COURSE PROGRAM TERM 3, 2021

Wk	**Wednesday** 10am – 12 noon Lec CLB5 & BBCU	**Thursday** 2-4 pm Lec CLB5 & BBCU or Lab CE201 / BBCU	**Thursday** 4-6pm Lab in CE201 / 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.	LS Treasure Hunt game. Matrix algebra, differentiation, Excel. Statistics problems
2	Input to LS programs. Preprocessing obs and std devs. Ch 3.	Modelling observation equations, Parametric method. Linearisation – Partial derivatives Ch 4.	Statistics and input to LS. Data collection, Pillar trilateration or traverse
3			

prior to the census date = 10 Oct 2021.

Supplementary Examinations for Term 3 2021 will be held on Monday 10 to Friday 14 January 2022 (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or

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. So for example their might be a graphic chart, plan, map or photograph or table of numbers on the screen and we talk about it. If you want to learn by reading then that's what my textbook (monograph) is for, because the lecture PowerPoint are missing some information.

At UNSW, the normal workload expectations of a student are about 150 hours per term for a 6 unit of credit course, including class contact hours, preparation and time spent on all assessable work. Are you a full time student spending less than 40 hours per week on uni studies, including class time? Are you balancing time between courses, i.e. one 6 unit course should get close to the same amount of time as another 6 unit course?

Downloading from Moodle and lecture recordings

Apparently downloading files is addictive. The amount of class and reference material that students can read is now enormous. Most people will download files because they think that if they have the file, they can read it at any time … so they don't have to read it now. So hardly anyone reads anymore and people only collect files and store them away. Is getting copies of all the material the only way you can keep up?

Have you tried an alternative? It's an old fashioned process where you attend the class live or place the reading material in front of your eyes and you let it go through there into the brain and it is much better than a download. [Paraphrased by Bruce Harvey from an article on Neuroxing (source unknown).] Even better than reading, is to do

	software, including variance factor and outlier investigations		
6.	Design a survey network using least squares analysis, including error ellipses and redundancy number investigations	Test 2, Final exam and labs	PE1.5, PE2.2, PE2.4
7.	Be familiar with computer programming aspects used within LS software	Not assessed, discussed in class	PE1.2

ASSESSMENT

Assessment Title	**Assess**

- 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

- Understand the basic principles of Least Squares analysis and their application to engineering surveying
- Setup the equations within a parametric method least squares adjustment
- Calculate a least squares adjustment of data step by step without using computer programs designed for Least Squares
- Properly prepare data for Least Squares analysis, including a priori statistics
- 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
- Setup the equations within a parametric method least squares adjustment
- Calculate a least squares adjustment of data step by step without using computer programs designed for Least Squares
- Professionally interpret output from Least Squares analysis software, including variance factor and outlier investigations

4. Final Exam

- Understand the basic principles of Least Squares analysis and their application to engineering surveying
- Setup the equations within a parametric method least squares adjustment
- Calculate a least squares adjustment of data step by step without using computer programs designed for Least Squares
- Properly prepare data for Least Squares analysis, including a priori statistics
- 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
- Be familiar with computer programming aspects used within LS software

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks.

PENALTIES

Late work will be penalised at the rate of 10% per day after the due time and date have expired.

RELEVANT RESOURCES AND BLENDED LEARNING

Lecture Material, Lab quizzes, and custom learning software for this course are available on the course website): moodle.telt.unsw.edu.au

Text Book Harvey B.R., 2016, Practical Least Squares and Statistics for Surveyors, Monograph 13, Third Edition, Available from UNSW Bookshop. ISBN 0733423396 $40.

Software Free copies of the FIXIT4 survey network analysis program and of the LSTH game are available (via the Moodle website) for students to use in class or at home for educational purposes.

Further references are described in the text book.

Computer software relevant to this course and available in the School's computer labs includes: FIXIT4 and MS Excel

DATES TO NOTE

Refer to MyUNSW for Important Dates available at: https://student.unsw.edu.au/dates

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Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership