## School of Architecture and Built Environment

# ARBE3100: Construction Technology 3

Singapore BCA, Callaghan and Online

Semester 2 - 2023

COURSE OUTLINE

# OVERVIEW

**Course Description**

This course explores the technical issues associated with building types for public use including building structure, construction materials and techniques, and cost planning and specification. It covers the implications of using alternative materials and construction processes for structural systems; construction design and detailing; and the selection and design of foundations in response to specific ground and soil conditions.

**Requisites**

This course is only available to students enrolled in the Bachelor of Design (Architecture) or Bachelor of Construction Management (Building) (Honours) [12331] or [40374] programs.

**Assumed Knowledge**

ARBE1305 Construction Technology, Sequencing and Representation or equivalent
or
ARBE1101 Construction Technology 1

**Contact Hours**

**Lectorial**
Face to Face On Campus
3 hour(s) per Week for 13 Weeks
Distance learning students will receive equivalent instruction through online or other distance education strategies.

**Unit Weighting Workload**

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

# CONTACTS

**Course Coordinator**

**Singapore BCA, Callaghan and Online**
Prof Patrick Tang
Patrick.Tang@newcastle.edu.au
(02) 4921 7246
Consultation: Appointments with your Course Coordinator must be made by email. Generally the Course Coordinator will be available for out of class assistance on Thursdays between 4:00 and 5:00 p.m

**Teaching Staff**

Mr Derren Lowe
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**School Office**

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# SYLLABUS

**Course Content**

Piled foundations and basement construction, structural form and construction in steel and concrete, cladding systems, building services and the Australian Building Code.
Lecture topics include:

- Soil pressures and forces; compressibility and settlement; shear strength
- Selection of foundations in response to ground conditions
- Piled foundations
- Basement construction
- Dewatering
- Concrete
- Formwork
- Steel
- Prestressed concrete
- Floors
- Specifications & approximate cost estimating
- Fire & fire fighting equipment
- Incorporation & distribution of services
- BIM for design and documentation of structural systems

**Course Learning Outcomes**

**On successful completion of this course, students will be able to:**
1. Accurately describe the characteristics of a range of ground and soil conditions, including: materials, systems and components; and accurately describe foundation techniques and methods used in the construction of commercial buildings.

2. Analyse the suitability of the various methods and technologies available for the construction of a commercial building in response to specific ground and site conditions.

3. Evaluate design alternatives in terms of buildability and cost.

4. Illustrate the construction sequencing of tasks and activities involved in the construction of commercial building.

5. Interpret the appropriate application of Building Information Modelling (BIM) tools for the design and documentation of structural systems for commercial buildings.

**Course Materials**

**Recommended Reading:**
Barry, R. (2001) The Construction of Buildings (Vol 3), 5 Edition, Blackwell Scientific Publications.

Barry, R. (2001) The Construction of Buildings (Vol 4), 5 Edition, Blackwell Scientific Publications.

Foster, J. S. (2000) Mitchell's Structure & Fabric (Part 1), 6 Edition, Longman Scientific & Technical.

Foster, J. S., Harrington, R. and Greeno, R. (2007) Mitchell's Structure & Fabric (Part 2), 7 Edition, Prentice Hall, New York.

McEvoy, M. (1994) External Components. Longman Scientific & Technical.

Blanc, A. (1994) Internal Components. Longman Scientific & Technical.

Burberry, P. (1997) Environment & Services, 8 Edition, Longman Scientific & Technical

**Other Resources:**

Salvadori, M. G. (1982) Why Buildings Stand Up - the strength of architecture, McGraw-Hill.

Levy, M. (2002) Why Buildings Fall Down, W.W. Norton.

Allen, E. (2004) Fundamentals of Building Construction, Materials & Methods, 4 Edition, J. Wiley & Sons.

Watts, A. (2001) Modern Construction Handbook, Springer.

Addis, W. (1994) The Art of the Structural Engineer, Artemis.

Schittich, C., Staib, G., Balkow, D., Schuler, M. and Sobek, W. (1999) Glass Construction Manual, Birkhauser.

Parlour, R. P. (1997) Building Services: A Guide to Integrated Design. Engineering for Architects, 2 Edition, Integral Publishing.

Riley, M. and Cotgrave, A. (2009) Construction Technology 2, Industrial and Commercial Building, 2 Edition, Palgrave Macmillian, UK.

Building Codes of Australia (available online via the University Library)

Australian Standards (available online via the University Library)

Metric Handbook Planning and Design Data (2007), Edited by David Littlefield, Architectural Press.

Rawlinsons Australian Construction Hand Book (the latest version), Rawlhouse Publishing.

