UNSW Course Outline

ZEIT8307 System Dynamics Modelling - 2024

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General Course Information

Course Code : ZEIT8307
Year : 2024
Term : Semester 2
Teaching Period : Z2
Is a multi-term course? : No
Faculty : UNSW Canberra
Academic Unit : School of Systems and Computing
Delivery Mode : Online
Delivery Format : Standard
Delivery Location : UNSW Canberra at ADFA
Campus : UNSW Canberra
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Systems Dynamics is a science that has its origins in engineering control theory, although systems concepts cross most disciplines. System Dynamics is the rigorous study of organisational problems, from a holistic or systemic perspective, where there is dynamic

behaviour (quantities changing over time) and where feedback impacts significantly on system behaviour. It provides the framework and rules for qualitative description, exploration and analysis of such systems in terms of their processes, information, boundaries and strategies, thereby facilitating quantitative computer simulation modelling and analysis to assist understanding of system structure and control. This course focuses on the application of system dynamics modelling in strategic and corporate environments, with an emphasis on Defence. The course has wide applicability across technical, environmental and social systems.

Course Aims

The principal purposes of this course are to develop in future managers of large public sector projects, with reference to a Defence context, a strong appreciation:

- of changes that occur over time in all organisations as they set out to deliver organisational outcomes, specifically where projects are involved;

- that to manage projects successfully demands more than high levels of technical competence, project management skills and detailed understanding of the internal functioning of organisations;

- of the complex dynamics that exist in project organisations, how these arise and how they militate against the achievement of project outcomes; and

- how to identify and manage the complex dynamics of projects and project management organisations.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Recognize and articulate the various sources of complexity and uncertainty that affect decision making
CLO2 : Articulate the benefits of using various decision making under uncertainty methodologies in solving complex problematic issues
CLO3 : Design and apply a process for integrating and utilizing SD models with decision making under uncertainty methodologies to address complex problematic situations
CLO4 : Reflect critically on the outcomes of the analysis obtained after utilizing SD models including encountered challenges and learnt lessons

Course Learning Outcomes	Assessment Item
CLO1 : Recognize and articulate the various sources of complexity and uncertainty that affect decision making	• Assignment 1 • Assignment 3
CLO2 : Articulate the benefits of using various decision making under uncertainty methodologies in solving complex problematic issues	• Assignment 2 • Assignment 3
CLO3 : Design and apply a process for integrating and utilizing SD models with decision making under uncertainty methodologies to address complex problematic situations	• Assignment 2 • Assignment 3
CLO4 : Reflect critically on the outcomes of the analysis obtained after utilizing SD models including encountered challenges and learnt lessons	• Assignment 2 • Assignment 3

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate

Learning and Teaching in this course

*T*he teaching approach to be employed will involve:

- Individual study of the essential texts, research articles, and web-based resources identified in this booklet, with the aim of developing knowledge of, and skills in, decision making under uncertainty via SD models.
- Independent study of additional textual materials and other coursework resources, as necessary to strengthen your understanding.
- Presenting specific coursework materials to: set the context, provide examples, and guide your individual study.
- Scheduled online sessions.

Assessable work has been designed to bring out specific lessons from the topics covered in the course up to selected points in time. Your lecturers will provide written formative (qualitative) feedback to you at the time of returning materials that have been submitted for assessment. This feedback will indicate the extent to which you have assimilated the coursework covered.

Email will be used to provide responses to student questions. Where these responses are of general interest, responses will be posted for the benefit of all students.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment 1 Assessment Format: Individual	20%	Start Date: 15/07/2024 12:00 AM Due Date: 29/07/2024 12:00 AM
Assignment 2 Assessment Format: Individual Short Extension: Yes (3 days)	40%	Due Date: 16/09/2024 12:00 AM
Assignment 3 Assessment Format: Individual Short Extension: Yes (3 days)	40%	Due Date: 25/10/2024 12:00 AM

Assessment Details

Assignment 1

Course Learning Outcomes

- CLO1 : Recognize and articulate the various sources of complexity and uncertainty that affect decision making

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Assignment 2

Course Learning Outcomes

- CLO2 : Articulate the benefits of using various decision making under uncertainty methodologies in solving complex problematic issues
- CLO3 : Design and apply a process for integrating and utilizing SD models with decision making under uncertainty methodologies to address complex problematic situations
- CLO4 : Reflect critically on the outcomes of the analysis obtained after utilizing SD models including encountered challenges and learnt lessons

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Assignment 3

Course Learning Outcomes

- CLO1 : Recognize and articulate the various sources of complexity and uncertainty that affect decision making
- CLO2 : Articulate the benefits of using various decision making under uncertainty methodologies in solving complex problematic issues
- CLO3 : Design and apply a process for integrating and utilizing SD models with decision making under uncertainty methodologies to address complex problematic situations
- CLO4 : Reflect critically on the outcomes of the analysis obtained after utilizing SD models including encountered challenges and learnt lessons

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

General Assessment Information

The assessments are designed to immerse you in a 'learning by doing' experience and are required to integrate some of the DMDU frameworks with a realistic SD simulation models with the help of the EMA Workbench. The assessments experience allows you to demonstrate:

- Your understanding of how to apply the principles, process, and techniques presented in the course into real-world motivated case studies, and
- Your understanding of how to produce various artefacts and interactive visualization to summarize and analyses findings.

