School of Civil and Environmental Engineering

Term 2, 2020

CVEN9407 TRANSPORT MODELLING

COURSE DETAILS

Units of Credit	6	
Contact hours	4 hours per week	
Class	Thu 08:00 - 11:00,	online
Workshop	Thu 11:00 - 12:00	online
Course Coordinator and Lecturer	Taha Rashidi email: rashidi@unsw.edu.au office: 93855063	
Lecturer	Taha Rashidi email: rashidi@unsw.edu.au office: 93855063	

INFORMATION ABOUT THE COURSE

This course is an advanced subject in econometrics with a focus on transportation demand modelling. This course covers a broad range of econometric modelling techniques and their applications in transport systems. Specific emphasis will be placed on estimation process of the models and their reliability in prediction. The topics of the course includes transport data analysis and modelling, linear regression models for continuous and discrete outcomes, interpretation of model estimation results, time series analysis, and survival analysis in transport systems.

HANDBOOK DESCRIPTION

See link to virtual handbook -

https://www.handbook.unsw.edu.au/undergraduate/courses/2020/CVEN9407/

OBJECTIVES

Learning objectives of the course are:

- Deepen the understanding about fundamental concepts in applied statistics.
- Familiarise with econometric methods.
- Explore the state-of-the-art techniques in investigating correlation between dependent and independent

variables.

• Employ mathematical techniques to assess the quality of data and find the suitable specification for different types of datasets.

• Engage in lifelong learning, reflective thinking and self-assessment.

• Communicate effectively in verbal, written and group contexts to a professional standard.

TEACHING STRATEGIES

The teaching strategies that will be used and their rationale. Give some suggested approaches to learning in the course.

(An example of the approaches to learning are)

Private Study	• Review lecture material and textbook • Do set problems and assignments • Join Moodle discussions of problems • Reflect on class problems and assignments • Download materials from Moodle • Keep up with notices and find out marks via Moodle
Lectures	• Find out what you must learn • See methods that are not in the textbook • Follow worked examples • Hear announcements on course changes
Workshops	• Be guided by Demonstrators • Practice solving set problems • Ask questions
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving
Laboratory Work	• Hands-on work, to set studies in context

EXPECTED LEARNING OUTCOMES

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

Example:

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

Learning Outcome		**EA Stage 1 Competencies**
1.	*Learning basic statistics and econometrics in transport modelling;*	*PE1.1, PE1.2, PE1.3*
2.	*Identifying the properties of variables in large scale data*	*PE1.1, PE1.2, PE2.2*
3.	*Complete a comprehensive statistical analysis on large data using statistical packages*	*PE1.2, PE2.2, PE2.3*
4.	*By the conclusion of this course the student will be able to develop knowledge and skills in inferring statistical conclusions from large data*	*PE2.2, PE3.2, PE3.3, PE3.4*

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

COURSE PROGRAM

A table of lectures and workshops or practical class topics for each week, indicating the name of lecturer involved (where multiple lecturers teaching in course), online activities, such as discussion forums, and relevant readings from textbook and other reference material identified for the course.

Term 2 2020

Date	Topic	Lecture Content	Demonstration Content
04/06/2020 (Week 1)	Introduction to transport modelling Statistical inference	Basics of econometrics Review of statistics and probabilities Statistical hypothesis testing	Introduction to R
11/06/2020 (Week 2)	Statistical inference Regression analysis	Two-variable regression assumptions Dummy variables	Running regression in R
18/06/2020 (Week 3)	Regression analysis	Multiple regression analysis Multicollinearity Count data	Running multiple regression in R
25/06/2020 (Week 4)	Regression model troubleshooting	Heteroscedasticity Autocorrelation	Heteroscedasticity and autocorrelation
02/07/2020 (Week 5)	Regression Model Time Series	Time series formulations and Count Data	Running time series in R
09/07/2020 (Week 6)		***Flexibility week for all courses (non-teaching)***	
16/07/2020 (Week 7)	Discrete choice	Basic definitions Choice set Logit models	Running logit with biogeme
23/07/2020 (Week 8)	Discrete choice	Nested logit	Running nested logit with biogeme
30/07/2020 (Week 9)	Discrete choice	Ordered logit	Running survival analysis in biogeme
06/08/2020 (Week 10)	Survival analysis	Base line hazard, definition and interpretations	Estimating Cox Proportional Hazard in R

ASSESSMENT

This subject has three assessment components: final exam, quizzes and assignments. The final exam is a 1.5-hour exam which includes all the covered topics in the course. The final exam is worth 40% of the overall grade.

