

University of Calgary / School of Architecture, Planning, and Landscape

**EVDA 613 H (3-0)
Structures for Architects 1**

Fall 2019

Classes: 9:00 am – 10:30 am Mondays and Wednesdays
Room: PF 2160

Instructor: Prof. Mauricio Soto-Rubio
mauricio.sotorubio@ucalgary.ca
PF 4181
Tel. 408.220.5507
Office hours: Wednesdays 1:00 pm – 2 pm by appointment

TAs:	Daphne Yuk Ying Tsang dyytsang@ucalgary.ca PF 4146 Office hours: Monday 12:30 pm – 2pm	Mehrdad Mishra mehrdad.mishra1@ucalgary.ca CBD Lab Fridays 1:00 pm – 2:00 pm
------	---	---

CACB student performance criteria (SPCs) met by the course:
Primary: Structural Systems, Building Materials and Assemblies
Secondary: Design Skills

Introduction

This course focuses on the fundamental principles that affect the structural behavior of buildings. Through lectures, exercises and hands on experiments, students will learn analytical techniques for measuring and evaluating the flow of forces through structural systems. They will also begin to appreciate the factors involved in choosing an appropriate structural system for their designs. Students will learn to consider the structural behavior of buildings as a fundamental factor in the design of architectural proposals.

Objectives

1. To learn the fundamentals principles that affect the structural behavior of buildings.
2. To learn analytical techniques to measure and evaluate the flow of forces through structural systems.
3. To develop the ability to evaluate and determine the appropriateness of structural systems and materials.
4. To understand the importance of considering the structural behavior of buildings in the design of architectural proposals.

Teaching Approach

The course is divided into two broad areas: Structural Analysis and Structural Design. Individual course topics are presented mainly through lectures. Weekly required readings, assignments, discussions of student work, and videos supplement the material presented in lectures.

Content:

Week 1 - September 9 & 11: Course Introduction. - Loads. Acting loads on buildings: Live loads, dead loads, wind loads, snow loads, earthquakes, and thermic loads. Static Fundamentals.

Week 2 - September 16 & 18: Forces. Composition and decomposition of forces. Reduction of force systems. Static Equilibrium.

Week 3 - September 23 & 25: Free body diagram. Types of Restrains. Moment. Pair of forces.

Week 4 - September 30 & October 2: Stability and Determination of Forces. Reaction forces in isostatic structures.

Week 5 - October 7: *Reaction forces in isostatic structures (Class given by TA)*
October 9: *Optional Review (Class given by TA)*

Week 6 October 14 & 16: *Thanksgiving (no class). Internal forces. Shear and Moment diagrams.*

Week 7 October 21 & 23: *Block Week (no class)*

Week 8 October 28 & 30: *Section Properties and allowable material capacity.*

Week 9 November 4 & 6: *Section Properties and allowable material capacity (continued)*

Week 10- November 11 & 13: *Term Break (no class)*

Week 11 - November 18 & 20: *Truss analysis. Method of joints. Method of sections.*

Week 12 - November 25 and 27: *Truss Analysis. Graphic method.*

Week 13 - December 2 and 4: *Course Review. Final Exam.*

Means of Evaluation

Students will be evaluated through group projects (40%), weekly quizzes on lectures (30%), and a final exam (30%). Quizzes and exams are closed book; however, 1 page of hand written notes (front and back) is allowed. Quizzes must be completed in the first 15 minutes of lecture class. Therefore, attendance to lecture is required. Absences will not count towards administrative fail but students are responsible for any missed work. Missed quizzes and exams due to un-excused absences will receive no credit.

Important Deadlines:

Review of Exercise 1: **September 25th**

Review of Exercise 2: **October 30st**

Review of Exercise 3: **November 20st**

Final Exam: **December 4th**

Grading Scale

Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range.

