UNSW Course Outline

ENGG9744 Nuclear Safety, Security and Safeguards - 2024

Published on the 24 May 2024

General Course Information

Course Code : ENGG9744
Year : 2024
Term : Term 2
Teaching Period : T2
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Mechanical and Manufacturing Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate, Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Students will learn from UNSW academics, senior professionals at the Australian Nuclear Science and Technology Organisation (ANSTO) and from the Australian Safeguards and Non-proliferation Office (ASNO) how specific nuclear materials and safety- or security-critical systems

are regulated in the organisational, national and international context. The course emphasises both knowledge and application. The assessments include presenting and critiquing safety cases and threat assessments, applying the tools for engineering safety assessments, and planning and communication for a localised nuclear accident case study. All these skills will be applicable in a wide range of contexts.

Course Aims

This course is aimed at achieving an advanced level of understanding of the regulatory challenges that face senior professionals in the nuclear industry, as well as those in other safety-critical or highly regulated industries which share similar challenges. These challenges are summarised as nuclear safety, nuclear security and nuclear safeguards. As such the course is wide in scope, but the common thread through all of this is that safety, security and safeguards are connected by their similarities in terms of the assessment and mitigation of threat and in the application of detailed conceptual and legal frameworks to ensure that these occur.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Present, critique and defend a safety case
CLO2 : Formulate threat assessments to specify physical protection measures
CLO3 : Prepare plans and response for a radiological incident
CLO4 : Name organisations, regulations and standards that influence operation of nuclear facilities
CLO5 : Explain how the operators of nuclear facilities mitigate nuclear proliferation risks
CLO6 : Apply nuclear design principles and safety analysis methodologies
CLO7 : Assess consequences of radiological contamination and exposure

Course Learning Outcomes	Assessment Item
CLO1 : Present, critique and defend a safety case	• Safety Case • Threat Assessment
CLO2 : Formulate threat assessments to specify physical protection measures	• Final written examination • Threat Assessment
CLO3 : Prepare plans and response for a radiological incident	• Emergency Scenario • Threat Assessment
CLO4 : Name organisations, regulations and standards that influence operation of nuclear facilities	• Emergency Scenario • Safety Case • Final written examination • Threat Assessment
CLO5 : Explain how the operators of nuclear facilities mitigate nuclear proliferation risks	• Final written examination • Threat Assessment
CLO6 : Apply nuclear design principles and safety analysis methodologies	• Safety Case • Final written examination • Threat Assessment
CLO7 : Assess consequences of radiological contamination and exposure	• Emergency Scenario • Safety Case • Final written examination • Threat Assessment

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Additional Course Information

This is a postgraduate course convened by the School of Mechanical and Manufacturing

Engineering. It is part of the MEngSci Nuclear Engineering specialization and can be taken as an

elective by 3rd or 4th year students from other schools and facualties on the approval of home school and the ENGG9744 course convener.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Emergency Scenario Assessment Format: Individual	15%	Start Date: 27/05/2024 12:00 PM Due Date: 16/06/2024 10:00 PM
Safety Case Assessment Format: Individual	30%	Start Date: 05/06/2024 11:00 AM Due Date: 25/07/2024 10:00 PM
Threat Assessment Assessment Format: Group	15%	Start Date: Not Applicable Due Date: 07/07/2024 10:00 PM
Final written examination Assessment Format: Individual	40%	

Assessment Details

Emergency Scenario

Assessment Overview

The emergency scenario assignment is a role play exercise that occurs over wk3-5, concerning radiation safety, radiological contamination, internal, and external communications. It is conducted individually, in response to notifications that students will receive during this time from the learning management system.

As this is staged assignment, there are no marks for late submissions in a given stage, but missing a stage does not prevent you from trying the next one on time.

Length: variable, 200-300 words, plus video and transcript.

Course Learning Outcomes

- CLO3 : Prepare plans and response for a radiological incident
- CLO4 : Name organisations, regulations and standards that influence operation of nuclear facilities
- CLO7 : Assess consequences of radiological contamination and exposure

Assessment Length

Variable, 200-300 words.

Submission notes

Submitted online

Safety Case

Assessment Overview

In the Safety Case project, students write a safety case for a change in activity at a nuclear facility.

There is an individual written report, and a safety case presentation. Grades are given based on a marking rubric. The safety case assignment is reviewed by student peers and graded by the course convener. The reason for this peer review is to teach the essential function of a safety/ security case for licensing - which is for it to be openly critiqued. Therefore, advocating for one's own assessments, as well as giving and receiving objective criticism, are essential skills for all levels of professionalism in safety-critical industries, and are assessed in this course. This assignment is submitted through Turnitin and students do not see Turnitin similarity reports. Length: max 30 pages.

