ZEIT8412 Simulation - 2024

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General Course Information

Course Code : ZEIT8412
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

This course provides an understanding of the underlying concepts and theory together with an introduction to the practical application of simulation for gaining insight or providing experience. Simulation may be considered as the implementation of a model over time, thereby comprising both Modelling and Simulation (M&S), or, the use of an imitation of a real system, or part thereof.

M&S is a problem-based discipline that assists in the delivery of complex systems. We take a system life cycle approach to understanding M&S. Major concepts of simulation are therefore introduced from two perspectives: the perspective of the multi-disciplinary domains involved in acquiring complex systems, and, the perspective of the multi-disciplinary domains involved in system utilisation. We also introduce the issues associated with acquiring M&S systems, as distinct from other system types. Issues related to simulation management and practical usage are identified. Systems are typically delivered through the instantiation of a project by an enterprise or business through the efforts of a number of different domains. Consequently, this course will be of interest to students from business management, project management, systems engineering, engineering, operations and support domains, all of whom might all be expected to be involved at various times and to varying degrees over the life cycle of the system.

Course Aims

This course exposes students to different simulation technologies and methods. Students would gain an understanding of the methodologies and techniques underpinning simulation systems and how they can impact decisions across domain including capability management, project management, information technology, and engineering science.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Articulate the role and contribution of modelling and simulation including verification, validation and accreditation, in various projects context
CLO2 : Develop an understanding of the underlying principles, theory and methodology relevant to simulation and modelling in project including verification, validation and accreditation, in various projects context
CLO3 : Appreciate the value of using simulation in gathering insight and solving problems
CLO4 : Assess strengths and weaknesses of modelling and simulation methodologies.

Course Learning Outcomes	Assessment Item
CLO1 : Articulate the role and contribution of modelling and simulation including verification, validation and accreditation, in various projects context	• Assignment 2
CLO2 : Develop an understanding of the underlying principles, theory and methodology relevant to simulation and modelling in project including verification, validation and accreditation, in various projects context	• Test 1 • Assignment 1 • Test 2 • Assignment 2
CLO3 : Appreciate the value of using simulation in gathering insight and solving problems	• Test 1 • Assignment 1 • Test 2 • Assignment 2
CLO4 : Assess strengths and weaknesses of modelling and simulation methodologies.	• Assignment 1 • Test 2 • Assignment 2

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate

Learning and Teaching in this course

Research suggests that students learn best when they are actively engaged in their learning through analysis, discussion, collaboration, reflection, and application. Thus, research has driven a shift in the way we teach, moving from a transmission approach to learning-centred and blended learning approaches. The teaching strategies in this course aim to model these approaches.

To scaffold and support your learning, we use the following learning activities:

- Readings from the course text supplemented by recorded lectures.
- Tutorials on simulation software AnyLogic supported by recorded lectures and notes in Lab practices that extend the theory into practice.
- Online sessions to enable and foster collaboration and facilitate further discussion and reflection on the subjects covered in readings and tutorials.

The teaching strategies utilised in this course are fully aligned with the course's learning outcomes and are designed to maximize your potential to achieve these outcomes and to complete the course's assessment tasks.

As a fully online course, the course will make use of Moodle as its learning management system and Collaborate as its online meeting tool. We recommend that you complete your study at least in accordance with the schedule provided (but earlier if possible). Each week read the chapter(s) of the course text listed in the course schedule and complete the AnyLogic practice tutorials. Weekly online sessions will be utilized to further reinforce the material covered within the week.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Test 1 Assessment Format: Individual	15%	Start Date: 02/08/2024 05:00 PM Due Date: 02/08/2024 11:00 PM
Assignment 1 Assessment Format: Individual	30%	Start Date: 29/07/2024 12:00 AM Due Date: 23/08/2024 05:00 PM
Test 2 Assessment Format: Individual	15%	Start Date: 27/09/2024 05:00 PM Due Date: 27/09/2024 11:00 PM
Assignment 2 Assessment Format: Individual	40%	Start Date: 16/09/2024 12:00 AM Due Date: 25/10/2024 05:00 PM

Assessment Details

Test 1

Assessment Overview

Multiple choice test covering first 3 weeks

Course Learning Outcomes

- CLO2 : Develop an understanding of the underlying principles, theory and methodology relevant to simulation and modelling in project including verification, validation and accreditation, in various projects context
- CLO3 : Appreciate the value of using simulation in gathering insight and solving problems

Assignment submission Turnitin type

Not Applicable

Assignment 1

Assessment Overview

Covers the material in the first 6 weeks

Course Learning Outcomes

- CLO2 : Develop an understanding of the underlying principles, theory and methodology relevant to simulation and modelling in project including verification, validation and accreditation, in various projects context
- CLO3 : Appreciate the value of using simulation in gathering insight and solving problems
- CLO4 : Assess strengths and weaknesses of modelling and simulation methodologies.

