The general objectives of this course are for students to become able to:

- Understand the three-dimensional modeling aspects and techniques of steel industrial buildings
- Understand and quantify the concept of structure stability and buckling of columns
- Understand the stability concepts of beam-columns
- Understand the lateral torsional buckling of steel beams
- Design steel plate girders with the provisions of CSA Standard CAN/CSA-S16-14
- Design crane-supporting steel structure with the provisions of CSA Standard CAN/CSA-S16-14
- Understand the behaviour of Steel Connections.

Calendar Copy:

Topics covered in this course include: analysis and behaviour of steel structures and industrial buildings; design of steel structures, understand the concepts of structure stability and lateral torsional buckling of steel beams, design of crane-supporting steel structures, plate girders, and steel connections.

Prerequisites:

Completion of the Civil and Environmental Engineering program

Antirequisites:

None

Note: It is the students' responsibility to ensure that all prerequisite and antirequisite conditions are met.

Instructor:

Dr. Ahmed (Mahdy) Hamada, P. Eng., SEB 3117, email: ahamada2@uwo.ca
Administrative Support: Room SEB 3009
**Teaching Assistant:**

TBA

**Contact Hours:**

3 lecture hours per week - attendance is mandatory
1 hours/week office hours (Will be decided during the first lecture)

**Textbook:**

Prepared class notes should be uploaded to OWL and brought to all lectures and tutorial sessions.

**Other references:**

List of books

Handbook of Steel Construction 2016, Canadian Institute of Steel Construction, 11th Edition, Second revised printing, Canada


The above references will be on hold in Taylor library, and will be available for one-day borrowing.

**Computing:**

Assignments and Final project involve computer modelling of industrial building using the commercial program ETABS, S-Pad, spread sheets, and writing report. The full version of all softwares are available at the PC labs in the engineering building.

**Specific Learning Objectives:**

1. Lateral Load resisting systems for industrial steel buildings
   a. Recognize different types of structural systems used to provide lateral resistance for industrial steel buildings
   b. Understand three-dimensional modeling aspects and techniques and learn how to model structures using commercial software ETABS
2. Concept of structure stability. At the end of this section, the student should be able to:
   a. Identify the different types of stability.
   b. Recognize the different methods of analysis in stability.
   c. Understand the buckling behaviour of compression member.
3. Understand the stability concepts of beam-columns. At the end of this section, the student should be able to:
   a. Understand the modified slope deflection method for beam column behaviour.
   b. Calculate the K factor suggested by the steel design code.
   c. Recognize the P-δ and the P-Δ effect in steel structures.

4. Comprehend the lateral torsional buckling of steel beams. At the end of this section, the student should be able to:
   a. Quantify the steel rigidity of different steel members.
   b. Calculate the lateral torsional buckling of narrow rectangular beams under pure moments.

5. Design of steel plate girders. At the end of this section, the student should be able to:
   a. Design plate girders for bending and shear
   b. Calculate required stiffeners for shear moments
   c. Design for concentrated loads

6. Design crane-supporting steel structure. At the end of this section, the student should be able to:
   a. Recognize different types of crane loads.
   b. Design mono-symmetric crane runway beams.

7. Understand steel connections behaviour and design steel connections
   a. Understand the difference between bolted and welded connections.
   b. Analyse and design steel connections

**Evaluation:**

The final mark will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>20%</td>
</tr>
<tr>
<td>2 Quizzes (1 hr each – Open Book)</td>
<td>30%</td>
</tr>
<tr>
<td>Project I (Industrial Building Analysis and Design – Group Project)</td>
<td>30%</td>
</tr>
<tr>
<td>Max. 2 Students/group</td>
<td></td>
</tr>
<tr>
<td>Project II (Presentation &amp; Report – Group Project)</td>
<td>20%</td>
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<tr>
<td>Max. 4 Students/group</td>
<td></td>
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<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Project I breakdown**

Final Project Portfolio:

- Cover Letter 10%
- Design Brief 10%
- Calculations 20%
Drawings     20%
Oral discussion & Defence of design    40%

Project II breakdown

Presentation and Oral Discussion   60%
Report       40%

Notes

Final Project Portfolio
Cover letter and Design Brief
The length of the final design brief shall not exceed 10 typed pages (font size 12, double spaced). Suggested contents are: Cover Letter, Executive Summary; Introduction, Design Criteria, particulars of design/analysis, and Recommendations (or Conclusions). The Design Criteria would include the design standards and technical references used; the particular design criteria adopted also must be indicated succinctly. The particulars of design/analysis would summarize the rationale behind the various design decisions. The evaluation of the final design brief shall be based on the format, layout, completeness, technical content and use of English.

Calculations
Calculations must be well organized, clear, complete, and done on calculation paper. Each calculation page shall be dated, and shall indicate the name or initials of the person who performed the calculations. A final calculation set, which must be current, checked and indexed, shall be submitted with the final design brief. The evaluation of calculations will be based on their clarity, completeness, technical content, originality, and accuracy.

Drawings
Each student is required to prepare a set of drawings. Each drawing shall be dated, and shall indicate the name or initials of the person who did the drawing. The evaluation of drawings will be based on their technical content, clarity, completeness, and quality of drafting.

Project II Report
Each group will give a 13 minutes presentation on their project followed by an oral discussion and defence of the report topic. Each student is required to be fully aware of all aspects of the report and participate in presenting. Some of the questions shall be asked individually to any of the group members, and others to the whole group. The length of the Project II report shall not exceed 10 typed pages (font size 12, double spaced, including all figures, references, title page, etc.). The evaluation of the final report shall be based on the format, layout, completeness, technical content and use of English.

Students who have failed this course previously must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted.
Assignments:

Each student must turn in the solution of the assignment at 9:00 am Monday Morning electronically on OWL. Hardcopy submissions are not accepted unless permission is granted by the instructor. Late assignment will be accepted till 4:00 pm on the same day and must be submitted directly to the instructor. Late assignments will be marked out of 80% of the total mark. Extensions are to be negotiated with the course instructor, not the teaching assistants.

Use of English:

In accordance with Senate and Faculty Policy, students may be penalised up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Cheating:

University policy states that cheating and plagiarism are scholastic offences. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

Attendance:

Any student who, in the opinion of the Instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Accessibility:

Please contact the Instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Conduct:

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. Late comers may be asked to wait outside the classroom until being invited in by the Instructor. Please turn off your cell phone before coming to a class, tutorial, quiz or exam.
**Sickness and Other Problems:**

Students should immediately consult with the Department of Civil and Environmental Engineering if they are ill or have any other problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor concerning the recovery of work missed. Failure to notify the Department of illness or any other matter that could affect academic performance immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

**Notices:**

Students are responsible for regularly checking their UWO-account email and notices posted outside the Civil and Environmental Engineering Department Office.

**Consultation:**

Students are encouraged to discuss problems with their Teaching Assistants and/or Instructor in tutorial sessions. Office hours will be arranged for the students to see the Instructor and Teaching Assistants. Other individual consultation can be arranged by appointment with the Instructor, preferably initiated by an electronic mail communication.

The document “INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED”, attached, is to be considered part of this course outline.