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	90-94.99	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	85-89.99	Very good performance
B+	3.30	3.15-3.49	80-84.99	Good performance
B	3.00	2.85-3.14	75-79.99	Satisfactory performance
B-	2.70	2.50-2.84	70-74.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	65-69.99	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.
C	2.00	1.85-2.14	60-64.99	
C-	1.70	1.50-1.84	55-59.99	
D+	1.30	1.15-1.49	50-54.99	
D	1.00	0.50-1.14	45-49.99	
F	0.00	0-0.49	0-44.99	

Notes:

- A student who receives a "B-" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

Highly recommended textbooks:

Millais, Mallcom, Building Structures: From Concept to Design; Spon Press, Taylor & Francis Group: 2005, ISBN: 0415336236

Recommended textbooks:

- Allen, Edward & Iano, Joseph, The Architect's Studio Companion, (2001, John Wiley & Sons, NY)
- Allen, Edward & Iano, Joseph, Fundamentals of Building Construction, (2003, John Wiley & Sons, NY)
- Ambrose, James, Building Structures, (1993, John Wiley & Sons, New York)
- Billington, David, The Tower & The Bridge, (1983, Princeton University Press, New Jersey)
- Ching, Francis D.K., Building Construction Illustrated, (1991, Van Nostrand Reinhold, New York)
- Ching, Francis D.K., Onouye, B. S., & Zuberbuhler, D., Building Structures Illustrated, Patterns, Systems, and Design, (2009, John Wiley & Sons, Hoboken, New Jersey)
- Deplazes, Andrea, Constructing Architecture, Materials Processes Structures, (2005, Birkhauser-Publishers, Basel, Boston, London)
- Engel, Heino, Structure Systems, (1997, Distributed Art Publishers, New York)

- Otto, Frei, & Rasch, Bodo, Finding Form, (1995, Edition Axel Menges)
- Salvadori, Mario, Why Buildings Stand Up, (2002, W. W. Norton & Co., New York)
- Salvadori, Mario, Why Buildings Fall Down, (2002, W. W. Norton & Co., New York)
- Schueller, Wolfgang., The Design of Building Structures, (1995, Prentice Hall, New Jersey)
- Wolfe, William S., Graphical Analysis , a text book on Graphic Statics , (1921, McGraw-Hill, NY)
- Zalewski, Waclaw & Allen, Edward, Shaping Structures Statics, (1998, John Wiley & Sons, NY)
- Canadian Wood Council, Wood Reference Handbook, (1991, Canadian Wood Council, Ontario, Canada)
- DETAIL, Review of Architecture, Glass Construction Manual, (1999, Birkhauser, Basel, Switzerland)
- DETAIL, Review of Architecture, Steel Construction Manual, (2000, Birkhauser, Basel, Switzerland)

Course Website

DLS will be utilized as the primary communication tool for this course. The course website will contain updated information regarding both project and homework assignments as well as required and recommended readings and references. It is the responsibility of students to ensure that they are registered for the course and that their e-mail contact information is up-to-date with the university.

Special Budgetary Requirements

There are no special budgetary requirements for this course.

University of Calgary Policies and Supports

ACADEMIC ACCOMMODATION

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

ACADEMIC MISCONDUCT

Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when: (a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work, (b) parts of the work are taken from another source without reference to the original author, (c) the whole work (e.g., an essay) is copied from another source, and/or, (d) a student submits or presents work in one course which has also been submitted in another course (although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic

offence. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.

For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

COPYRIGHT LEGISLATION:

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

UNIVERSITY STUDENT APPEALS OFFICE: If a student has a concern about the course, academic matter, or a grade that they have been assigned, they must first communicate this concern with the instructor. If the concern cannot be resolved with the instructor, the student can proceed with an academic appeal, which normally begins with the Faculty. <https://ucalgary.ca/student-appeals/>

More student support and resources (e.g. safety and wellness) can be found here:

<https://www.ucalgary.ca/registrar/registration/course-outlines>