CIVE 285 – Civil Engineering Materials

Term – SUMMER 2016 (201506)

Instructor
Dr. Rishi Gupta
Phone: 250-721-7033
E-mail: guptar@uvic.ca

Office Hours
Days: Posted outside office
Time: Posted outside office
Location: ECS 314

List all prerequisites and co-requisites: MATH 100, CHEM 101 or 150, PHYS 110 or 122, 111 or 125

LECTURE DATE(S)
Section: A / CRN30115
Days: M/Th
Time: 8:30-9:50am
Location: ECS 116

TUTORIAL SECTIONS
Section: T
Days:
Time: 8:30-9:20am
Location: David Strong C118

LAB SECTIONS
Section: B (Multiple)
Days: T/Th
Time: 2-4:50pm
Location: CIVE Materials Facility

Lab times and locations are also available from the timetable through Sign in to UVic, My Page.

TA Name
Adham Elnewihy
Majid Soleimani Nia

E-mail
elnewihy@uvic.ca
majids@uvic.ca

Office
ELW B208
ELW A248

Required Text
Title: Design and Control of Concrete Mixtures
Author: Kosmatka et al
Publisher/Year: Cement Association of Canada (2011, 8th edition)

Optional Text
Pavement Analysis and Design
Huang Y. H
Pearson, 2004

Reference Materials:
1. CSA A23.1-09 & A23.2-09 Concrete Materials & Methods of Concrete Construction / Methods of Test for Concrete (check for availability in the library)
3. ACI Materials Journals and Concrete International, Monthly publication by ACI (online for student learning)

Other learning resources:
Required:
1. ASTM standards. A student package created with 10 standards on asphalt, cement, and concrete (Instructions to be provided by the instructor)
2. Lab/safety gear: Lab coats are mandatory for all labs. For some lab sessions it is recommended that you wear old clothes and rubber boots. Safety glasses are required and CSA approved steel toed shoes are highly recommended.
3. Valid WHMIS training (Instructions to be provided by the instructor)

**COURSE OBJECTIVES:**

**LEARNING OUTCOMES:** At the end of this course, students will be able to:
(refer Bloom’s Taxonomy Sharepoint Site for suggested verbs)
- Differentiate between the types of Portland cement, and explain the Portland cement hydration process.
- Identify and explain the use of supplementary cementing materials and chemical admixtures.
- Determine constituent material proportions for standard Portland cement concrete mixtures.
- Explain the basic procedures involved in batching, mixing, transporting, handling, placing, finishing, and curing Portland cement concrete.
- Conduct laboratory tests on Portland cement concrete while developing an understanding of the effect of water/cement ratio and curing methods on concrete strength.
- Identify the sources, types, properties, and uses of asphaltic cements.
- Conduct basic asphalt cement tests and other tests on asphalt concrete.
- Describe the various layers and calculate stresses in flexible pavements.
- State the basics of Marshall and Superpave design method.
- Describe the fundamentals behind development of composites and its effect on pavement life.

<table>
<thead>
<tr>
<th>Weight &amp; Date(s) of Assessments</th>
<th>Weight</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments/Projects</td>
<td>10%</td>
<td>TBA</td>
</tr>
<tr>
<td>Labs and tutorials: reports, quizzes, participation and safety</td>
<td>20%</td>
<td>TBA</td>
</tr>
<tr>
<td>Mid-term 1</td>
<td>25%</td>
<td>TBA</td>
</tr>
<tr>
<td>Mid-term 2</td>
<td>30%</td>
<td>TBA</td>
</tr>
<tr>
<td>Mid-term 3</td>
<td>15%</td>
<td>TBA</td>
</tr>
</tbody>
</table>
ASSIGNMENTS (Include Assignment Schedule) (Description & Method of Delivery)

Students will be required to complete three lab assignments and one in this course. Details and submission dates will be confirmed in class.

<table>
<thead>
<tr>
<th>Assignment #</th>
<th>Modules</th>
<th>Start</th>
<th>Due (5 pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>LAB REPORT on Aggregates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>LAB REPORT on asphalt and SUPERPAVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>LAB REPORT on w/cm ratio experiment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LABORATORIES (Description & Method of Delivery)

The laboratory sessions are mandatory for students to attend. The lab sessions are meant to facilitate student projects. Students will be required to come to the Civil Engineering Materials Facility during the scheduled lab time only. Students required to bring PPE with them for ALL labs. Refer to the last page for the tentative schedule.

