



## UNSW Course Outline

# ZEIT8512 Explosive Ordnance Effects - 2024

Published on the 11 Feb 2024

## General Course Information

Course Code : ZEIT8512

Year : 2024

Term : Semester 1

Teaching Period : Z1

Is a multi-term course? : No

Faculty : UNSW Canberra

Academic Unit : School of Engineering and Technology

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 develops an understanding of the use of explosives with regards to how effects are realized during and after detonation of a warhead. This includes aspects of shock, spall, fragmentation and fragment characteristics (including velocity, shape and size). Additionally, the

theory behind shaped-charge penetration will be examined and applied to such systems as anti-tank guided missiles. The effects that could be expected on concrete structures will also be evaluated. Finally the matching of the warhead to the target (weaponneering) will be covered.

Enrolment in this course is only available to students nominated by the Department of Defence.

## Course Aims

This course aims to give the students the tools to evaluate how a specific warhead would function to deliver damage to its target.

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the mechanisms of blast, material deformation and fragmentation that occurs during a dynamic event.
CLO2 : Describe how and why shock waves propagate during an explosion or penetration.
CLO3 : Describe the design and mechanisms of attack of the various natures of ammunition.
CLO4 : Evaluate the range of wounding and damage mechanisms to human, soft and hard targets from a range of ammunition natures.
CLO5 : Match a particular warhead to a specific target.

Course Learning Outcomes	Assessment Item
CLO1 : Describe the mechanisms of blast, material deformation and fragmentation that occurs during a dynamic event.	
CLO2 : Describe how and why shock waves propagate during an explosion or penetration.	
CLO3 : Describe the design and mechanisms of attack of the various natures of ammunition.	
CLO4 : Evaluate the range of wounding and damage mechanisms to human, soft and hard targets from a range of ammunition natures.	
CLO5 : Match a particular warhead to a specific target.	

## Learning and Teaching Technologies

Moodle - Learning Management System | Zoom

## Learning and Teaching in this course

Lecture recordings will be released on weekly basis.

## The Learning 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 7, 10, Mac OSX Sierra, iPad IOS10

For further details about system requirements click [here](#).

Log in to Moodle [here](#).

If you need further assistance with Moodle:

For enrolment and login issues please contact:

IT Service Centre

Email: [itservicecentre@unsw.edu.au](mailto: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](mailto:externalteltsupport@unsw.edu.au)

Phone: (02) 9385-3331

International: +61 2 938 53331

Opening hours:

Monday – Friday 7:30am – 9:30 pm

## Additional Course Information

### Referencing

In this course, students are required to reference following the APA 7 / Chicago NB referencing style. Information about referencing styles is available at: <https://guides.lib.unsw.adfa.edu.au/c.php?g=472948&p=3246720>

### Developing Graduate Capabilities

Successful completion of this course contributes to the acquisition of UNSW graduate capabilities. UNSW aspires to develop globally focused graduates who are **rigorous scholars**, capable of **leadership** and **professional practice** in an **international** community.

### Class Attendance and Absence

Students are expected to attend all classes in the course in which they are enrolled. All requests for exemption from attendance or absence should be addressed to the Course Authority and where applicable, be accompanied by a medical certificate.

See University Rules at: <https://student.unsw.edu.au/attendance>

All Defence and Defence-funded students must also seek approval from relevant Defence authority for exemption from attendance or absence.

### Academic Integrity and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. All students are expected to adhere to UNSW's [Student Code of Conduct Policy](#).

Plagiarism undermines academic integrity and is not tolerated at UNSW. It is defined as using the words or ideas of others and passing them off as your own, and can take many forms, from deliberate cheating to accidental copying from a source without acknowledgement.

For more information, please refer to the following:

## Study at UNSW Canberra

<https://www.unsw.adfa.edu.au/study>

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.