As the second assessment component, there are five short Moodle quizzes each worth 3% of the overall grade (15% in total). Each quiz takes 15 minutes and it is done at the beginning of classes. Three assignments on regression modelling, count data and time series, and discrete choice modelling will be provided on the due courses.

Details of the assignments are given in separate briefs.

Assignment 1 and quiz 1 – Linear regression

Assignment 2 and quiz 2 – Count and time series regression

Assignment 3 and quiz 3 – Discrete choice models

Format of the assignments:

- Have a cover letter.
- Each question starts from the top of the page
- Reference your work appropriately, if not, you may be penalized for plagiarism.
- Only PDF files are acceptable.
- You have to type your answers. Scanned sheets are NOT acceptable.
- Assignments MUST be submitted to Moodle.

Late submission of assignments results in losing 10% of the total mark of the assignment per day. So there is no point to submit if there has been 10 days after the submission date.

The pass mark in this course is 50% overall, however, students must score at least 40% in the final examination in order to qualify for a Pass in this course (double hurdle).

Supplementary Examinations for Term 2 2020 will be held on Monday 7th September – Friday 11th September (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 travel arrangements during this period.

PENALTIES

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

ASSESSMENT OVERVIEW

Item	**Available date**	**Weighting**	**Learning outcomes assessed**	**Assessment Criteria** *(this needs to explicitly describe what students are expected to demonstrate in the task)*	**Due date**	**Deadline for absolute fail**	**Marks returned**
1.Quizzes							
Quiz 1	18/06/2020 10:00	3	Comprehensive understanding of basic statistics and probabilities	Students will be assessed based on the accuracy and validity of their submitted solutions to the questions.	18/06/2020 10:15	18/06/2020 10:15	18/06/2020 10:15
Quiz 2	25/06/2020 10:00	3	Understanding about the basic assumptions behind linear regression models.	Students will be assessed based on the accuracy and validity of their submitted solutions to the questions.	25/06/2020 10:15	25/06/2020 10:15	25/06/2020 10:15
Quiz 3	02/07/2020 10:00	3	Potential troubles resulting from violating the assumptions and common remedies for them.	Students will be assessed based on the accuracy and validity of their submitted solutions to the questions.	02/07/2020 10:15	02/07/2020 10:15	02/07/2020 10:15
Quiz 4	16/07/2020 10:00	3	Time series regression and count data	Students will be assessed based on the accuracy and validity of their submitted solutions to the questions.	16/07/2020 10:15	16/07/2020 10:15	16/07/2020 10:15
Quiz 5	06/08/2020 10:00	3	Discrete choice modelling	Students will be assessed based on the accuracy and validity of their submitted solutions to the questions.	06/08/2020 10:15	06/08/2020 10:15	06/08/2020 10:15

2. Assessments							
Assignment 1	11/06/2020	15	Linear regression	Hands on project with real world data	02/07/2020 08:00	Refer to penalties	16/07/2020
Assignment 1	25/06/2020	15	Time series regression and count data	Hands on project with real world data	16/07/2020 08:00	Refer to penalties	30/07/2020
Assignment 1	16/07/2020	15	Discrete choice modelling	Hands on project with synthesised data	06/08/2020 08:00	Refer to penalties	20/082020
3. Final Exam		40					

RELEVANT RESOURCES

Material essential for this course is provided in lecture notes available through Moodle.
Suggested references are listed below:

- Gujarati, D.N. (2004) Basic Econometrics, 4th Edition, McGraw Hill
- Casella, G., and R.L. Berger (2001) Statistical Inference, 2nd Edition, Duxbury Press
- Train, K. (2009) Discrete Choice Methods with Simulation, 2nd Edition, Cambridge University Press
- Washington, S. P., M. G. Karlaftis and F. L. Mannering (2011) Statistical and Econometric Methods for Transportation Data Analysis, CRC Press Taylor and Francis Group
- Alain Zuur, Elena N. Ieno, Erik Meesters (2009) A Beginner's Guide to R, Springer
- Randall Schumacker, Sara Tomek (2013) Understanding Statistics Using R, Springer

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

https://student.unsw.edu.au/dates

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 Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

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