Assignment submission Turnitin type

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

Test 2

Assessment Overview

Multiple choice test covering the material in the first 9 weeks

Course Learning Outcomes

- CLO2 : Develop an understanding of the underlying principles, theory and methodology relevant to simulation and modelling in project including verification, validation and accreditation, in various projects context
- CLO3 : Appreciate the value of using simulation in gathering insight and solving problems
- CLO4 : Assess strengths and weaknesses of modelling and simulation methodologies.

Assignment submission Turnitin type

Not Applicable

Assignment 2

Assessment Overview

Covers all course material. It is a capstone type assingment.

Course Learning Outcomes

- CLO1 : Articulate the role and contribution of modelling and simulation including verification, validation and accreditation, in various projects context
- CLO2 : Develop an understanding of the underlying principles, theory and methodology

relevant to simulation and modelling in project including verification, validation and accreditation, in various projects context

- CLO3 : Appreciate the value of using simulation in gathering insight and solving problems
- CLO4 : Assess strengths and weaknesses of modelling and simulation methodologies.

<u>Assignment submission Turnitin type</u>

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

General Assessment Information

The course contains two multiple choice tests and two assignments (posted on Moodle site). Assignments provide you with an opportunity to demonstrate your ability to apply the knowledge and understanding you have gained throughout the course. The assignments require higher-order independent thinking beyond the ability to read, comprehend, remember, and implement the information provided in the course.

You are expected to undertake significant effort to complete your assignments. For the students who would submit the first assignment on time, feedback will usually be available on Moodle within two weeks of the due date. As the second assignment is considered as the capstone assessment of the course, no customised feedback will be provided.

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.

<u>Grading Basis</u>

Standard

<u>Requirements to pass course</u>

Students are not required to pass any one piece of the assessments. Students are required to achieve at least 50 marks out of a total 100 marks to pass this course.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 15 July - 19 July	Lecture	Chapter 1: Defining Simulation: What, Why and When?
Week 2 : 22 July - 26 July	Blended	Chapter 2: Inside Simulation Software: modelling the progress of time and variability. Lab 1: Developing a Discrete Event Simulation (DES) model in AnyLogic using source, service, select output, resource pool and sink blocks from Process Modelling library
Week 3 : 29 July - 2 August	Blended	Chapter 3 Software for Simulation Lab 2: Developing simple animations for a DES model in AnyLogic
Week 4 : 5 August - 9 August	Blended	Chapter 4 Simulation Studies: An Overview (Conceptual modelling, coding, experimentation, implementation) Lab 3: Setting priority, adding key performance indicators (KPIs), exporting KPIs after the simulation run in AnyLogic
Week 5 : 12 August - 16 August	Blended	Chapter 5 Conceptual modelling Lab 4: Using Empirical Distributions for DES models, adding control widgets (e.g., buttons and sliders) and creating interactive dashboards in AnyLogic
Week 6 : 19 August - 23 August	Blended	Chapter 6 Developing the Conceptual Model Lab 5: Building a new model from scratch and investigating further properties of AnyLogic blocks
Week 7 : 9 September - 13 September	Blended	Chapter 7 Data Collection and Analysis Lab 6: Java for AnyLogic Part I (Data types, variable declarations, local and global variables, arithmetic operations, etc.)
Week 8 : 16 September - 20 September	Blended	Chapter 8 Model Coding Lab 7: Java for AnyLogic Part II (Assignment operators, logical operators, if-else statements, for loops, etc.)
Week 9 : 23 September - 27 September	Blended	Chapter 9 Experimentation: Obtaining Accurate Results Lab 8: Warmup period analysis, setting up parameter variation experiments in AnyLogic
Week 10 : 30 September - 4 October	Blended	Chapter 10 Experimentation: Searching the Solution Space Lab 9: Model validation via checking the inner workings of the model in AnyLogic, applying statistical comparison for validation, setting up optimization experiments in AnyLogic
Week 11 : 7 October - 11 October	Blended	Chapter 12 Verification, Validation and Confidence Lab 10: Sensitivity Analysis and output recording to external environments in AnyLogic
Week 12 : 14 October - 18 October	Blended	Chapter 13 The Practice of Simulation Lab 11: Advanced Modelling in Anylogic including blocks from Material Handling Library
Week 13 : 21 October - 25 October	Assessment	

Attendance Requirements

Not Applicable - as no class attendance is required

Course Resources

Prescribed Resources

The required text is "Robinson, S. (2014). *Simulation: the practice of model development and use*". Bloomsbury Publishing. You can access the electronic version of the book via the Academy Library and purchase electronic version online.

The simulation modelling software for this course is *AnyLogic*. The Personal Learning Edition (PLE) of AnyLogic is free and it can be downloaded from https://www.anylogic.com/downloads/ for Linux Windows, and Mac OS.

Additional resources are provided on Moodle, and you should expect to use other resources to augment your understanding of the area and to complete the assignments.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Hasan Turan		Room 238, Building 21, UNSW Canberra	0413654084	Please email me to book a session. Thanks	Yes	Yes
	Ruhul Sarker					No	No

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)