

Course Outline

1. COURSE INFORMATION

Session Offered	Summer 2015	
Course Name	Bridge Design, Maintenance & Repair	
Course Code	CIV TECH 4BD3	
Program Name	Civil Engineering Infrastructure Technology	
Calendar Description	<p>The McMaster University Faculty of Engineering and the Mohawk College School of Engineering Technology are collaborating in the development of a unique concept for the shared delivery of technological education in Ontario. The primary purpose of this endeavour is to offer Bachelor of Technology degree programs with a variety of technical specializations. This type of program is targeted to individuals whose technological interests are applications-oriented.</p>	
Instructor(s)	Andy Kikites, P.Eng.	Phone: (647) 777-4949 E-Mail: andy.kikites@hdrinc.com

2. COURSE SPECIFICS

Course Description	<p>This course covers the fundamental principles of bridge engineering with respect to design, maintenance and repair of common bridge types found in Ontario.</p> <p>Students will learn the terminology and standards required for the design/detailing of transportation projects relating to highways, bridges and culverts. Typical bridge project drawings will be introduced, highlighting industry design and draughting standards. Students will become familiar with current codes (CAN/CSA-S6 Canadian Highway Bridge Design Code, CHBDC), guidelines and standards through the use of various MTO (Ministry of Transportation) manuals, guidelines and specifications (ie. MTO Geometric Design Standards for Ontario Highways, MTO Structural Manual, MTO Concrete Culvert Design and Detailing Manual, MTO Structure Rehabilitation Manual, MTO Structural Planning Guidelines, OPSDs, etc.). The design process will be explained, with emphasis on how bridges fit into the overall transportation network design process.</p> <p>Students will take part in practical field sessions throughout the course with the goal of enabling them to take part in and conduct OSIM inspections and bridge condition surveys once working full-time.</p> <p>Students will be able to identify and name all components of transportation structures, and determine the appropriate structural system to be used for bridges according to the site topography and highway characteristics and sections. Preliminary bridge design methods will be covered in order to allow students to proportion bridge members, and produce detailed bridge sections in turn producing a General Arrangement drawing to initiate the detailed design phase of a bridge project. In addition, various methods of analysis will be covered enabling the student to calculate design forces to be used for</p>
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	<p>detailed design of bridge components.</p> <p>The course will culminate in a term project that combines the information covered throughout the course along with aspects of the material covered in various other courses of the Civil Engineering Infrastructure Technology program, resulting in the submission of a report and presentation of the work.</p> <p>Real world bridge projects will be used for assignments and terms projects in order to help students practice the above mentioned skills.</p>		
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	36
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	
	DE	Distance education	
	Total Hours		36
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	CAN/CSA-S6: Canadian Highway Bridge Design Code		
	CAN/CSA-S6.1: Commentary on Canadian Highway Bridge Design Code		
	MTO Manuals below: http://www.library.mto.gov.on.ca/webopac/search.asp?mode=search		
	MTO Geometric Design Standards for Ontario Highways		
	MTO Structural Planning Guidelines		
	MTO Structure Rehabilitation Manual		
	MTO Structural Financial Analysis Manual		
	MTO Concrete Culvert Design and Detailing Manual		
	MTO Ontario Structure Inspection Manual (OSIM)		
	MTO Structural Manual		
	MTO Aesthetic Guidelines for Bridges		
	TAC Geometric Design Guide for Canadian Roads		
	OPSS & OPSD: http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage		
	Other Supplies		
	Personal Protective Equipment (hard hat, vest, boots, eye protection)		
Prerequisite(s)	CIV TECH 3SA3 CIV TECH 4SD3		
Corequisite(s)	N/A		
Antirequisite(s)	N/A		
Course Specific Policies	<p>Students should be aware that, when they access the electronic components of this course, private information such as company names and locations shown or stated on drawings, reports and any other type of documentation are to remain confidential, and that all drawings, reports, etc. are to be used for the sole purpose of this course (i.e. educational purposes) and are not to be given to or used by third parties under any circumstances.</p> <p>Field work will be required for this course. As such, all personal protective equipment (i.e. hard hat, safety boots/shoes, safety vest, eye protection) is required to be worn during field work.</p> <p>Group work may be required for a major term project. This project is considered a mandatory evaluation component of the course.</p> <p>All assignments and projects are to be submitted at the start of the class (i.e. before the lecture begins) in which the assignment or project is due. All assignments and projects submitted after the start of class will be considered</p>		

