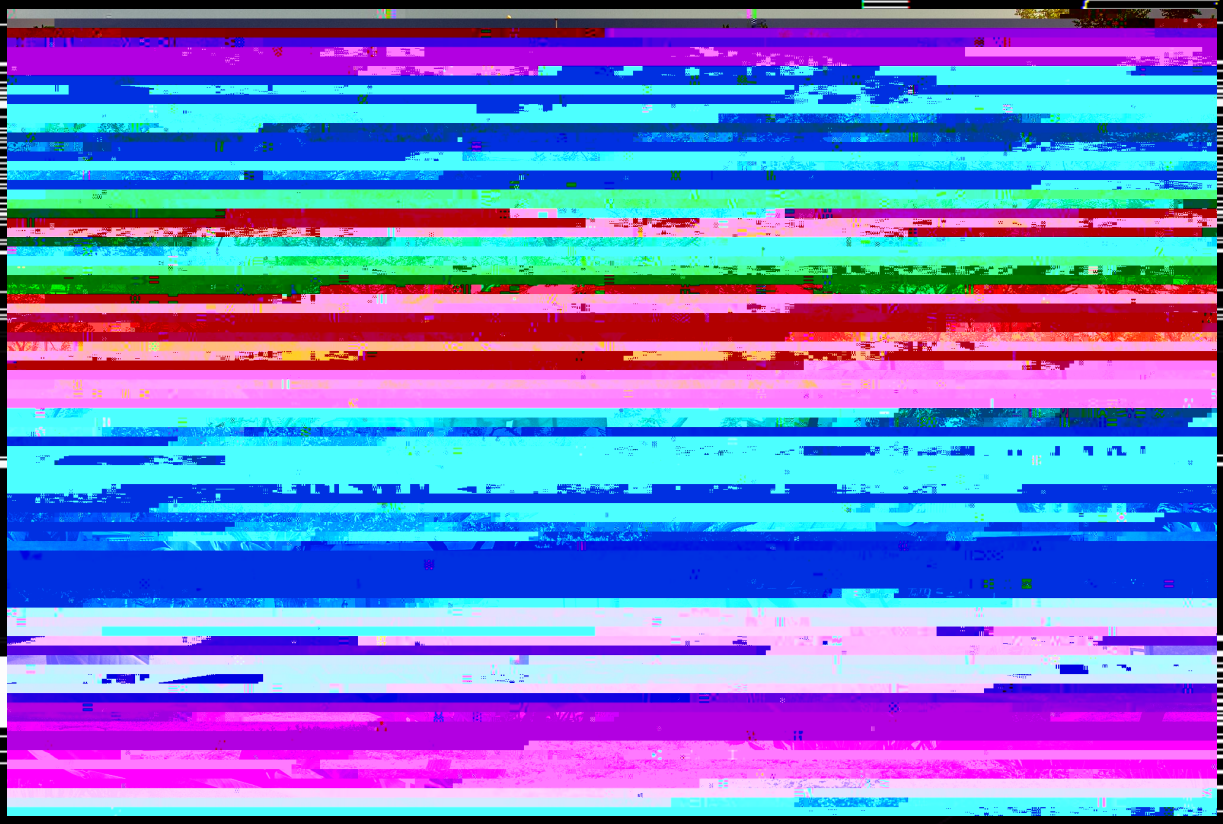


Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Elena Atroshchenko	e.atroshchenko@unsw.edu.au	appointment via e-mail	H20-607	
Jeffrey Kwan	j.t.kwan@unsw.edu.au	appointment via e-mail	Red Center Room 1037	

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of the Course

An introduction to the application of advanced analytical, statistical and numerical techniques to the solution of engineering problems relevant to civil and environmental engineers and surveyors. Review of analytical techniques. Addressing issues of variability and uncertainty in engineering. Descriptive statistics. Foundations of Probability. Random variables. Special distributions (discrete and continuous). Normal distribution, sampling distributions. Confidence Intervals. Hypothesis testing. Inferences for proportions, variances and means. Regression. ANOVA. Numerical solution of linear and non-linear equations; numerical differentiation and integration, finite differences; differential equations, boundary value problems, initial value problems and partial differential equations.

