

WESTERN UNIVERSITY - FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CEE 9548B – Advanced Design and Behaviour of Steel – Course Outline Winter 2017

The general objectives of this course are for student 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 Hollow Steel structures
- 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, and understand the behaviour of Hollow Steel structures.

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

G. L. Kulak, and G. Y. Grondin 2016, Limit States Design in Structural Steel, Canadian Institute of Steel Construction, 10th Edition, First printing, Canada

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

Computing:

Final project involves computer modelling of industrial building using the commercial program ETABS 2016, spread sheets, and writing report. The full-version of ETABS 2016 is 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 $P-\delta$ and the $P-\Delta$ 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 Hollow Steel Structures behaviour and design
 - a. Understand the behaviour of Hollow Steel members
 - b. Analyse and design Hollow Steel members
8. 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:

Assignments	40%
Project I (Industrial Building Analysis and Design)	40%
Project II (Presentation & Report)	20%
 Total	 <hr style="width: 10%; margin: 0 auto;"/> 100%

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

The length of the Project II report shall not exceed 10 typed pages (font size 12, double spaced). The evaluation of the final design brief 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.

***INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS
OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED***

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic accommodation will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services office if you are in first year) that there are compelling medical or compassionate grounds that can be documented before academic accommodation will be considered. Different regulations apply to term tests, final examinations and late assignments. Read the instructions carefully. (see the 2016 Western [Academic Calendar](#)).

A. GENERAL REGULATIONS & PROCEDURES

1. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
2. Bring your request for academic accommodation to the attention of the Chair of the department (or the Undergraduate Services office if you are in first year) prior to the scheduled time of the test or final examination or due date of the assignment. If you are unable to contact the relevant person, leave a message with the appropriate department (or Undergraduate Services office, if you are in first year). The addresses, telephone and fax numbers are given at the end of these instructions. Documentation must be provided as soon as possible.
3. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or exam reweighted on a retroactive basis is not permitted.

B. TERM TESTS

1. If you are unable to write a term test, inform your instructor and the Chair of your Department (or the Undergraduate Services Office if you are in first year) prior to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office and inform the Chair of the Department (or the Undergraduate Services Office if you are in first year).
2. Be prepared to provide supporting documentation to the Chair and the Undergraduate Services Office (see next page for information on documentation).
3. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair (or the Undergraduate Services Office if you are in first year) is required when rescheduling term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office **PRIOR TO THE SCHEDULED EXAMINATION TIME** to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number (please spell your full name).
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a special examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

N.B. It is the student's responsibility to check the date, time and location of the special examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Associate Dean if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean.

SHORT ABSENCES

If you miss a class due to a minor illness or other problems, check your course outlines for information regarding attendance requirements and make sure you are not missing a test or assignment. Cover any readings and arrange to borrow notes from a classmate.

EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You may want to seek advice from the academic counsellor in your Department or the counsellors in the Undergraduate Services Office if you are in first year.

DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, you must provide the doctor with a Student Medical Certificate to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office if you are in first year). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

ACADEMIC CONCERNS

You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).

You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.

If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your academic counsellor.

Calendar References: Check these regulations in your 2016 Western Academic Calendar available at www.westerncalendar.uwo.ca.

[Absences Due to Illness](#) - page 117

[Academic Accommodations for Students with Disabilities](#) - page 118

[Academic Accommodations for Religious Holidays](#) - page 119

[Incomplete Standing](#) - page 104

[Scheduling of Term Assignments](#) - page 97

[Scholastic Offences](#) - page 113

[Special Examinations](#) - page 132

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

<u>Drop Deadlines:</u>	First term half course (i.e. "A" or "F"):	November 5, 2016
	Full courses and full-year half courses (i.e. "E", "Y" or no suffix):	November 30, 2016
	Second term half or second term full course (i.e. "B" or "G"):	March 7, 2017

Undergraduate Services Office:	SEB 2097	telephone: (519) 661-2130	fax: (519) 661-3757
Dept. of Chemical and Biochemical Engineering:	TEB 477	telephone: (519) 661-2131	fax: (519) 661-3498
Dept. of Civil and Environmental Engineering:	SEB 3005	telephone: (519) 661-2139	fax: (519) 661-3779
Dept. of Electrical and Computer Engineering, Software Engineering Mechatronics Engineering	TEB 279	telephone: (519) 661-3758	fax: (519) 850-2436
Dept. of Mechanical and Materials Engineering:	SEB 3002	telephone: (519) 661-4122	fax: (519) 661-3020