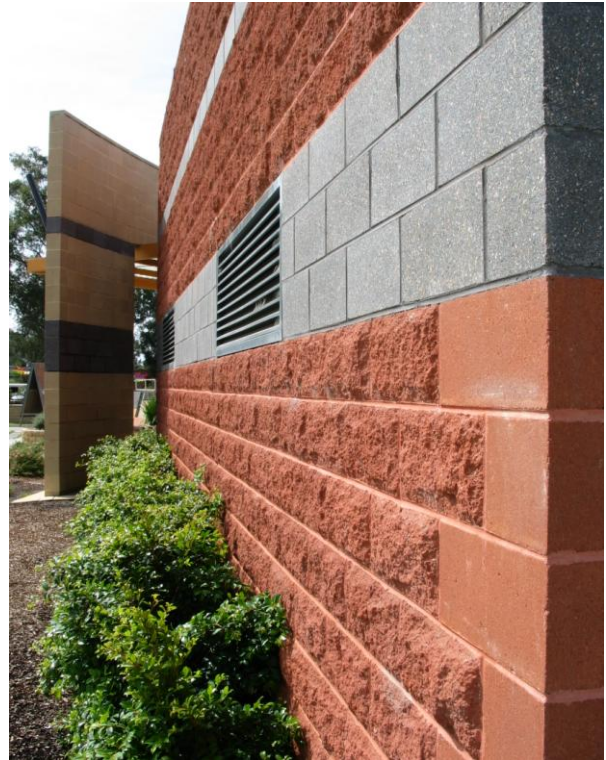


Design of Masonry Structures

Course ENB384 – Queensland University of Technology

A course designed to develop understanding of structural masonry, in particular material properties, structural design and construction principles in reference to AS3700 Masonry Structures

- A unit written for QUT Structural Engineering students
- Available for students from other universities and graduate engineers who enrol as QUT visiting students
- Students may do the course remotely, but need to sit the exam in person at QUT, Brisbane
- Semester 1, 2011



- Resource materials for each learning session will be delivered through the BlackBoard portal on the QUT website
- See attached Unit Information document for details, including lecture and tutorial dates at QUT, Brisbane, for those who can attend
- For further information, application details and costs visit:
<http://www.qut.edu.au/study/applying/visiting-cross-institutional.jsp>
- You may also contact the Unit Coordinator/Lecturer at QUT:
Sekar – m.dhanasekar@qut.edu.au
- Resource material can be gained from the CMAA website (www.cmaa.com.au)
 - MA55 *Design and Construction of Concrete Masonry Buildings*
 - CMAA Concrete Masonry Design Check Software
 - Other guides and technical papers on concrete masonry
- Also see www.thinkbrick.com.au



Queensland University of Technology



Concrete Masonry
Association of
Australia





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ENB384 Design of Masonry Structures

Unit Information: Semester 1, 2011

Introduction

This document is written with a view to clarifying the information on lectures, tutorials and assessment strategies in the unit outline. Students are therefore advised to read this document in conjunction with the unit outline.

What is this Unit all about?

ENB384 is one of the compulsory units for the students with a second major in Structural Engineering. This unit is intended to develop students' understanding of structural masonry; in particular material properties, structural design and construction principles in reference to AS3700, the Australian Masonry Structures standard. To a limited extent, non-structural detailing in the context of practices in Australia will be covered. ENB384 is also available to students of other universities and graduate engineers who enrol as visiting students (<http://www.qut.edu.au/study/applying/visiting-cross-institutional.jsp>) to QUT.

ENB384 focuses particularly on designing masonry buildings including masonry in buildings; some overview of the design of masonry that forms part of civil infrastructure will also be provided. Capacity design principles will be introduced (for completeness) although some students would have learnt these principles from other structural design units. The learning outcome of this unit will develop the knowledge required for the design of masonry walling systems as per the provisions in AS3700. Masonry retaining walls and paving systems will also be introduced with the objective of preparing you to practice as a building structural engineer.

How this unit is organised

The unit is organised into several well defined 'learning sessions'. Resource materials for each learning session will be delivered through the BlackBoard portal in the QUT web (accessible through the *quicklink* in www.qut.edu.au). Care is taken to make the resource material as clear as possible for first time readers with basic knowledge on the pre-requisite unit; however, students are encouraged to participate in face-to-face learning sessions on a weekly basis (Thursdays 1PM to 5PM Room O-412) to re-confirm their understanding of their ongoing reading of resource materials and/ or for clarification of assessment items.

