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T... 3, 2020

# GMAT2550 SURVEYING COMPUTATIONS B

## COURSE DETAILS

Contact hours 6 hours per week  
Lecture Class Monday, 1 3pm  
Tuesday, 9 11am

Online – Moodle link to BBCU  
Online – Moodle link to BBCU  
or CE201 (see timetable below)

**COURSE PROGRAM TERM 3, 2020**

Wk	Monday 1 3pm Lec BBCU	Tuesday 9 11 am Lec or <a href="#">Lab CE201</a> or BBCU	Wednesday 9 11am <a href="#">Lab in CE201</a> or BBCU
1	Course Outline. Least Squares concepts & principles Why use LS? LS & means. Ch1.	Revision matrix algebra, differentiation, Excel. Ch 1. Statistics applied to surveying problems. Ch2.	<a href="#">LS Treasure Hunt game. Matrix algebra, differentiation, Excel. Statistics problems</a>
2	Input to LS programs. Preprocessing obs & std devs. Ch 3.	Modelling observation equations, Parametric method. Linearisation – Partial derivatives Ch 4.	<a href="#">Statistics and input to LS. Data collection, Pillar trilateration or traverse</a>
3	Derivation of LS equations. Ch 4. Least Squares step by step worked examples Ch4.	Forming and solving normal equations. Ch 4. (abt 1 hr) <a href="#">then lab</a>	<a href="#">Modelling &amp; linearization LS software FIXIT4. Input trilateration data.</a>
4	Public Holiday	<a href="#">Lab: Forming &amp; solving normal equations in Excel. CE201</a>	<b>Test 1 in CE computer lab</b>
5	VCV matrices, residuals, VF. Ch4	Analysis of Output. Ch 5.	<a href="#">Analysis of Output</a>
6	<b>No lecture classes</b>	<a href="#">Optional Field: EDM baseline</a>	<a href="#">Optional lab class</a>
7	Outliers. Ch 6.	Redundancy. Ch 6. Survey Design. Ch 7.	<a href="#">Analysis of Output</a>
8	Survey Design. Ch 7	<a href="#">Lab: Outliers. Simulations CE201</a>	<b>Test 2 in CE computer lab</b>
9	EDM Calibration. LS aspects of EDM calibration	Combined and condition methods. Ch 8.	<a href="#">Combined and condition methods</a>
10	Advanced LS. Ch9. LS Essentials and Predicting results. Ch 10.	Case Studies: OH, SHB, CD control surveys examples of network analysis. Exam discussion.	<a href="#">Final Lab class – analysis of past papers</a>

*Chapters in the table above refer to Monograph 13, third edition.*

**ASSESSMENT COMPONENTS**

We have a class with < 40 students so we have considerable flexibility with assessment methods. For example tests can be conducted in our computer lab with all students present at one time or via email in 2020. Computers used in CE201 in tests will not have network or email access.

Assessment for the course includes:

Mid term test 1

20%

On Wednesday week [TJTD0Tc<0003Tj/TT101Tf.](#)

**HANDBOOK DESCRIPTION**

See virtual handbook: <http://www.handbook.unsw.edu.au/undergraduate/courses/2020/GMAT2550.html>

Least Squares measurement adjustment principles and concepts, with particular reference to

You are encouraged to ask questions and participate in class discussions during lectures, computer labs. Read the text and lecture slides. Attempt the computer lab questions and worked examples yourself. Get feedback: Ask the lecturer for help and help each other. After the mid term tests visit me individually for feedback. AND after the end of the course you are welcome to see me and get feedback on your final exams and assignments and to collect any of your remaining submissions.

I encourage attendance in class and participation because I think it is better for your education than just reading the PowerPoint. You will also notice that I say more in class than what is written on PowerPoint slides. I do not like lectures that read the screen to you.



Professionally interpret output from Least Squares analysis software, including variance factor and outlier investigations

Design a survey network using least squares analysis, including error ellipses and redundancy number investigations

### 3. Computer Lab exercises

Pocket calculators are required during lecturing hours, for computer labs and practicals in this course. They have to be hand held,

**Appendix A: Engineers Australia (EA) Competencies**

*Stage 1 Competencies for Professional Engineers*

**Program Intended Learning Outcomes**