### Additional Information as required

CRICOS Provider no. 00098G

The University of New South Wales Canberra.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment Assessment Format: Individual	20%	Start Date: 11/03/2024 12:01 AM Due Date: 17/03/2024 11:59 PM
On-line Quiz 2 Assessment Format: Individual	20%	Start Date: 29/04/2024 12:01 AM Due Date: 06/05/2024 11:59 PM
Final Assignment Assessment Format: Individual	40%	Start Date: 20/05/2024 12:01 AM Due Date: 03/06/2024 11:59 PM
On-line Quiz 1 Assessment Format: Individual	20%	Start Date: 08/04/2024 12:01 AM Due Date: 15/04/2024 11:59 PM

## Assessment Details

### Assignment

#### Assessment Overview

n/a

#### Detailed Assessment Description

Description of the basic information of a real-life explosive ordnance;

Ability to calculate the state parameters of a shock wave.

Mapping to course learning outcome: CLO 1, 2

The first assignment will be due in the end of week 3 (17th Mar). Feedback, grades, and worked solutions will be given to students during week 4 before the census date (end of week 4).

#### Assessment Length

No more than 10 pages

#### Submission notes

Typewriting is preferable; Word or PDF

#### Assessment information

Assignment must be submitted before the due date; Deduction will be applied for late submission.

## **On-line Quiz 2**

#### Assessment Overview

n/a

#### Detailed Assessment Description

True or false, multiple choices, and calculation questions will be assessed based on the learning content from week 1 to week 9.

Mapping to course learning outcome: CLO 1, 2, 3, 4

#### Submission notes

Typewriting is preferable

#### Assessment information

One attempt only.

## **Final Assignment**

#### Assessment Overview

n/a

#### Detailed Assessment Description

This major assignment is linked to all learning outcome and lectures.

Mapping to course learning outcome: CLO 1, 2, 3, 4, 5

#### Assessment Length

No more than 20 pages

#### Submission notes

Typewriting is preferable

### On-line Quiz 1

#### Assessment Overview

n/a

#### Detailed Assessment Description

True or false, multiple choices, and calculation questions will be assessed based on the learning content from week 1 to week 6.

Mapping to course learning outcome: CLO 1, 2, 3

#### Submission notes

Typewriting is preferable

#### Assessment information

Only one attempt will be allowed.

## General Assessment Information

### Outcomes-Assessment

There will be two online quizzes that will be set using the UNSW Moodle site. There will also be two assignments in which students are individually expected to prepare technical essays, calculations, diagram explanations, etc. **No AI tools are allowed.** Once detected, it will be reported, and outcome will follow UNSW's student code of conduct policy and corresponding procures. This is a postgraduate course and students are expected to learn new knowledge through the assignments.

Marking rubric will be provided for assignments before the start date.

Details of the assessments will be given in the lectures.

**The first assignment will be due in the end of week 3 (17th Mar). Feedback, grades, and worked**

solutions will be given to students during week 4 before the census date (end of week 4).

### **Late Submission of Assignment**

Unless prior arrangement is made with the lecturer or a formal application for special consideration is submitted, a penalty of 5% of the total available mark for the assessment will apply for each day that an assessment item is late up to a maximum of 5 days (120 hours) after which an assessment can no longer be submitted and a grade of 0 will be applied.

### **Supplementary Assessment**

Supplementary assessment may be offered to any student who fails an assessment task if their request for Special Consideration for that task is approved. The mark awarded for the assessment task will be based on the supplementary assessment and previous results.

Where a student fails an assessment task in a course in the final term or semester of their program but does not have an approved Special Consideration for that task, supplementary assessment may still be offered in cases where passing the task would have resulted in the student passing the course and completing the program. This requirement does not apply to research- or project-based assessments and theses.

Where a supplementary assessment is provided to a student with a Fail based on the overall course result, the final mark for the course will be capped at 50%.

For the avoidance of doubt, please refer to the current UNSW [Assessment Implementation Procedure](#).