Learning Sessions

These weekly sessions are organised for face-to-face delivery of the content of the unit as well as to solve some simple illustrative examples (in tutorial format) so that the learners would re-confirm their understanding of the principles and practices of design and construction of the masonry walling system conforming to the Australian Standard AS3700. Table 1 provides further details on learning sessions. Typically the content lectured in Week 1 will be assisted with a tutorial session in week 2 prior to delivering new content for week 2. This system necessitates division of the four hour learning session

into 2 – two hour sessions. For the first week, the first hour (1PM – 2PM) will be introductions and the lecture will commence at 2PM. For all other weeks, although variations will occur, typically the first of the two hour sessions (1PM – 3PM) will be Tutorial (typically on the lecture content of previous week) and the second (3PM – 5PM) two hour session will be the traditional lecture. The teaching team apologises for this single time slot and requests your patience as QUT experiences acute space shortage currently.

How will your performance be measured?

Students' performances in this unit will be measured using three (3) items of summative assessment. Two of the three assessment items will be a mid-semester informal exam and a final formal exam. Both the informal and formal exams will be conducted based on an open book format that will assess the students' understanding of the principles and practices of the design of masonry covered within the content of this unit (not just memory – but memory will still play a significant role). You will be permitted to use any type of calculator. Usage of a laptop/ mobile phones/ wireless mobile internet will **not** be permitted.

The third assessment item is partly formative and summative. You will be required to submit solutions to some selected tutorial problems (facilitated in tutorial sessions) as an assignment by the due date shown in Table 1. This assignment will demonstrate your development of knowledge on the subject matters related to masonry and its design in buildings and infrastructure.

The Assessment System

The assessment criteria defined in each assignment reflect the unit objectives and what the students are expected to learn from this unit. Criteria Reference Assessment (CRA) sheets for each assessment item will be provided in the Blackboard website. These sheets will be used to assess your work against a set of standards (or performance indicators) for each of the assessment criteria. You are encouraged to use these sheets to assess your own work prior to submission and thus develop self-directed learning and critical thinking skills.

The Process for Submission of Work:

The assignment will be submitted through the Assignment Minder (AM), which is located at the Library at Gardens Point campus. The service is available 7 days/week. You will need to complete a Built Environment and Engineering Assignment Submission Form with a unique barcode available only from the AM desk or the website at <http://www.am.qut.edu.au/> to affix to the front of your assignment. When submitting and collecting your reports your student card must be presented for scanning along with the barcode number identifying the submission form. You should be notified by email by the AM staff in the library when your assignment is ready for collection. You must present your student card when picking up the assignment. Students outside Brisbane, who registered as external students, will submit their assignments via Blackboard or through mail.

Requesting an Extension:

If you are seeking an extension on the due date for the project report, you must apply through the BEE Student Services Desk. Extensions are typically granted for periods of sickness and the like. They are not normally granted for 'work related' reasons. You will be required to complete and submit an Assignment Extension Request Form and attach supporting documentation (such as a doctor's certificate, or a letter of support from a counsellor). The Assignment Extension Request Form can be downloaded from: <http://www.bee.qut.edu.au/study/current/studying/extension.jsp> Penalties for late submissions (without approved extension) will be 10% of the possible total mark per day.

How to study for ENB384

Make sure you follow the schedule below. This is a 12 credit point unit – which means for an average student whose ambition is just to pass (grade 4.0), he/ she will have to spend 12 hours a week (including 4 hour contact) for this unit. A good practice is to log and check your time against this

notional value. If your academic record is average to date but if you want to excel in this unit with a HD (grade 7), you may require much more time to be spent on this unit. Team learning will be a significant advantage. ENB384 is one of the structural engineering units specifically tailored for Structural Engineering second major students; therefore, numerical calculations and skills for interpretation of the standard, mechanics of the behaviour of masonry structural components will form the core of the unit. This will include materials and construction practices. Other matters including history, aesthetics and impact on society will not outweigh the core requirement of the unit.

