

ELEC9741_{Term II, 2020} Electrical Engineering Data Science

Instructors: Prof. V. Solo Dr. V. Sethu
E-Mail: v.solo@unsw.edu.au (use subject: ELEC 9741) v.sethu@unsw.edu.au
UOC: 6
Class Times: Wednesday, 6pm-9pm + 1 extra lecture for each part Online Using 'Teams'
Prerequisites: Undergraduate Signal Processing Course
& Undergraduate Control Course

Course Organisation

There are two parts to the course
Part I: weeks 1-5: Visualization & System Identification
Part II: weeks 6-10: Pattern Recognition

Aims:

Provide an introduction to Data Science principles and practice from a Control and a Signal Processing point of view.

Assessment :

To pass, students must obtain a pass level in each part of the course

Assignments (one for each part) 2×15% each

Keep a copy of your assignment

Late assignments will be penalised at 10% of the maximum value per day late.

Exams (Take-home) 2×35% each

The same conditions apply as for Assignments.

Assignment & Exam Timetable

Assignment 1: out - week 3 ; due - week 5

Exam 1: out - week 5 ; due - Friday of week 6

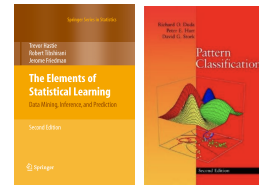
Assignment 2: out - week 8 ; due - week 10

Exam 2: out - week 10 ; due - Monday of week 12

Resources

	Part I	Part II
Software:	Matlab & R	Matlab & Python
Textbook:	none.	none.
Reference	R. Shumway & D. Stoffer (2011) Time Series Analysis and its Applications. 3rd. ed. Springer.	(i) T. Hastie, R. Tibshirani, J. Friedman The Elements of Statistical Learning, 2nd ed. Springer (2009). (ii) R.O. Duda, D.G. Stork, P.E.Hart (2001) Pattern Classification 2nd.ed., J. Wiley.

All three
available Online



Teaching Strategies

Lectures	To give the basic material in written form, and to highlight the importance of different sections, and help with the formation of schema.
Assignments	To give practice in problem solving, and to assess your progress.
Examination & Project	Final test of competency.

Learning Outcomes

At the end of the course the student will be familiar with basic aspects of Data Science from both a Control and a Signal Processing point of view
And will be able to use this knowledge to solve basic problems in Data Science

Academic Honesty and Plagiarism

Plagiarism means copying. You cannot copy other people's work of any kind; you cannot copy from any source. Plagiarism is a serious offence and (severe) penalties will apply; see <https://student.unsw.edu.au/plagiarism>

Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrolment, rights, and general expectations of students, please refer to the School policies, on the School webpage.

Part I Topics

Week Topic

- 1a Introduction to Data Science.
- 1b Matrix Methods Review:
emphasizing e.g. eigen-analysis.
- 2 Information Visualization: Principles & Practice.
- 3 Introduction to System Identification.
- 4 Stochastic Processes and Spectra in System Identification.
- 5 Kalman Filter, Wiener Filter.

Part II Topics

Week Topic

- 6 Introduction to Machine Learning.
- 7 Feature Representations:
e.g. speech and image features
- 8 Linear Methods for Regression and Classification.
- 9 Generative Models and Support Vector Machines.
- 10a Deep Learning.
- 10b Hardware and Software Considerations:
e.g. databases, toolboxes, GPUs, etc.