Upon successful completion of all assignments, you will have developed a **practical understanding** of the requirements for successful use of SD models in decision making under uncertainty. A full documentation of the course assessments will be available on the course Moodle website.

You are encouraged to seek early and frequent guidance from your lecturers regarding the development of your assignments. You can find information on the availability of the course lecturer at the course Moodle website.

You are permitted to use standard editing and referencing functions in word processing software for spelling and grammar checking and reference citation generation in the creation of your

submissions. You must not use any functions that generate or paraphrase (or translate) passages of text, whether based on your own work or not.

Please note that your submission will be passed through an AI-generated text detection tool. If your marker has concerns that your answer contains passages of AI-generated text you may be asked to explain your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

Grading Basis

Standard

Requirements to pass course

To pass the course, **students must submit assignment 1, 2, and 3.** The overall passing mark for this course is set at 50%.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 15 July - 19 July	Lecture	Introduction to the course Introduction to Decision Making under (deep) uncertainty (DMDU)
Week 2 : 22 July - 26 July	Assessment	Assignment 1 preparation
Week 3 : 29 July - 2 August	Lecture	Introduction to Exploratory Modelling and Analysis (EMA) Introduction to the EMA Workbench
Week 4 : 5 August - 9 August	Lecture	Robust Decision Making (RDM) Scenario Discovery
Week 5 : 12 August - 16 August	Lecture	RDM Applications
Week 6 : 19 August - 23 August	Lecture	Implementation practice on the EMA Workbench and the RDM
Week 7 : 9 September - 13 September	Assessment	Assignment 2 preparation
Week 8 : 16 September - 20 September	Lecture	Many-Objective Robust Decision Making (MORDM)
Week 9 : 23 September - 27 September	Lecture	MORDM Applications
Week 10 : 30 September - 4 October	Lecture	Implementation practice on the MORDM
Week 11 : 7 October - 11 October	Lecture	Other DMDU Applications Dynamic Adaptive Planning (DAP) Dynamic Adaptive Policy Pathways (DAPP)
Week 12 : 14 October - 18 October	Lecture	Other DMDU Applications Epoch Era Analysis (EEA)
Week 13 : 21 October - 25 October	Lecture	Assignment 3 preparation

Attendance Requirements

Not Applicable - as no class attendance is required

Course Resources

Prescribed Resources

Marchau, V.A., Walker, W.E., Bloemen, P.J. and Popper, S.W., 2019. *Decision making under deep uncertainty: from theory to practice* (Springer Nature).

Course notes (available on Moodle), which are essential components of the course material in addition to the textbook.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Hasan Turan					No	Yes

Other Useful Information

School-specific Information

The Leaning Management System

Moodle is the Learning Management System used at UNSW Canberra. All courses have a Moodle site which will become available to students at least one week before the start of semester. Please find all help and documentation (including Blackboard Collaborate) at the Moodle Support page.

UNSW Moodle supports the following web browsers:
• Google Chrome 50+
• Safari 10+
Internet Explorer is not recommended. Addons and Toolbars can affect any browser's performance.

Operating systems recommended are:
• Windows 10,
• Mac OSX Sierra,
• iPad IOS10

Further details:

[Moodle System Requirements](#)

[Moodle Log In](#)

If you need further assistance with Moodle:

For enrolment and login issues please contact:

IT Service Centre

Email: itservicecentre@unsw.edu.au

Phone: (02) 9385-1333

International: +61 2 9385 1333

For all other Moodle issues please contact:

External TELT Support

Email: externalteltsupport@unsw.edu.au

Phone: (02) 9385-3331

International: +61 2 938 53331

Opening hours:

Monday – Friday 7:30am – 9:30 pm

Saturday & Sunday 8:30 am – 4:30pm

[Study at UNSW Canberra](#)

Study at UNSW Canberra has lots of useful information regarding:

• Where to get help

• Administrative matters

• Getting your passwords set up

• How to log on to Moodle

• Accessing the Library and other areas.

[UNSW Canberra Student Hub](#)

For News and Notices, Student Services and Support, Campus Comminity, Quick Links,

Important Dates and Upcoming Events

School Contact Information

Deputy Head of School (Education): Dr Erandi Hene Kankanamge

E: e.henekankanamge@adfa.edu.au

T: 02 5114 5157

Syscom Admin Support: syscom@unsw.edu.au

T: 02 5114 5284

Syscom Admin Office: Building 15, Level 1, Room 101 (open 10am to 4pm, Mon to Fri)