Course Aims

The aims of the course are to enable students to apply the fundamentals of Numerical Methods and Statistics to Engineering problems in the fields of Civil and Environmental Engineering and Surveying.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Apply numerical methods and statistics to problems in the fields of Civil and Environmental Engineering and Surveying.	PE1.1, PE1.2, PE1.3
2. Numerical methods strand: calculate numerical (not analytical) solutions to problems in linear and non-linear equations; numerical differentiation and integration, finite differences; differential equations, boundary value problems, initial value problems and partial differential equations.	PE1.1, PE1.2, PE1.3
3. Statistics strand: Describe the various ways in which random variation arises in engineering contexts.	PE1.1, PE1.2, PE1.3
4. Statistics strand: Apply various graphical and data analysis methods for summarizing and understanding data.	PE1.1, PE1.2, PE1.3
5. Apply various statistical models and methods for drawing conclusions and making decisions under uncertainty in engineering contexts.	PE1.1, PE1.2, PE1.3
6. Utilize the MATLAB environment and programming for calculating solutions to numerical problems, graphical and statistical analyses, including assignment problems in subsequent courses.	PE1.1, PE1.2

Teaching Strategies

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Numerics Online Quiz 1	5%	02/07/2022 05:00 PM	1, 2, 3, 4
2. Numerics Online Quiz 2	10%	02/07/2022 05:00 PM	1, 2, 4
3. Numerics 5 online quizzes	5%	weeks 2, 4, 7, 9, 10	1, 2, 3, 4
4. Statistics 10 online lectures and quizzes	10%	weeks 2-5, 7-10	3, 4
5. Statistics Mid-semester Test	10%	Weeks 6-7	1, 2, 3, 4
6. Final Exam	60%	Not Applicable	1, 2, 3, 4

Assessment 1: Numerics Online Quiz 1

Start date: 29/06/2022 05:00 PM
Assessment length: 40 min
Due date: 02/07/2022 05:00 PM

40 mins. Numerics Strand Quiz 1: covering numerics part of this course for the first 4 lectures (5%)

Assessment 2: Numerics Online Quiz 2

Start date: 31/08/2022 05:00 PM
Assessment length: 60
Due date: 02/07/2022 05:00 PM

Students are expected to demonstrate their ability to apply the methods taught in the numerics part of this course. Covers material from previous week's lectures and since Quiz 1. Full marks for correct numerical answers, reduced marks for partial solutions.

