

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

THE UNIVERSITY OF
NEW SOUTH WALES

Semester 2, 2010

CVEN2002 Engineering Computations for Civil Engineers
CVEN2702 Engineering Computations for Environmental Engineers



COURSE DETAILS

Units of Credit	6
Contact hours	6 hours per week
Course Convener	Bill Peirson w.peirson@unsw.edu.au CVEN Room 108A (Consultation 16:00 to 18:00 Friday) 0416 150 223

This course is composed of two strands: numerical computations and statistics. The requirements of each strand are summarised separately below.

Each component will contribute 50% towards your final mark but you must score at least 40% in each component to obtain a pass in this subject.

The course convener reserves the right to adjust the final scores by scaling if agreed by the Head of School.

The minimum attendance requirement is 80% of all classes, including lectures and tutorials. You may fail the course if more than 20% absences are recorded.

The formal exam scripts will not be returned. Students who perform poorly in the quizzes and tutorials are recommended to discuss progress with the lecturer during the semester.

INFORMATION ABOUT THE COURSE

CVEN2002/CVEN2702 is the primary source of training in numerical and statistical methods that Civil and Environmental Engineering students will receive during their course. It builds on their previous analytical mathematical training as well as computer programming.

HANDBOOK DESCRIPTION

Refer to Online Handbook available at:

<http://www.handbook.unsw.edu.au/undergraduate/courses/2010/CVEN2002.html>

<http://www.handbook.unsw.edu.au/undergraduate/courses/2010/CVEN2702.html>

TEACHING STRATEGIES

Private Study	<ul style="list-style-type: none">• Review lecture material and textbook• Do set problems and assignments• Reflect on class problems and assignments• Download materials from UNSW Blackboard for the statistics strand• Check your e-mail regularly for messages and tutorial solutions for the computations strand.
Lectures	<ul style="list-style-type: none">• Find out what you must learn• See methods that are not in the textbook• Follow worked examples• Hear announcements on course changes

Tutorials	<ul style="list-style-type: none"> • Be guided by tutors • Practice solving set problems • Ask questions
Assessments (multiple choice questions, quizzes, tests, examinations, assignments, hand-in tutorials)	<ul style="list-style-type: none"> • Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving

COURSE EVALUATION AND DEVELOPMENT

The School of Civil and Environmental Engineering evaluates each course each time it is run through:

- (i) the UNSW Course and Teaching Evaluation and Improvement (CATEI) process

As part of the CATEI process, your student evaluations on various aspects of the course are graded; the Course Coordinator prepares a summary report for the Head of School. Any problem areas are identified for remedial action, and ideas for making improvements to the course are noted for action the next time that the course is run. Past comments have highlighted the critical importance of gaining competence in Matlab as early as possible, and have led to some changes in how Matlab is integrated into the course. The statistics online quizzes have been introduced partly in response to students' requests for more regular in-session feedback.
- (ii) Focus Group Meetings.

Focus Group Meetings are conducted by the four Year Managers (academic staff) for any students who wish to attend, in each year of the civil and/or environmental engineering programs. Student comments on each course are collected and disseminated to the Lecturers concerned, noting any points which can help improve the course.

COMMON SCHOOL INFORMATION

Common School information may be found at:

http://www.civeng.unsw.edu.au/currentstudents/ug/common_ug/index.html

To navigate to this website from the *Civil and Environmental Engineering School Home page*:
 → *Current Students* → *General Information* → *Common School Info for Undergraduate Students*

The **Common School Information** site has information on the following:

1. **Dates to Note** - important dates relating to enrolling and disenrolling, and a University website (via MyUNSW) with a calendar of other important UNSW dates (semester dates, recess weeks, stuvac dates and exam periods).
2. **School Contacts**
 - i. for enrolment or timetable difficulties,
 - ii. referral chain of contacts for course difficulties:
Course Coordinator/Lecturer → Year Coordinators → Grievance Officer,
 - iii. Advanced Standing, and
 - iv. Mentoring.
3. **Course Requirements**
 - i. attendance at lectures, tutorials and laboratory classes,
 - ii. participation in tutorials, and
 - iii. completion of assessment work.
4. **Notes on Assessment**
 - i. plagiarism (with link to UNSW Learning Centre web site on plagiarism),
 - ii. keep a copy of written submissions,
 - iii. submitting assignments, and
 - iv. late submissions (obtaining extensions and special consideration)
5. **Supplementary Exams** – includes link to School website with School policy on supplementary exams.
 - i. Special Consideration – includes link to UNSW website (New South Q) for downloading forms, requirements for lodging special consideration forms.
6. **Solutions to Problems – Troubleshooters**
 - i. Learning Centre,
 - ii. student counsellors, and
 - iii. student support services.
7. **CEVSOC** – student committee membership and link to (unofficial) student CEVSOC website.

