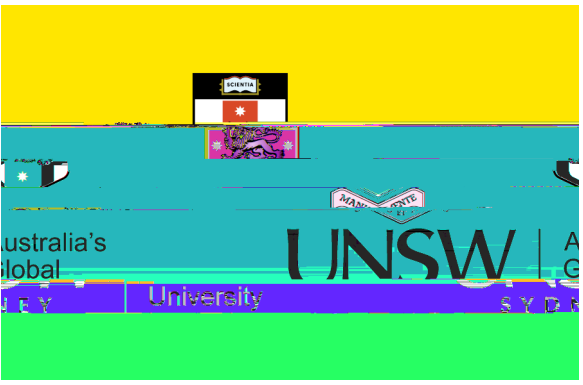

Mechanical and Manufacturing Engineering

Course Outline

Term 2 2020

MANF4611

PROCESS MODELLING AND SIMULATION

Contents

1.

Chat meetings. Each week there are scheduled tasks and tutorials to complete in your own time.

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 10 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact hours

	Day	**Time**	**Location**
Lectures	N/A	2 hrs/week	Moodle Recorded Lectures

Week	Lecture Content – Delivery Mode is Online	Demonstration Topics – Delivery Mode is Online
2	**Random Variables and Probability Distributions** x Observing, Measuring and Analysing Random Behaviour x Binomial, Poisson, Geometric, Exponential, Normal Distribution x Fitting a Distribution and Goodness of Fit x Random Number Generators x Generating Random Observations x Stationary – non-Stationary Processes x Introduction to Arena Input Analyzer	x Introduction to Arena Input Analyser – x Introduction to Minitab x On-going Arena support for Assignments x Homework: Start working on Tutorial Set 2
3	**Model Design** x Modeling Operations and Processes in Arena x Essential modules, elements and blocks x Flow Control in Arena: Decisions, Queues, Hold, Signal x Arena variables, logic control and expressions: Variables (**TNOW, MREP, NREP**), Attributes, Record, Assign, Expressions x Data collection inside Arena	x On-going Arena support for Assignments x Homework: Start working on Tutorial Set 3
4	**Data Manipulation in Arena** x Reading and Writing Data between Arena and the outside world x Interfacing to Excel, ASCII files x Data manipulation x Verification and Validation	x On-going Arena support for Assignments x Homework: Start working on Tutorial Set 4
5	**Creating Simulation Scenarios, Generating Data and Analysis of Output** x The Arena debugging environment x Finite – Infinite Horizon Simulations x Effect of Initial Conditions, Warming-up Period x Comparison of Different System Configurations and Designs x Types of	

Week	Lecture Content – Delivery Mode is Online	Demonstration Topics – Delivery Mode is Online
7	**Reporting and Documentation** x Reporting Statistics x Model layout and presentation x Model Documentation	x On-going Arena support for Assignments
8	**Design of Experiment Theory (DOE) Part I** x Single factor experiments x Introduction to factorial designs x Introduction to DOE in Minitab	x On-going Arena support for Assignments
9	**Design of Experiment Theory (DOE) Part II** x Blockings in factorial design x Screening and characterization of models x Best practice in DOE	x Minitab Tutorial on DOE Set 1 x On-going Arena support for Assignments
10	**Decision Analysis** x Overcoming risk and uncertainty x Decision Trees x Decision tables x Decision methods: Maximax, Maximin, Equally Likely x Expected monetary value x Value of information	x Minitab Tutorial on DOE Set 2 x On-going Arena support for Assignments

6. Assessment

Assessment overview

Assessment	Group Project? (# Students per group)	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Group assignment 1	Yes (4)	4 pages	15%	1, 2,3 and 4	Process flowchart and scope	Week 3	Friday Week 5	Within 2 weeks of submission
Group assignment 2	Yes (4)	6 pages						

Assignments

Each part of the Assignment (3 parts) will involve a written submission. Details will be posted on Moodle. The final part of the assignment requires a write-up and this is due at the end of Week 11.

You need to ensure that you use both an appropriate writing style as well as professional formatting and editing of style and content in your report.

The assignments will be posted on Moodle and discussed in class (as shown in the teaching schedule) and the due dates shown are firm. The final report will be submitted electronically on Moodle by the end of week 10. The assignments support the learning outcomes by incorporating an appropriate mix of analytical techniques, enabling software, and data analysis that supports achievement of appropriate solutions.

Presentation

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

Submission

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

Work submitted after the ‘deadline for absolute fail’ is not accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These are clearly indica

assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

The following criteria will be used to grade Viva examinations (Detailed instructions will be posted on Moodle):

- The level of progress achieved by the team at Stages 1 and 2 of the assignment. Stage 1 focuses on understanding the process flow and logic (flow charts and documentation) as well as identifying the issues, aims and scope of the model. Stage 2 needs to deliver a model, coded in Arena, appropriately verified, validated and documented that will be the engine for generating data from appropriate scenarios that the team will test and analyse (and ultimately submit as Part 3 of the assignment).
- The quality of work produced by the team at each of these stages. This includes the correctness of the work produced, an appropriate level of detail and documentation.
- The contribution of each team member to the efforts of the team. Each team member will be expected to present his or her part of the work and answer questions by the examiner(s).

The following criteria will be used to grade written assignments:

- Analysis and evaluation of requirements by integrating knowledge and methods learned in lectures and demonstrations
- Sentences in clear and plain English—this includes correct grammar, spelling and punctuation
- Correct referencing in accordance with the prescribed citation and style guide
- Appropriateness of engineering techniques and methodologies used
- Accuracy of numerical answers and comprehensiveness of methods and techniques employed
- Evidence of quality data and analysis-based decision making
- All working shown
- Use of diagrams, where appropriate, to support or illustrate the calculations
- Use of graphs, where appropriate, to support or illustrate the calculations
- Use of tables, where appropriate, to support or shorten the calculations
- Neatness

Examinations

The end-of-session exam will cover all material including the simulation part of the course. It will specifically examine statistical analysis, simulation theory and design of experiment (DOE).

You must be available for all quizzes, tests and examinations.

Final examinations for each course are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates.

For further information on exams, please see the Exams webpage.

Special consideration and supplementary assessment

In this course, recent improvements resulting from student feedback include improved tutorial and example models that align better with the requirements of the assignment. This will allow for faster and more efficient model development for all teams.

9. Academic honesty and plagiarism

- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

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