Course Learning Outcomes

- CLO1 : Present, critique and defend a safety case
- CLO4 : Name organisations, regulations and standards that influence operation of nuclear facilities
- CLO6 : Apply nuclear design principles and safety analysis methodologies
- CLO7 : Assess consequences of radiological contamination and exposure

Assessment Length

max 30 pages

Submission notes

Submitted through Turnitin, in Moodle.

Assignment submission Turnitin type

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

Threat Assessment

Assessment Overview

Students work in groups to produce a design basis threat assessment for a nuclear facility.

The assignment is graded by a rubric. This assignment is submitted through Turnitin and students do not see Turnitin similarity reports. Length: 800 words, plus threat assessment table of around 30 threats.

<u>Course Learning Outcomes</u>

- CLO1 : Present, critique and defend a safety case
- CLO2 : Formulate threat assessments to specify physical protection measures
- CLO3 : Prepare plans and response for a radiological incident
- CLO4 : Name organisations, regulations and standards that influence operation of nuclear facilities
- CLO5 : Explain how the operators of nuclear facilities mitigate nuclear proliferation risks
- CLO6 : Apply nuclear design principles and safety analysis methodologies
- CLO7 : Assess consequences of radiological contamination and exposure

<u>Assessment Length</u>

up to 800 words, plus threat assessment table of around 30 threats

<u>Submission notes</u>

Submitted through Turnitin, in moodle.

<u>Assignment submission Turnitin type</u>

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

Final written examination

<u>Assessment Overview</u>

The exam is a hand-written, 2 hr invigilated exam. No study materials are permitted in the exam. Approved calculators are allowed.

<u>Course Learning Outcomes</u>

- CLO2 : Formulate threat assessments to specify physical protection measures
- CLO4 : Name organisations, regulations and standards that influence operation of nuclear facilities
- CLO5 : Explain how the operators of nuclear facilities mitigate nuclear proliferation risks
- CLO6 : Apply nuclear design principles and safety analysis methodologies
- CLO7 : Assess consequences of radiological contamination and exposure

<u>Assessment Length</u>

2 hr

<u>Assignment submission Turnitin type</u>

This is not a Turnitin assignment

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Safety Fundamentals
Week 2 : 3 June - 9 June	Lecture	Safety Assessment 1
Week 3 : 10 June - 16 June	Lecture	Safety Assessment 2
Week 4 : 17 June - 23 June	Lecture	Nuclear International Law
Week 5 : 24 June - 30 June	Lecture	Nuclear Security
Week 6 : 1 July - 7 July	Fieldwork	Visit to ANSTO
Week 7 : 8 July - 14 July	Lecture	Safeguards 1
Week 8 : 15 July - 21 July	Workshop	Safety Case Check-in
Week 9 : 22 July - 28 July	Lecture	Safeguards 2
Week 10 : 29 July - 4 August	Workshop	Safety Case Presentations

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Prescribed Resources

The most important resources are provided as pdf documents as part of the course.

Recommended Resources

1. Nuclear Safeguards, Security and Nonproliferation: Achieving Security with Technology and Policy Author: James Doyle ISBN 978-0750686730 Year Published 2008 Publisher Heinemann-Butterworth

2. Three Mile Island: A Nuclear Crisis in Historical Perspective Author: J. Samuel Walker ISBN 978-0520246836 Year Published 2006

3. Ablaze (The Story of the Heroes and Victims of Chernobyl) Author: Piers Paul Read ISBN 978-0679408192 Publisher Random House

4. Websites: Particularly IAEA documents (provided in the course materials). Also: WNA, ANS, NEI, WINS

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including th UNSW MyExperience process, informal discussion in the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Edward Obbard		Ainsworth Building J17	93857625	Please email me to arrange a meeting	No	Yes
	Edward Obbard					No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)

- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) 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. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be 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 will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash

requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

Review of Results

The purpose of a review of results is if there was a marking error. Review of results is for when you have cause to believe that there is a marking error. Review of Results cannot be used to get feedback. If you would like feedback for assessments prior to the final exam, you are welcome to contact the course convenor directly. No feedback will be provided on final exams.

Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

School Contact Information

Location

UNSW Mechanical and Manufacturing Engineering

Ainsworth building J17, Level 1

Above Coffee on Campus

Hours

9:00–5:00pm, Monday–Friday*

*Closed on public holidays, School scheduled events and University Shutdown

Web

[School of Mechanical and Manufacturing Engineering](#)

[Engineering Student Support Services](#)

[Engineering Industrial Training](#)

[UNSW Study Abroad and Exchange](#) (for inbound students)

[UNSW Future Students](#)

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

(+61 2) 9385 4097 – School Office**

**Please note that the School Office will not know when/if your course convenor is on campus or available

Email

[Engineering Student Support Services](#) – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

[School Office](#) – School general office administration enquiries

- NB: the relevant teams listed above must be contacted for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

Important Links

- [Student Wellbeing](#)
- [Urgent Mental Health & Support](#)
- [Equitable Learning Services](#)
- [Faculty Transitional Arrangements for COVID-19](#)
- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)