COMPUTATIONS STRAND

Class Friday, 13:00 – 15:00 Keith Burrows Theatre

Lecturer Bill Peirson
w.peirson@unsw.edu.au
CVEN Room 108A
0416 150 223

Tutorial Friday, 15:00 – 16:00 Locations as follows:

Location	Senior Tutor	2nd Tutor	Class	Family name commences with:
Quad G053			CVEN2002	A-Coo (44)
Gold G04			CVEN2002	Cop-Has (37)
Gold G06			CVEN2002	Hat-Lia (40)
MorvB G3			CVEN2002	Lib-M (43)
MorvB G4			CVEN2002	N-Sa (42)
Mat 107			CVEN2002	Sb-V (45)
Mat 309			CVEN2002	W-Z (42)
HutD10 G01			spare	
OMB151			CVEN2702	All (45)

NOTE: TUTORIALS COMMENCE WEEK 1

The roll will be marked!

During the computations tutorial CVEN Room 201 is reserved for class use. If you wish to use a computer to solve problems during the tutorial, please ensure that you go to your allocated tutorial room first. Note that 2nd year students cannot use Room 609.

OBJECTIVES

To understand how Civil and Environmental Engineering problems can be mathematically formulated and answered practically in the engineering sense using numerical solution of linear and non-linear equations; numerical integration, finite differences; differential equations, boundary value problems, initial value problems and partial differential equations.

EXPECTED LEARNING OUTCOMES

At the end of this course, students should be familiar with the basic numerical techniques used in Civil and Environmental Engineering and be equipped to start applying these techniques to practical problems.

For each hour of contact it is expected that a student will put in at least 1.5 hours of private study.

ASSESSMENT

The final grade for the numerical computations component will be based on the sum of the scores from each of the assessment tasks.

ASSESSMENT COMPONENT	DETAILS	Mark	DUE DATE
Hand-in assignments	Tutorial hand-ins	15	To be advised during the tutorial.
Mid-session quiz	Will be held during tutorial period of week 7	25	3 September 2010
Final examination	During examination period. The formal exam scripts will not be returned.	60	November 2010
TOTAL		100	

Three tutorial hand-in assignments will be requested during the course of the session. To be marked, these must be submitted during the respective tutorial. Each hand-in will be of equal value. Late hand-ins will not be marked.

COMPUTATIONS PROGRAM

Week	Date	Topic	Assessments Due
1	23 July 2010	1. Intro. to numerical methods (Hornbeck Ch. 1) 2. Numerical Interpreters	TUTORIALS COMMENCE
2	30 July 2010	3. Solution of equations (Hornbeck Ch. 5)	
3	6 August 2010	4. Soln. of simultaneous linear eqns (Hornbeck Ch. 6) 5. Iterative solutions	
4	13 August 2010	6. Taylor series (Hornbeck Ch. 2) 7. Finite differences and Numerical differentiation (Hornbeck Ch. 3)	
5	20 August 2010	8. Numerical Differentiation (Hornbeck Ch. 3)	
6	27 August 2010	9. Numerical integration (Hornbeck Ch. 8)	
7	3 Sept 2010	10. Interpolation (Hornbeck Ch. 4)	Quiz during tutorial period
<i>Semester Recess (Mon 6 Sept – Fri 10 Sept)</i>			
8	17 Sept 2010	11. Differential equations 12. 1st order initial value problems (Hornbeck Ch. 9)	
9	24 Sept 2010	13. Differential equations continued - second and higher order problems (Hornbeck 9.8) 14. Boundary value problems (Hornbeck 9.9)	
10	1 Oct 2010	15. Partial differential equations (Hornbeck Ch.3 &11)	
11	8 Oct 2010	16. Time-dependent partial differential equations (Hornbeck Ch.11)	
12	15 Oct 2010	Revision	
13	22 Oct 2010	A free week to get into the examination groove.	NO TUTORIAL THIS WEEK

