
<tr>
<td>5</td>
<td>Student Review Submittal (-1% for each day beyond deadline. <em>No extensions</em>).</td>
<td>10%</td>
</tr>
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</table>

Submittals 1, 2, and 3 will be graded on formatting and grammar (-0.25% for each noted mistake) in addition to the noted penalties for late submissions. You will also be provided feedback on Submittals 2 and 3 intended to assist you in the preparation of your completed paper (i.e. Submittal 4). Submittal 4 will be graded in accordance with the Research Paper Grading Rubric, which can be found on the course website.

**Essential Learning Outcome (ELO) – Information Literacy (IL) Information**
The definition of the Information Literacy (IL) ELO is as follows: *The ability to use digital technologies, communication tools and/or networks to define a problem or an information need; devise an effective search strategy; identify, locate, and evaluate appropriate sources; and manage, synthesize, use and effectively communicate information ethically and legally.*

The University of Massachusetts Lowell has identified the following six (6) criteria related to expectations for student learning for the Information Literacy (IL) ELO.
1. Define and identify in-depth knowledge of resources in their discipline and be able to identify and choose the most appropriate information and resources for the task at hand (i.e. research question, thesis, hypothesis, etc.). Also to identify a wide range of appropriate sources of information and be able to make critical, reflective, and strategic information decisions.

2. The skills and ability to locate and access information and formulate sophisticated and effective, well-designed targeted search strategies. The student is able to judge the value of the search results, use that information to adjust strategy if necessary, and narrow or broaden topic in order to answer the question most effectively.

3. A sophisticated understanding of information and research concepts. Applies an understanding of research concepts and terminology to the inquiry process including:
   a. Peer reviewed and non-peer reviewed journal articles, popular vs. scholarly sources, primary research materials, reviews of research, opinion papers, and scholarly media sources.
   b. Also, synonyms, related terms, thesauri, index, abstracts, keyword and controlled vocabularies, authority and currency of information to determine appropriateness.

4. The ability to organize, manage, synthesize and communicate (written, orally, graphically and/or, visually) information effectively; apply the most appropriate tool(s), and exhibit an understanding of audience and purpose with clarity and depth.

5. A clear understanding of, and adherence to, the ethical and legal use of information including the importance of accurate citation, plagiarism, copyright infringement, and the appropriate use of paraphrasing, summarizing and quoting, inline citations, and citation styles.

6. The skills and ability to analyze their own and others’ assumptions and carefully evaluate the relevance of context when presenting a position.

With this research paper, you will demonstrate knowledge of and/or skill in all six (6) criteria as follows:

- By generating a list of references (a.k.a. bibliography) in Submittals 3 and 4 by using the vast network of civil engineering related publications accessible via the UMass Lowell library system, you are demonstrating knowledge and skill in Criteria 1, 2, and 3.
- By generating a written report that communicates an original position based on the appropriate use and understanding of the information found in your gathered sources (i.e. Submittal 4), you are demonstrating knowledge and skill in Criteria 2, 3, 4, and 5.
- By observing how your ideas have changed from your original topic submittal (Submittal 1) to your preliminary abstract (Submittal 3) to your completed paper (Submittal 4), you are demonstrating knowledge and skill in Criteria 6 with regards to your own work. By reviewing a fellow student’s paper, you also you are demonstrating knowledge and skill in Criteria 6 with regards to the work of others.