Table 1. Suggested Study Schedule

Week	Date	Learning Session
1	03 Mar 2011	Introduction, unit operation, deadlines, on-line material access,
		Masonry standards: Historical Development; Modern Masonry – Principles of Design. AS3700 – Introduction & Overview. Control Joints; Robustness.
2	10 Mar 2011	Tutorial: Control Joints & Robustness
		Unreinforced Masonry – Out of Plane Flexure
3	17 Mar 2011	Tutorial: Out-of-plane flexure
		Unreinforced Masonry – out-of-plane and inplane Shear Design
4	24 Mar 2011	Tutorial: URM Shear Design
		Constituent Materials & Characterisation Processes and Standards.
5	31 Mar 2011	Tutorial: Material Properties
		Masonry Retaining Walls – Allan Herse, Anchor Wall Systems, Gold Coast
6	07 Apr 2011	Mid Term Exercises (20%)
		Reinforced Masonry (I) – Design for Flexure & Shear
7	14 Apr 2011	Tutorial: Reinforced Masonry flexure and shear Design (I)
		Reinforced Masonry (II) – Design for Flexure & Shear
8	21 Apr 2011	Tutorial: Reinforced Masonry flexure and shear Design (II)
		Design of Masonry for Compression; Slender Walls
9	05 May 2011	Tutorial: Masonry (URM/ RM) Compression Design
		Design for Concentrated Compression & Post Tensioned Masonry
10	12 May 2011	Tutorial: Design for Concentrated Compression & Post Tensioned Masonry
		Design of Masonry for Earthquakes
11	19 May 2011	Tutorial: Design of Masonry for Earthquakes
		Design for Durability, Fire & Ties.
12	26 May 2011	Tutorial: Ties/ Durability/ Fire;
		Design of Concrete Masonry Segmental Paving: Prof. Brian Shackel, UNSW
13	02 Jun 2011	Masonry Building Design Project (II) – Workshop Assignment Submission (30%) (Due: 4PM Wednesday 26 May 2010)
		Review
14	Exam Period	FINAL EXAM (Summative)(50%)

Learning Resources:

Most of the material covered in lectures in the unit will be placed in the unit website from time to time during the semester.

Required Texts:

- (1) AS3700 (2001) Australian Standard – Masonry Structures, Standards Australia, Sydney. (QUT library database - logon required)
- (2) AS3700 Supplement 1 (2004) Australian Standard – Masonry Structures, Standards Australia, Sydney.(QUT library database - logon required)

References:

- (1) CMAA Resource Materials – Concrete Masonry Walling;
<http://www.cmaa.com.au/html/TechInfo/TechInfoWalling.html>
- (2) Think Brick Australia Reference Library; <http://www.thinkbrick.com.au/brick-data.cfm>
- (3) Drysdale, R.G., Hamid, A.A. & Baker, L.R., “Masonry Structures Behaviour & Design”, Prentice Hall, NJ 1994.

Staff Details

Unit Coordinator/ Lecturer: Sekar, room L206 GP Campus
m.dhanasekar@qut.edu.au

Sessional Staff:

Wayne HOLT Technical Manager, Adbri Masonry Wayne.holt@adbri.com.au	Mr. Lungten JAMTSO Master of Engineering Research Student lungten.jamtso@qut.edu.au
Susan TEH Bornhorst + Ward Consulting Engineers s.teh@bornhorstward.com.au	

Risk Management:

Students will be informed of any requirements pertaining to a safe workplace. In the face-to-face learning sessions, the information will include location of fire exits and meeting points in case of fire. **Students who do not follow legitimate instructions** or who endanger the safety of others or do not act in accordance with the requirements of the Workplace Health and Safety Act **will be required to leave the session.**

Additional Costs

There are no out of the ordinary costs expected; you may elect to print the presentation slides/ resource materials at your own cost.

Academic Integrity:

You need to be made aware of issues of academic honesty and how to avoid plagiarism. Plagiarism is the act of taking and using another person's work as one's own. For example, incorporating another person's work in an assignment without acknowledging the source, or simply copying or summarising another student's work. **The University regards plagiarism as equivalent to cheating in an examination and it incurs the same penalties.** For further details of plagiarism please consult the QUT APPU website – the link is shown in the grey box (right column) in this page.