### **Grading Basis**

Standard

### **Requirements to pass course**

Achieve a composite mark of at least 50 out of 100 to pass this course



# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 26 February - 1 March	Lecture	Introduction - General theory of explosion
Week 2 : 4 March - 8 March	Lecture	Initiation and Fuzing of Explosive Ordnance
Week 3 : 11 March - 15 March	Lecture	Shock wave and Blast effects
	Assessment	Assignment
Week 4 : 18 March - 22 March	Lecture	Detonation
Week 5 : 25 March - 29 March	Lecture	Fragmentation effects
Week 6 : 1 April - 5 April	Lecture	Shaped charge effects
	Assessment	On-line Quiz 1 due on 15th April
Week 7 : 22 April - 26 April	Lecture	Underground and underwater explosions
	Assessment	Online quiz 1
Week 8 : 29 April - 3 May	Lecture	Effects of nuclear explosions
Week 9 : 6 May - 10 May	Lecture	Numerical analysis of Explosive Ordnance Effects
	Assessment	On-line Quiz 2 due on 6th May
Week 10 : 13 May - 17 May	Lecture	Handling, Transport and Disposal of Explosive Ordnance
	Assessment	Online quiz 2
Week 11 : 20 May - 24 May	Lecture	Case Study (Military applications)
Week 12 : 27 May - 31 May	Lecture	Case Study (Explosive Ordnance Effects on Targets/Structures)
Week 13 : 3 June - 7 June	Lecture	Revision/Online seminar
	Assessment	Final assignment due on 3rd of June.

## Attendance Requirements

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

## General Schedule Information

This course will be run as an intensive delivery module (IDM) with the academic content delivered in an approximate 12-weeks period, the last three weeks are the supplementary courses for the missed lessons due to holidays, military training days or other.

There is a compulsory practicum for this course as well, however, it won't be assessed. The practicum will be holding in week 17 (between 17th and 21st June). If you cannot attend the practicum this year, you can contact me or the program convenor Prof Paul Hazell by email to enroll you in the practicum next year.

Lecture recordings will be released on weekly basis.

Since the lecture series will be provided in a distance mode, all the lectures will be recorded and uploaded as video files or links that can be redirected to videos. Students are encouraged to email me to arrange a meeting in Zoom, Teams, or other software which is practical.

# Course Resources

## Prescribed Resources

Explosives Engineering, Paul W. Cooper, 1996, John Wiley & Sons

Armour: Materials, Theory, and Design, 2nd edition, 2022, Paul J. Hazell, CRC Press

The effects of nuclear weapons, (1977) 2022, Samuel Glasstone and Philip J. Dolan, United States Department of Defense and the United States Department of Energy

Note: all available from library or online sources (free)

## Recommended Resources

Explosive effects and applications, Jonas A. Zukas & William P. Walters, 1998. Springer

Detonation of condensed explosives, 1993, Roger Cheret, Springer-Verlag

Explosive Blast Injuries - Principles and Practices, 2023, Zhengguo Wang & Jianxin Jiang, Springer

Additional resources will be given during lecture series

## Course Evaluation and Development

One of the key priorities in the 2025 Strategy for UNSW is a drive for academic excellence in education. One of the ways of determining how well UNSW is progressing towards this goal is by listening to our own students. Students will be asked to complete the myExperience survey towards the end of this course

You can email me, program convenor, or other EO lecturers to discuss about anything related to the course/program, such as learning experience, unclear explained concepts, relevance of the course content, iterative coursework development, etc.

There will be a section on Moodle where you can formally express yourself or other feedback.

There will also be a discussion section on Moodle where you might discuss what was identified in past feedback and how this course was changed to address the issue.

Please feel free to contact us.

Students can also provide feedback during the semester via: direct contact with the lecturer, the “On-going Student Feedback” link in Moodle, Student-Staff Liaison Committee meetings in schools, informal feedback conducted by staff, and focus groups. Student opinions really do make a difference. Refer to the Moodle site for this course to see how the feedback from previous students has contributed to the course development.