RELEVANT RESOURCES**Textbook**

Hornbeck R Numerical methods Quantum 1975

Additional Readings

Faires JD and Burden RL Numerical methods 2nd edition Brooks/Cole 1998 (1st edition PWS-Kent 1993)
Cheney W and Kincaid D Numerical mathematics and computing Brooks/Cole 1985

STATISTICS STRAND

Class Monday 3pm-5pm Keith Burrows Theatre
Lectures run in week 1 though to week 13 (excluding week 11 when there is no lecture because of the Monday public holiday)

Statistics Coordinator and Lecturer Diana Combe
email: Diana@unsw.edu.au
Red Centre: RC-1032.
9385 7022.

Tutorials & computer tutorials:

Note that tutorials start in week 1 and run through to week 13, excluding week 10 where there is no tutorial/lab class because of Matlab tests. Times and locations indicated on your timetable through MYUNSW. **The week 1 tutorial is a computer tutorial.** The week 2 tutorial is another computer tutorial. There are computer tutes on the even weeks 2,4,6,8 and 12. Computer tutorials alternate with the classroom tutorials which are held on the odd weeks 3,5,7,9,11 and 13. Computer tutorials are held in the School of Mathematics and Statistics' computer laboratories in the Red Centre. Students are expected to attend their tutorials/laboratory classes, and rolls will be kept.

Early in the session you should make sure you can logon to the computers in the School of Mathematics and Statistics. You will first need to set your Mathematics and Statistics' password using the Maths Info link on the course home page. If you are having difficulties please go to the Computing Centre helpdesk on the mezzanine level of the Red Centre.

You are advised to start, as soon as possible, to do the preliminary online Matlab Quizzes which are available on Maple TA (which you can access through the CVEN2002/2702 course web page on **UNSW Blackboard**). These quizzes are designed to help you to get started using Matlab, and they form part of your assessment.

You must have set your password and be able to login in the Mathematics & Statistics' computer laboratories BEFORE your first lab class in Week 1.

Statistics Web Site: The CVEN2002/CVEN2702 course web site will be available through **UNSW Blackboard**: <http://lms-blackboard.telt.unsw.edu.au/>
Please check the web page regularly for new and updated information.

Announcements: may be made in lectures or through the course web site.

Required Text: J. Devore and N. Farnum, *Applied Statistics for Engineers and Scientists*, 2nd Edition, Duxbury Press, Thomson Publishers.

Lecture notes: for the Statistics strand will be made available via course web site. They are not a substitute for attendance at lectures. In addition Laboratory and Tutorial material will be made available on this website.

Help with the course: Times and places where you can get help with the course will be advertised on the course web page. Your lecturer will have regular consultation times which will be advertised in lectures and on **UNSW Blackboard**. There will also be additional regular consultation times advertised with other members of the statistics department. At all of these times you are welcome to just turn up. For other times, please email your lecturer for an appointment.

Peer Support: There will be a peer support session through the Student Support Scheme in the School of Mathematics and Statistics, where you can get help with statistics. Details will be announced in lectures and on **UNSW Blackboard**.

OBJECTIVES and EXPECTED LEARNING OUTCOMES

The Statistics strand of CVEN2002/CVEN2702 will enable you to understand the various ways in which random variation arises in engineering contexts and to develop facility at:

- applying various graphical and data analysis methods for summarizing and understanding data;
- applying various statistical models and methods for drawing conclusions and making decisions under uncertainty in engineering contexts; and,
- applying Matlab for graphical and statistical analysis.

We believe that effective learning is best supported by a climate of inquiry, in which students are actively engaged in the learning process. Hence this course is structured with a strong emphasis on problem-solving tasks in lectures, in tutorials and laboratories, and in assessment tasks. Students are expected to devote the majority of their class and study time to the solving of such tasks.

New ideas and skills are first introduced and demonstrated in lectures, and then students develop these skills by applying them to specific tasks in tutorials and assessments. Computing skills are developed and practiced in regular computer laboratory sessions.

This course has a major focus on research, inquiry and analytical thinking as well as information literacy. We will also explore capacity and motivation for intellectual development through the solution of both simple and complex mathematical models of problems arising in engineering, and the interpretation and communication of the results.