Assessment 3: Numerics 5 online quizzes

Start date: weeks 2, 4, 7, 9, 10
Due date: weeks 2, 4, 7, 9, 10

Matlab quizzes

Assessment 4: Statistics 10 online lectures and quizzes

Start date: weeks 2-5, 7-10
Due date: weeks 2-5, 7-10

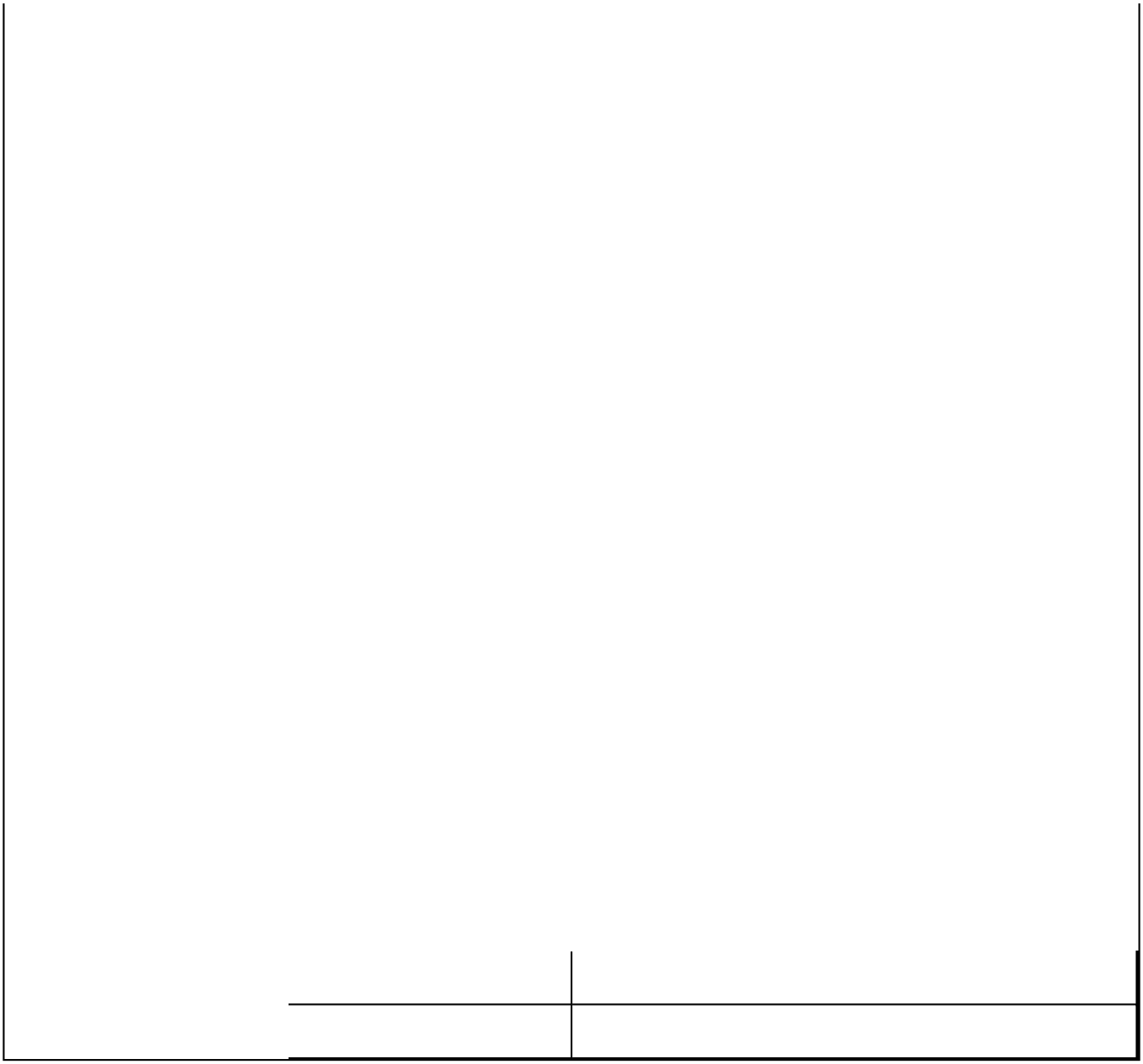
1% each. Students are expected to demonstrate their ability to apply the methods taught in the statistics part of this course.

Assessment 5: Statistics Mid-semester Test

Start date: Weeks 6-7
Due date: Weeks 6-7

40 mins. Students are expected to demonstrate their ability to apply the methods taught in the statistics

Attendance Requirements



Resources

Prescribed Resources

Students are required to have an account on https://au.mathworks.com/

Recommended Resources

For the Numerical Methods strand of CVEN2002:

- Recommended: “Numerical Methods for Engineers”: Steven C. Chapra, Raymond P. Canale;

Course Evaluation and Development

Informal feedback will be gathered throughout the term and used to improve the course. Formal feedback will be gathered in the end of the term and used to improve the course in the upcoming years.

Laboratory Workshop Information

The course has one 1-hr workshop for Numerics and one 1-hr workshop for Statistics weekly.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and Plagiarism

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering 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	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in 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	