**Important note:** Students are reminded that any feedback provided should be constructive and professional and that they are bound by the Student Code of Conduct Policy

<https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf>

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Discipline coordinator	Paul Hazell					No	No
Convenor	Zongjun Li		UNSW Canberra @ ADFA, Building 15, Room 118		From Monday to Friday (0900 to 2100)	No	Yes

## Other Useful Information

### Academic Information

#### Course Evaluation and Development

One of the key priorities in the 2025 Strategy for UNSW is a drive for academic excellence in education. One of the ways of determining how well UNSW is progressing towards this goal is by listening to our own students. Students will be asked to complete the myExperience survey towards the end of each course.

Students can also provide feedback during the semester via: direct contact with the lecturer, the “On-going Student Feedback” link in Moodle, Student-Staff Liaison Committee meetings in schools, informal feedback conducted by staff, and focus groups (where applicable). Student opinions really do make a difference. Refer to the Moodle site for your course to see how the feedback from previous students has contributed to the course development.

**Important note:** Students are reminded that any feedback provided should be constructive and professional and that they are bound by the Student Code of Conduct.

## **Equitable Learning Services (ELS)**

Students living with neurodivergent, physical and/or mental health conditions or caring for someone with these conditions may be eligible for support through the Equitable Learning Services team. Equitable Learning Services is a free and confidential service that provides practical support to ensure your mental or physical health conditions do not adversely affect your studies.

Our team of dedicated **Equitable Learning Facilitators (ELFs)** are here to assist you through this process. We offer a number of services to make your education at UNSW easier and more equitable.

Further information about ELS for currently enrolled students can be found at: <https://www.student.unsw.edu.au/equitable-learning>

## **Academic Honesty and Plagiarism**

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Plagiarism undermines academic integrity and is not tolerated at UNSW. It is defined as using the words or ideas of others and passing them off as your own, and can take many forms, from deliberate cheating to accidental copying from a source without acknowledgement.

For more information, please refer to the following:

<https://student.unsw.edu.au/plagiarism>

## **Submission of Assessment Tasks**

### **Special Consideration**

Special Consideration is the process for assessing and addressing the impact on students of short-term events, that are beyond the control of the student, and that affect performance in a specific assessment task or tasks.

Applications for Special Consideration will be accepted in the following circumstances only:

- Where academic work has been hampered to a substantial degree by illness or other cause;
- The circumstances are unexpected and beyond the student's control;
- The circumstances could not have reasonably been anticipated, avoided or guarded against by the student; and either:

(i) they occurred during a critical study period and was 3 consecutive days or more duration, or a total of 5 days within the critical study period; or

(ii) they prevented the ability to complete, attend or submit an assessment task for a specific date (e.g. final exam, in class test/quiz, in class presentation)

Applications for Special Consideration must be made as soon as practicable after the problem occurs and at the latest within three working days of the assessment or the period covered by the supporting documentation.

By sitting or submitting the assessment task the student is declaring that they are fit to do so and cannot later apply for Special Consideration (UNSW 'fit to sit or submit' requirement).

Sitting, accessing or submitting an assessment task on the scheduled assessment date, after applying for special consideration, renders the special consideration application void.

Find more information about special consideration at: <https://www.student.unsw.edu.au/special/consideration/guide>

Or apply for special consideration through your [MyUNSW portal](#).

### **Late Submission of assessment tasks (other than examinations)**

UNSW has a standard late submission penalty of:

- 5% per day,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

### **Electronic submission of assessment**

Except where the nature of an assessment task precludes its electronic submission, all assessments must be submitted to an electronic repository, approved by UNSW or the Faculty, for archiving and subsequent marking and analysis.

### **Release of final mark**

All marks obtained for assessment items during the session are provisional. The final mark as published by the university following the assessment review group meeting is the only official mark.