	<p>late and therefore subject to a 10% late penalty to be applied towards the final assignment or project mark. Submission of assignments and projects the week(s) following the due date will not be accepted, resulting in a mark of 0%.</p> <p>Students must pass the final exam to pass the course.</p>		
Departmental Policies	<p>Students must maintain a GPA of 3.5 on a 12 point scale to continue in the program.</p> <p>In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of “out-of-class” work for every scheduled hour in class. “Out-of-class” work includes reading, research, assignments and preparation for tests and examinations. Students who are employed while doing B.Tech. studies are cautioned to be realistic about the number of courses which they can take while employed. Experience suggests that those with full-time jobs should take no more than 3 or 4 courses.</p> <p>The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception.</p> <p>Announcements made in class or placed on Avenue are considered to have been communicated to all students including those not in class.</p> <p>Instructors have the right to submit work to software to identify plagiarism.</p> <p>Instructors are permitted to enforce a preference to shut off all electronic devices during class.</p>		
3. SUB TOPIC(S)			
WEEK	DATE	TOPIC	EVALUATION
Week 1	May 12	Introduction to Bridges: Types, Components, Industry Standards	
Week 2	May 19	OSIM Inspections	
Week 3	May 26	OSIM Inspection of Bridge (Field Work)	10%
Week 4	June 2	Guest Lecture: Condition Surveys Condition Survey of Bridge (Field Work)	
Week 5	June 9	Methods of Bridge Repair: Concrete, Steel, Timber	
Week 6	June 16	Mid-Term Exam	20%
Week 7	June 23	Loads: Types & Application Material Properties & Detailing Requirements	
Week 8	June 30	Preliminary Bridge Design: Selection of Type, Member Sizing Production of General Arrangement Drawing	
Week 9	July 7	Methods of Bridge Analysis and Design for Dead Load Methods of Bridge Analysis and Design for Live Load	
Week 10	July 14	Methods of Bridge Analysis and Design for Dead Load Methods of Bridge Analysis and Design for Live Load	
Week 11	July 21	Project: Bridge Rehabilitation & Life Cycle Costing Analysis	
Week 12	July 28	Project: Project Submission and Class Presentations	40%
Week 13	Aug 4	Final Exam <small>Scheduled during regular University class time.</small>	30%
<p>Note that this structure represents a plan and is subject to adjustment term by term. The instructor and the University reserve the right to modify elements of the course during the term.</p>			

The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

4. ASSESSMENT OF LEARNING		Weight
Field Work/Participation		10%
Mid-Term Exam		20%
Project		40%
Final Examination		30%
	TOTAL	100%

Course results determined on a percentage scale will be converted to an official letter grade, as indicated in the Undergraduate Calendar. The results of all courses attempted will appear on your transcript as letter grades.

5. LEARNING OUTCOMES

1. Ability to identify bridge components, different bridge types and appropriate uses for each.
2. Become familiar with industry codes, standards, manuals, guidelines and specifications.
3. Knowledge of various loads on bridges and their effects on the behaviour of the structure.
4. Ability to determine causes & mechanisms of deterioration for concrete, steel & timber bridges.
5. Ability to assess deterioration and level of severity as per OSIM requirements.
6. Ability to carry out OSIM inspections and full bridge condition surveys and interpret results for maintenance and repair planning.
7. Knowledge of various bridge repair and strengthening techniques and their applications.
8. Ability to determine the appropriate structural system to be used for bridges according to the site topography, etc., and through preliminary design produce detailed bridge sections.
9. Ability to perform preliminary design of bridges of various superstructure types and production of General Arrangement drawing to initiate detailed design.
10. Ability to analyze bridges using simplified methods of analysis in the CHBDC.
11. Ability to perform life cycle costing analysis of various rehabilitation options in order to determine optimal repair/maintenance program.
12. Use correctly the language of the industry, including but not limited to, scales, systems of measurement, standard practice in producing bridge drawings, and definition of plans, sections, profiles and schematic drawings.
13. Understand the design process for bridge engineering projects.
14. Understand how each area of specialization (highway, structural, municipal, etc.) fits into a transportation project and the roles each discipline plays.

6. POLICIES

Anti-Discrimination

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.
<http://www.mcmaster.ca/policy/General/HR/Anti-Discrimination%20policy.pdf>

Academic Integrity

Attention is drawn to the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office. Any student who infringes one of these resolutions will be treated according to the published policy.

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the University.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix

3, located at: <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>

Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is a self reporting tool for **Undergraduate Students** to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 5 days or exceed 1 request per term you **MUST** visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence. <http://www.mcmaster.ca/msaf/>

E-Learning Policy

Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. Avenue can be accessed via <http://avenue.mcmaster.ca>

Communications

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

Turnitin (Optional)

This course will be using a web-based service (Turnitin.com) to reveal plagiarism. Students will be expected to submit their work electronically to Turnitin.com and in hard copy so that it can be checked for academic dishonesty. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to <http://www.mcmaster.ca/academicintegrity/>

Protection of Privacy Act (FIPPA)

The Freedom of Privacy of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality.

<http://www.mcmaster.ca/univsec/fippa/fippa.cfm>

Academic Accommodation of Students with Disabilities Policy

The Centre for Student Development is committed to the continuous improvement of accessibility for students with disabilities. Students are encouraged to contact CSD as early as possible before each term starts to become familiar with the services offered and to confirm their accommodations.

Students must forward a copy of the CSD accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses **NOT** to take advantage of a CSD accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete.

<http://csd.mcmaster.ca>

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University.

<http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf>