**CIV E 479 SYLLABUS**

COURSE NAME: Structural Design III- CIV E 479
DETAILS: 3 hour lectures, 3/1 hour Lab
TERM: Winter

COURSE DESCRIPTION

The four-credit course is the “capstone” project course offered by the Department of Civil and Environmental Engineering to undergraduate students in the Structural Engineering stream. The course gives advanced topics in design of steel, reinforced concrete, and timber structures under gravity and lateral loads using the limit states design method. Furthermore, the introduction to seismic design of structures in accordance with the National Building Code of Canada (NBCC) is given. The students are expected to complete a design project as part of this course using the knowledge that they have gained throughout their program, in particular, the topics covered in

Civ E 270, 372, 374, and 474. The project this year will be detailed design of a building or a composite bridge structure, which will be completed in a group of five students. Each group will submit a professional report on structural design of the structure together with design drawings at the end of the term and make an oral presentation to a group of industry leaders.

REQUIRED MATERIAL

1. Cement Association of Canada (2016) “Concrete Design Handbook” Cement Association of Canada, 4th Edition.

2. Canadian Institute of Steel Construction (2016) “Handbook of Steel Construction” Canadian Institute of Steel Construction, 11th Edition. This book contains the governing design standard for the design of steel structures in Canada in accordance with 2014 edition of the CAN/CSA S16. (Student discount is offered by CISC and CISC Alberta Region to the students registered in this semester).

3. Canadian Wood Council (2018) “Wood Design Manual” This book contains the 2014 edition of CSA O86-14 Engineering Design in Wood. ($225. Students receive a 40% discount.)

LECTURE CONTENT

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| **Week** | **Date** | **Content** |  |
|  |  | **Tuesday** | **Thursday** |
| **1** | **Jan. 7, 9** | Introduction; Structural design process; Limit states design(YHC) | Review of design loads; Snow and wind loading (YHC) |
| **2** | **Jan. 14, 16** | Introduction to earthquake engineering (AI) | Seismic force-resisting systems (AI) |
| **3** | **Jan. 21, 23** | Seismic analysis of structures I (AI) | Seismic analysis of structures II (AI) |
| **4** | **Jan. 28, 30** | Equivalent static force procedure and response spectra (AI) | Capacity design principle (AI) |
| **5** | **Feb. 4, 6** | Seismic design of steel braced frames I (AI) | Seismic design of steel braced frames II (AI) |
| **6** | **Feb. 11, 13** | Seismic design of steel braced frames III (AI) | Seismic design of steel braced frames IV (AI) |
| ***7*** | ***Feb. 18, 20*** | *Reading week* |  |
| **8** | **Feb. 25, 27** | Introduction to structural timber design (YHC) | Design of axially loaded timber members (YHC) |
| **9** | **Mar. 3, 5** | Design of flexural timber members (YHC) | Design of composite timber members (YHC) |
| **10** | **Mar. 10, 12** | Design of CLT LLRS (YHC) | Introduction to design of RC structures (AI) |
| **11** | **Mar. 17, 19** | Design of bearing and retaining walls I (AI) - Online | Design of bearing and retaining walls II (AI) - Online |
| **12** | **Mar. 24, 26** | Design of RC shear walls I (AI) - Online | Design of RC shear walls II (AI) - Online |
| **13** | **Mar. 31, April 2** | Design of timber connections (YHC) - Online | Design of timber connections (YHC) - Online |
| **14** | **April 7** | Design of steel connections (AI)- Online |  |

LAB CONTENT

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| **Week** | **Dates** | **Content** |
| **1** | **Jan. 10** | Project introduction: Building and Bridge (YHC & AI) |
| **2** | **Jan. 17** | Bridge loading and construction I by Amir Jamshidi, Niik Group, *PhD, PEng**S-Frame tutorial session: Seismic analysis of building* |
| **3** | **Jan. 24** | Bridge loading and construction II by Amir Jamshidi*S-Frame tutorial session: Moving loads and bridge analysis* |
| **4** | **Jan. 31** | Seismic analysis lab (AI) |
| **5** | **Feb. 7** | **Quiz 1: Seismic loading (1h)**Bridge loading example by Amir Jamshidi |
| **6** | **Feb. 14** | Preliminary design project presentation |
| ***7*** | ***Feb. 21*** | *Reading week* |
| **8** | **Feb. 28** | Bridge design I: Steel-concrete composite bridge by Jessica Gagné, |
|  |  | Associated Engineering, *MEng, PEng*Invited lecturer (TBD) |
| **9** | **Mar. 6** | Bridge design II: Steel-concrete composite bridge by Jessica GagnéBridge design lab by Jessica Gagné |
| **10** | **Mar. 13** | **~~Quiz 2: Timber design (1h)~~** (Cancelled) |
|  |  | ~~Design of crane-supporting structures by Dr. Hossein Daneshvar,~~ *~~PhD,~~ ~~PEng~~* (Cancelled) |
| **11** | **Mar. 20** | **Quiz 2: Timber design (Online 2:00 – 3:15pm)**Design of steel crane-supporting structures by Dr. Hossein Daneshvar, |
|  |  | *PhD, PEng* (Online 3:30 – 4:50pm) |
|  |  | ~~Behaviour and design of masonry structures by Dr. Carlos Cruz~~ (No lecture, notes posted for self-study) |
| **12** | **Mar. 27** | **Quiz 3: Steel and Reinforced concrete design (Online 2:00 – 3:30pm)***Life Cycle Assessment and software introduction* (YHC) (Online 3:45 – 4:50pm) |
| **13** | **April 3** | ~~Supreme shop tour~~ (Cancelled)Q & A Session with Instructors (Online) |
| **14** | **April 8** | Final presentation (Online 1pm – 5pm) |