UNSW Course Outline

ZEIT3753 Ship Design Fundamentals - 2024

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General Course Information

Course Code : ZEIT3753
Year : 2024
Term : Semester 2
Teaching Period : Z2
Is a multi-term course? : No
Faculty : UNSW Canberra
Academic Unit : School of Engineering and Technology
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : UNSW Canberra at ADFA
Campus : UNSW Canberra
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course introduces the preliminary ship design and construction process with emphasis on naval ship types and requirements, including submarines. Methods for the initial estimation of vessel performance, dimensions, weights/centres and volumetric capacity are practised before

undertaking vessel geometry definition using software tools to generate preliminary hull lines and general arrangement drawings. Requirements for load lines and freeboard are discussed, followed by navy vessel survivability and vulnerability considerations. The case of high-speed displacement ships is addressed.

Course Aims

The course is core to the standard BE (Hons) (Naval Architecture) program and its CDF variant (Year 3).

The course provides a blend of essential specialised engineering knowledge, skills and application in the key area of:
Ship Design. Presented and explored are the key fundamental issues to be considered when addressing the "whole of ship" design process.

Relationship to Other Courses

This course is heavily inter-related to ZEIT3751 Ship Hydrodynamics and ZEIT3752 Ship Structures, which are undertaken concurrently in a standard program of study. It also assumes good knowledge, recall and application of the learning outcomes found in ZEIT3750 Naval architecture Practice, Hydrostatics and Stability (a pre-requisite course), and will form the foundation for the subsequent courses ZEIT4750 and ZEIT4751 Ship Design 1 and 2.

Course Learning Outcomes

Course Learning Outcomes	Engineers Australia - Professional Engineer (Stage 1)
CLO1 : Understand vessel requirements, margins and terminology to support preliminary ship design.	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.4 : Professional use and management of information
CLO2 : Understand preliminary design processes with emphasis on naval vessels.	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the

	engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.4 : Professional use and management of information
CLO3 : Develop and draft a preliminary vessel general arrangement and estimate principal particulars.	
CLO4 : Develop and draft vessel hull lines through proficient use of industry-standard software and the initial estimation of performance.	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.4 : Professional use and management of information

Course Learning Outcomes	Assessment Item
CLO1 : Understand vessel requirements, margins and terminology to support preliminary ship design.	• Introduction to propulsion Quiz • Concept Development • Preliminary Design • Final Exam / Viva
CLO2 : Understand preliminary design processes with emphasis on naval vessels.	• Introduction to propulsion Quiz • Concept Development • Preliminary Design • Final Exam / Viva
CLO3 : Develop and draft a preliminary vessel general arrangement and estimate principal particulars.	• Preliminary Design • Final Exam / Viva
CLO4 : Develop and draft vessel hull lines through proficient use of industry-standard software and the initial estimation of performance.	• Preliminary Design • Final Exam / Viva

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | 6 computer mice would be a great asset to assist with CAD work on students' own devices.

Learning and Teaching in this course

The teaching strategies employed in this core course in the discipline of naval architecture have at their heart, a close two-way exchange between the course convenor/lecturers and the small student cohort in group and individual learning contexts. The high instructor-to-student ratio allows plentiful feedback and support, designed to foster the earliest possible development of solid technical skills and appreciation of the critical nature of highly professional practice in naval architecture. Training in the use of industry leading software supports the learning outcomes in a practical manner.

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
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

Additional Course Information

This course requires students to preferably have education-licenced Maxsurf suite AutoCad software on their own PC-compatible (non-Apple) device, otherwise UNSW myAccess may be relied upon but is not recommended.

Refer to https://education.bentley.com/ and https://www.myit.unsw.edu.au/software-students.