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

ASSESSMENT

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

Statistics Component Assessment Summary

ASSESSMENT	DETAILS	WEIGHT	DATE
Online Matlab Quizzes.	Available through Maple TA. Start as early as possible. Due Monday week 3 at 1pm	4	1pm Monday week 3
3 online quizzes Through Maple TA	Online multiple choice quizzes due Monday at 1pm, weeks 5, 9 and 13	6	Monday week 5 Monday week 9 Monday week 13
Mid-session Test	Administered during week 7 tutorials.	15	Week 7 tutorial
Matlab computer Test	held in blocks in computer laboratory	15	Week 10
Final Examination	During the exam period. 3 hours (including Numerical Methods)	60	November 2010
Total		100	

Assessments: There are two tests held during session – a mid-session test conducted during the tutorial in week 7 and a lab test in week 10. There are online Matlab quizzes due to be completed by Monday week 3; and then online quizzes due in on Mondays in each of weeks 5, 9 and 13. All online quizzes are run through Maple TA and will be scheduled to be due in at 1pm on Monday. For each of the quizzes due in on the Mondays of weeks 5, 9 and 13 the quizzes will be open for approximately a week before they are due. More details of the quizzes will be announced in lectures. Details of material to be assessed in tests will be clarified in the couple of weeks before each of the tests.

Students must sit their test in week 7 in the tutorial in which they are enrolled unless they have prior written approval from the lecturer. Students unable to attend for a test must give a medical certificate to the tutor or lecturer. There will be no opportunity for a re-sit.

Rationale for assessment: The quizzes in weeks 5, 9 and 13 are designed to give immediate in-session feedback about understanding of new concepts. The class tests also give students an opportunity for feedback on their progress and mastery of the material.

Many practical problems require use of a computer software package, and in this course students are required to become familiar with Matlab.

The Matlab part of the Statistics strand is assessed by:

- Online quizzes to get you started with the basics of Matlab.
- The block laboratory test in week 10.

You will be required to arrange a time to do your block lab test through the School of Mathematics and Statistics' 'Student Web Portal', to which there will be a link on **UNSW Blackboard**. Further details of the MATLAB test will be made available on **UNSW Blackboard** and in lectures closer to the time. Students are advised to arrange the time for the Matlab block test as soon as possible as there are limited places available at each time. Students who are unable to attend for the test at the time at which they have booked must give a medical certificate to the lecturer.

The final exam will assess student mastery of the material covered in the course.

Tutorial and Lab classes in week 10: Because of the block lab test in Week 10, the regular Statistics computer laboratory classes will not be held in week 10.

STATISTICS PROGRAM: approximate schedule of topics and references.

Week of Session Assessments due	Monday date	Topic	Text Reference
1	19th July 2010	Data and Distributions, Intro to densities	1.1, 1.2, 1.3,1.4
2	26th July 2010	Distributions, including normal, exponential, binomial, Poisson.	1.4, 1.5, 1.6, 2.1
3 Online Matlab quizzes due Monday 1pm	2nd Aug 2010	Numerical summaries of data. Correlation and regression.	2.2, 2.3, 2.4 3.1, 3.2, 3.3, 3.4, 3.5
4	9th Aug 2010	Probability concepts	5.1,5.2,5.3
5. Online quizzes due Monday 1pm	16th Aug 2010	Random variables and sampling distributions	5.4,5.5,5.6
6	23th Aug 2010	Quality and Reliability; Parameter Estimation	Chapter 6 7.1, 7.2, 7.3
7. Mid-session test in tutorial	30th Aug 2010	Confidence intervals. Hypothesis testing.	7.4,7.5; 8.1,8.2,8.3
Mid-session Break	6 th Sept 2010		
8	13th Sept 2010	The analysis of variance	9.1, 9.2, 9.3, 9.4
Online quizzes due Monday 1pm	20th Sept 2010	Inferential methods in Regression and Correlation – one predictor	11.1, 11.2, 11.3
10 Matlab Block Lab test	27th Sept 2010	Inferential methods in regression and correlation – many predictors	11.4,11.5,11.6
11 Public Holiday Monday	4th Oct 2010	No Monday lectures	Stats tutorials run as usual.
12	11th Oct 2010	Data collection	Chapter 4
13 Online quizzes due Monday 1pm	18th October	Experimental design	Chapter 10.