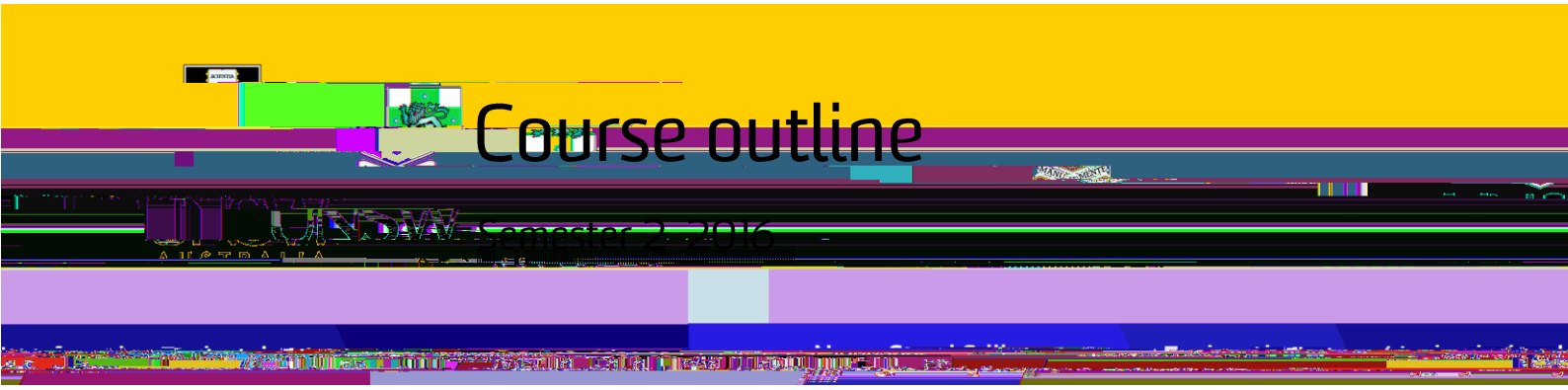

MTRN 4030

OPTIMISATION METHODS FOR ENGINEERING SYSTEMS

Contents

Staff contact d

Contact details and consultation times for course convenor

Name: Dr Ngai Ming Kwok

Summary of the course

This course will enable students to acquire an understanding of optimization concepts in engineering system designs and the applications of optimization algorithms in mechanical, manufacturing, and mechatronic systems.

Aims of the course

This course enables you to explore the theories and concepts from the viewpoint of the application of optimization methods in engineering systems. The course will give you tools in the design of engineering systems for optimum characteristics. Example cases will be focused on mechanical system design, manufacturing task scheduling and robotics trajectory planning.

The course also provides you with the concepts employed in the development of classical optimisation methods and metaheuristic optimisation approaches. You will be provided with insights into the advantages and disadvantages of these optimisation methods when they are applied to solve engineering problems.

This course will further develop your computer based skills in implementing and developing algorithms to solve engineering optimisation problems. You will improve your Matlab programming techniques through laboratory based exercise. Your understanding of numerical methods, learned in MATH2089 (or equivalent), will be further enhanced. The assignments also build on the report-writing skills which you commenced in ENGG1000.

Student 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.

4.	Develop computer programs to implement and analyse optimisation approaches in the engineering context. Apply learned programming skills to develop computer programs for optimisation.	PE2.1, PE2.2

3. Teaching strategies

Lectures in the course are designed to cover the terminology, core concepts and theories in the optimum design of engineering systems. They do not simply reiterate the texts, but build on the lecture topics using examples to show how the theory is applied in practice and the details of when, where and how it should be applied.

The work in laboratory exercises involves self-directed work, in being theoretically sound in the design of your optimisation algorithms. It also allows you to integrate your theoretical basics into the construction of computer programs to solve optimisation problems.

Lectures and laboratory exercises are supported by current scientific publications as a means to let you explore the development in the field of engineering optimization. Thus, literature readings pre-laboratory preparations are strongly recommended.

4. Course schedule

Date	Topic	Location	Lecture Content	Demonstration/ Lab Content	Suggested Readings
Week 1 26/07/16	Introduction to optimization	Vallentine Annexe 121 (K-H22-121)	Course introduction, engineering optimization examples	N/A	Lecture handouts
Week 2 02/08/16					

Week 12 20/10/16	Metaheuristics optimization	2	Ainsworth Building 204 (K-J17-204)	N/A

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work. Presenting them clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Submission

Late submissions will be penalised 5 marks per calendar day (including weekends). An extension may only be granted in exceptional circumstances. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the course convenor ***before the due date***. Special consideration for assessment tasks of 20%

6. [illegible]

Textbook

X.S. : An Introduction with Metaheuristic
Wiley & Sons, 2010. (available from UNSW library)

Recommended Readings

Engineering Optimization: Theory and Practice

P. Venkataraman Optimization with MATLAB P John Wiley & Sons, 2009.

Additional materials provided in UNSW Moodle

This course has a website on UNSW Moodle which includes:

In this course, recent improvements resulting from student feedback include the hands-on exercises integrated with practical application of the theoretical knowledge.

8. Academic honesty and plagiarism

Attendance, Participation and Class Etiquette
UNSW Email Address
Computing Facilities
Assessment Matters (including guidelines for assignments, exams and special consideration)
Academic Honesty and Plagiarism
Student Equity and Disabilities Unit
Health and Safety
Student Support Services

Ngai Ming Kwok
08 July 2016

10. Appendix A: Engineers Australia (EA) Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge	