

CIVE 4403/5200 –Masonry Design



Instructor: Ted Sherwood ted.sherwood@carleton.ca
Office: ME 3366
Office Hours: tbd
 I am easily reached by email. This means I get many of them. Please use “CIVE 4403” or “CIVE 5200” in the subject header when emailing as it aids me in prioritizing yours above others.

TA: Madeleine Fayle, madeleinefayle@cmail.carleton.ca

Lectures: Every Wednesday
PA: Alternate Wednesdays
 (Sept 18, Oct 2, Oct 16, Nov 6, Nov 20, Dec 4)
 No lectures or PAs during the week of Oct 21

Topics Covered:

| | | |
|----|--------------------------------------|---|
| 1. | Introduction | -History of masonry and reinforced masonry -Structural design requirements, building loads, building layout |
| 2. | Material Properties | -Concrete and clay masonry units, mortar, grout, reinforcement -Properties of masonry assemblages |
| 3. | Beams and Lintels | -Singly and doubly-reinforced beams, deflections, shear, splices and development |
| 4. | Columns | -Design of masonry columns, pilasters -Slenderness effects, biaxial bending. |
| 5. | Loadbearing Walls | -Design of unreinforced walls and reinforced walls under axial load, combined axial load and bending. Slenderness effects |
| 6. | Shear Walls | -Failure modes, distribution of lateral loads to walls, wall rigidity, flexural and shear design, seismic considerations |
| 7. | Brick Veneer and Cavity Walls | -Masonry components of the building envelope, design of rain screen walls, wall detailing, shelf angles, building science |
| 8. | Design of Low-Rise Masonry Buildings | -Bringing it all together: design of a low-rise industrial building |

Note: topics may be added, modified or removed as the term progresses

Required Texts:

- 1) **Masonry Structures: Behaviour and Design (2nd Canadian Edition), R.G. Drysdale, B.R. Banting, Canada Masonry Design Centre, 769pp.** This text has been generously donated by the Canada Masonry Design Centre (CMDC). Hard copies should be available soon.
- 2) CSA S304-14: Design of Masonry Structures, Canadian Standards Association, 126pp.

This text is available for free download from Carleton’s Techstreet database. (<https://library.carleton.ca/find/databases/techstreet-enterprise>)

Mark Breakdown:

| | |
|--------------|---|
| Assignments | 30% (About 8 to 10 in total through the term) |
| Midterm Exam | 20% (October 16, 2 hours long) |
| Final Exam | 50% (3 hours long, time and date tbd) |

The class will visit the masonry training centre at La Cité Collégiale in Orleans for a field trip (<https://carleton.ca/cee/2017/masonry-design-students-learn-hands/>) where students will learn masonry techniques and how to build a masonry wall. The trip will be held from 8:00-2:30 on a Wednesday when we have both a PA and lecture scheduled. A bus will be available to take students to and from campus, and more details will be presented in class. This excellent opportunity is being kindly supported by the masonry industry; hence attendance is mandatory (*failure to attend the field trip will result in a failing grade*). To accommodate inclusion of the field trip into the course, one or more lectures will be held during the PA sessions in addition to the regular lecture times.

Students are required to wear CSA approved steel-toed shoes on the field trip.

Assignments must be completed in pencil on engineering computation paper. Assignments must be neat, clear and of professional quality. Drawings are to be done by hand and in pencil. Assignments that are not handed in when due will immediately receive a 50% penalty. Thereafter a penalty of 10% per day will be assessed. The only reasons that will excuse a late assignment are illness documented by a doctor's note or prior permission from the instructor. Calculators (regular and programmable) are the only electronic aids permitted during exams. A minimum grade of 40 out of 100 must be obtained on the final exam in order to receive credit for the course.

General:

Attendance at lectures and PA sessions is mandatory. Handouts that supplement the lecture material will be given out from time-to-time during the term. Experience has shown that there is a direct relationship between regular attendance and the student's final grade (and can be the difference between a passing or failing mark).

Students are required to check Brightspace and their Carleton email regularly for messages, updates and course content. All electronic devices other than calculators are to be turned off prior to lectures.

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation. Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally scheduled exam.

Your professor would like to acknowledge that the land on which we gather for this course is the traditional and unceded territory of the Algonquin nation.