<table>
<thead>
<tr>
<th>Lab #</th>
<th>Modules</th>
<th>Start</th>
<th>Due (5 pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Library resources for CIVE 285 at the Library (Katy Nelson)- Rm#130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Safety demonstration (quiz- online), Aggregate prep and testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A/C tests, Possible demo on Marshal Method (video)/ SUPERPAVE, Material prep for w/c lab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>w/c lab: mixing and casting (stripping next day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Grinding demo, Grinding cylinders, 14d testing, calculations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Grinding and 28d testing, Calculations and rebound hammer (TBC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROJECTS: (Description & Method of Delivery)

P1: GROUP PROJECT:
Comparative LCA of a rigid and flexible pavement in Victoria: The project involves using the program “Athena Impact Estimator for Highways” as a tool to compare the performance of pavements in Victoria, BC. The influence of using fiber reinforcement in HMA and concrete also needs to be studied.

NOTE:
Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.
COURSE LECTURE NOTES

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

There will be no supplemental examination for this course.

GENERAL INFORMATION

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair’s Secretary to set up an appointment.

“Attendance

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time....

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course.” UVic Calendar, (2015) http://web.uvic.ca/calendar2015-09/FACS/UnIn/UARe/Atte.html

Accommodation of Religious Observance (AC1210)
http://web.uvic.ca/calendar2015-09/GI/GUPo.html

Discrimination and Harassment Policy (GV0205)
http://web.uvic.ca/calendar2015-09/GI/GUPo.html

Faculty of Engineering, University of Victoria

Standards for Professional Behaviour

“It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals....”

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.
http://www.uvic.ca/engineering/current/undergrad/index.php #section0-23

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

Policy on Academic Integrity
http://web.uvic.ca/calendar2015-09/FACS/UnIn/UARe/PoAcI.html
# Tentative Lecture & Lab Schedule

<table>
<thead>
<tr>
<th>Lecture (wk of)</th>
<th>Topics Covered</th>
<th>Relevant Reading*</th>
<th>Recommended Problems</th>
<th>Labs/Tutorials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, May 2</td>
<td>Introduction to course, materials, and Properties of aggregates</td>
<td>Chapter 6</td>
<td>See handout</td>
<td>Library resources for CIVE 285 at the Library (Katy Nelson)- Rm#130</td>
</tr>
<tr>
<td>9</td>
<td>Introduction to Pavement Systems / Terminology / Asphalt technology</td>
<td>Refer to handouts</td>
<td></td>
<td>Safety demonstration (quiz- online), Aggregate prep and testing</td>
</tr>
<tr>
<td>16</td>
<td>Flexible Pavements-Stresses, strains and design</td>
<td>Refer to handouts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 (Victoria Day)</td>
<td>Overlay Design- Marshall Method / Superpave</td>
<td>Refer to handouts</td>
<td></td>
<td>A/C tests, Possible demo on Marshal Method (video)/ SUPERPAVE, Material prep for w/c lab</td>
</tr>
<tr>
<td>May 30</td>
<td>Placing, Compaction, condition assessment / Pavement Failures (guest speaker-Tetratech) Exam 1 (TBC)</td>
<td>Refer to handouts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 6</td>
<td>Introduction to concrete Portland Cements; Hydration</td>
<td>Chapter 1</td>
<td>See handout</td>
<td>w/c lab: mixing and casting (stripping next day)</td>
</tr>
<tr>
<td>13</td>
<td>Supplementary Cementing Materials, Chemical admixtures</td>
<td>Chapter 4 &amp; 7</td>
<td>See handout</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td><strong>Assign Project (Introduction to LCA and Athena software)</strong> Mix Proportioning</td>
<td>Chapter 12</td>
<td>See handout</td>
<td>Grinding demo, Grinding cylinders, 14d testing, calculations</td>
</tr>
<tr>
<td>27 (Reading brk 30-3)</td>
<td><strong>Exam 2</strong>, Batching, Mixing, Transporting and Handling Concrete Placing, Finishing, and curing concrete</td>
<td>Chapter 13</td>
<td>See handout</td>
<td>Reading break</td>
</tr>
<tr>
<td>July 4</td>
<td>Properties of hardened concrete</td>
<td>Chapter 18</td>
<td>See handout</td>
<td>Grinding and 28d testing, Calculations and rebound hammer (TBC)</td>
</tr>
<tr>
<td>11</td>
<td>Effect of environment on properties of concrete</td>
<td>Chapter 9 &amp; 11</td>
<td>See handout</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Recent trends in materials engineering and sustainable composites and LCA (project)</td>
<td>Handouts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td><strong>Exam 3, Project submission</strong>. August 1*, last day of classes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* “Chapters” are from DCCM