# SCHEDULE

| Week | Week Begins | Topic | Learning Activity | Assessment Due |
|---|---|---|---|---|
| **1** | 17 Jul | Course Introduction | | |
| **2** | 24 Jul | Site Investigation -<br>Ground investigation and soil properties | | |
| **3** | 31 Jul | Basement Construction -<br>Construction methods and soil support systems | | |
| **4** | 7 Aug | Foundation Construction -<br>Construction methods and dewatering techniques | | **Quiz 1**<br>Due:<br>Thursday 10 August by 23:59 Hr |
| **5** | 14 Aug | Specifications, BIM and Cost Estimating | | |
| **6** | 21 Aug | Concrete Technology -<br>Concrete production, delivery and properties | | |
| **7** | 28 Aug | Steel Application -<br>Reinforcing steel and Structural steel | | **Report 1**<br>Basement Construction<br>Due:<br>Wednesday 30 August by 23:59 Hr<br><br>**Quiz 2**<br>Due:<br>Sunday 3 September by 23:59 Hr |
| **8** | 4 Sep | Temporary Work -<br>Formwork systems | | |
| **9** | 11 Sep | Superstructure 1 -<br>Floor, Ceiling and Roof Systems | | |
| **10** | 18 Sep | Superstructure 2 -<br>External wall, cladding and internal access systems | | |
| **Mid Term Break** | | | | |
| **Mid Term Break** | | | | |
| **11** | 9 Oct | Prefabricated Concrete -<br>Precast and prestressed concrete | | |
| **12** | 16 Oct | Fire Engineering and Protection -<br>Fire theory, fire protection and safety measures | | |
| **13** | 23 Oct | Course Review (if required) | | **Report 2**<br>Superstructure Construction<br>Due:5<br>Wednesday 25 October by 23:59 Hr<br><br>**Labster Simulation**<br>Due:<br>Sunday 29 October by 23:59 Hr |
| **Examination Period** | | | | |
| **Examination Period** | | | | |

# ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

| | Assessment Name | Due Date | Involvement | Weighting | Learning Outcomes |
|---|---|---|---|---|---|
| **1** | Quizzes | Quiz 1 - Week 4 (5% of Course Mark)<br>Quiz 2 - Week 7 (5% of Course Mark)<br>Simulation - Week 13 (10% of Course Mark) | Individual | 20% | 1, 2, 5 |
| **2** | Report 1: Basement Construction | August 30, 2023, 11:59 p.m. AEST | Individual | 40% | 1, 2, 3, 4 |
| **3** | Report 2: Superstructure Construction | October 25, 2023, 11:59 p.m. AEDT | Individual | 40% | 1, 2, 3, 4 |

**Late Submissions** The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

## Assessment 1 - Quizzes

**Assessment Type** Quiz

**Purpose** On completion of these quizzes the student should be able to:

1. Understand the key knowledge of the ground and soil conditions, materials, systems and components used in the construction of commercial buildings;
2. Understand the key knowledge of the techniques used to incorporate them into the building, including sequencing of operations;
3. Understand the use of Building Information Modelling (BIM) tools for design and documentation of structural system for commercial buildings

**Description** Quiz 1 - Week 4 (5% of Course Mark)
Quiz 2 - Week 7 (5% of Course Mark)
Simulation - Week 13 (10% of Course Mark)
The quiz will be conducted online through Canvas. The quiz will be available for 7 days, and students will be able to access the quiz any time within the available period. Students are required to complete the quiz within the specified time in one sitting. **Failure to complete the online quizzes/simulation within the set period of time will result in a zero mark unless adverse circumstances make this inappropriate.**

**Weighting** 20%

**Due Date** See above assessment table and due dates.

**Submission Method** Online

**Assessment Criteria** -

**Return Method** Not Returned

**Feedback Provided** No Feedback

## Assessment 2 - Report 1: Basement Construction

| | |
|---|---|
| **Assessment Type** | Report |
| **Purpose** | On completion of this assignment the student should be able to:<br>1. Demonstrate knowledge of the ground and soil conditions, materials, systems and components used in the construction of commercial buildings;<br>2. Demonstrate knowledge of the techniques used to incorporate them into the building, including sequencing of operations;<br>3. Evaluate design alternatives in terms of buildability and cost;<br>4. Communicate design alternatives using drawings reflecting the statutory standards. |
| **Description** | Please refer to the Assignment Brief on Canvas for details. |
| **Weighting** | 40% |
| **Length** | 3000 words ± 10% |
| **Due Date** | August 30, 2023, 11:59 p.m. AEST |
| **Submission Method** | Online |
| **Assessment Criteria** | Please refer to the Assignment Brief on Canvas for details |
| **Submission Method** | Online |
| **Feedback Provided** | Online - Within three weeks after submission. |

## Assessment 3 - Report 2: Superstructure Construction

| | |
|---|---|
| **Assessment Type** | Report |
| **Purpose** | On completion of this assignment the student should be able to:<br>1. Demonstrate knowledge of the site conditions, materials, systems and components used in the construction of commercial buildings;<br>2. Demonstrate knowledge of the techniques used to incorporate them into the building, including sequencing of operations;<br>3. Evaluate design alternatives in terms of buildability and cost;<br>4. Communicate design alternatives using drawings reflecting the statutory standards. |
| **Description** | Please refer to the Assignment Brief on Canvas for details. |
| **Weighting** | 40% |
| **Length** | 3000 words ± 10% |
| **Due Date** | October 25, 2023, 11:59 p.m. AEDT |
| **Submission Method** | Online |
| **Assessment Criteria** | Please refer to the Assignment Brief on Canvas for details. |
| **Return Method** | Not Returned |
| **Feedback Provided** | Online - Within three weeks after submission. |

# ADDITIONAL INFORMATION

**Grading Scheme**

This course is graded as follows:

| Range of Marks | Grade | Description |
|---|---|---|
| 85-100 | High Distinction (HD) | Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives. |
| 75-84 | Distinction (D) | Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives. |
| 65-74 | Credit (C) | Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes. |
| 50-64 | Pass (P) | Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning |

| | | |
|---|---|---|
| | | outcomes. |
| 0-49 | Fail (FF) | Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action. |

*Skills are those identified for the purposes of assessment task(s).

**Communication Methods**

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face lectorial sessions

**Course Evaluation**

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

**Oral Interviews (Vivas)**

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

**Academic Misconduct**

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

**Adverse Circumstances**

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

**Important Policy Information**

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures that support a safe and respectful environment at the University.

*This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*