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

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

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

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	Engineers Australia - Professional Engineer (Stage 1)
Introduction to propulsion Quiz Assessment Format: Individual	10%	Start Date: Week 2 Tuesday Due Date: Week 2: 22 July - 26 July	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline
Concept Development Assessment Format: Individual Short Extension: Yes (7 days)	20%	Start Date: Not Applicable Due Date: Week 7: 09 September - 13 September	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the

			mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.4 : Professional use and management of information
Preliminary Design Assessment Format: Individual Short Extension: Yes (7 days)	30%	Start Date: Not Applicable Due Date: Week 12: 14 October - 18 October	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and

			computer and information sciences which underpin the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.4 : Professional use and management of information
Final Exam / Viva Assessment Format: Individual	40%	Start Date: Not Applicable Due Date: Exam week	• PEE1.1 : Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin

			the engineering discipline • PEE1.3 : In-depth understanding of specialist bodies of knowledge within the engineering discipline • PEE1.4 : Discernment of knowledge development and research directions within the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.4 : Professional use and management of information

Assessment Details

Introduction to propulsion Quiz

Assessment Overview

Introduction to propulsion Quiz

Course Learning Outcomes

- CLO1 : Understand vessel requirements, margins and terminology to support preliminary ship design.
- CLO2 : Understand preliminary design processes with emphasis on naval vessels.

Detailed Assessment Description

In-class quiz (multiple-choice format) addressing fundamental knowledge on conventional surface vessel propulsion.

Assessment Length

20 minutes

Submission notes

Hand-written multiple choice in-class quiz.

Assessment information

See Moodle as applicable.

Assignment submission Turnitin type

Not Applicable

Concept Development

Assessment Overview

Concept Development

Course Learning Outcomes

- CLO1 : Understand vessel requirements, margins and terminology to support preliminary ship design.
- CLO2 : Understand preliminary design processes with emphasis on naval vessels.

Detailed Assessment Description

Design (commercial).

Assessment Length

5 pages plus appendices plus drawings.

Submission notes

Moodle.

Assessment information

Refer detailed assessment specification on Moodle and Teams.

Assignment submission Turnitin type

This is not a Turnitin assignment

Preliminary Design

Assessment Overview

Preliminary Design

Course Learning Outcomes

- CLO1 : Understand vessel requirements, margins and terminology to support preliminary ship design.
- CLO2 : Understand preliminary design processes with emphasis on naval vessels.
- CLO3 : Develop and draft a preliminary vessel general arrangement and estimate principal particulars.
- CLO4 : Develop and draft vessel hull lines through proficient use of industry-standard software and the initial estimation of performance.

Detailed Assessment Description

Design (naval).

Assessment Length

10 pages plus appendices plus drawings.

Submission notes

Moodle.

Assessment information

Refer detailed assessment specification on Moodle and Teams.

Assignment submission Turnitin type

This is not a Turnitin assignment

Final Exam / Viva

Assessment Overview

Examination

Course Learning Outcomes

- CLO1 : Understand vessel requirements, margins and terminology to support preliminary ship design.
- CLO2 : Understand preliminary design processes with emphasis on naval vessels.
- CLO3 : Develop and draft a preliminary vessel general arrangement and estimate principal particulars.
- CLO4 : Develop and draft vessel hull lines through proficient use of industry-standard software and the initial estimation of performance.

Detailed Assessment Description

The viva will be held in the examination period, cover all aspects of the course and is undertaken individually in front of the course convenor and teaching staff.

Assessment Length

Up to 1 hour for questions and answers.

Assessment information

Precise information on format and scheduling of the viva for each student during the examination period will be announced closer to the date.

Assignment submission Turnitin type

Not Applicable

Hurdle rules

Achievement of a minimum of 50% in the viva/examination is required to pass the course.

General Assessment Information

Discussion of the aims and outcomes of the assessments will be discussed at least one week before they are presented to students.

Students will receive written feedback on the quiz in week 4, before the census date (11 August).

Late Submission of Assessment

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.

Use of Generative AI in Assessments:

SIMPLE EDITING ASSISTANCE – acceptable use in Assessments 1, 2 and 3 for course as structured.

For this assessment task, you may use standard editing and referencing software. You are permitted to use the full capabilities of the standard software to answer the question (e.g. Microsoft Office suite, Grammarly, etc.).

In this course, students are required to reference and the APA 7 style (variant of Harvard) (Author, date) is recommended as a simple referencing style.

Information about referencing styles is available at: https://guides.lib.unsw.adfa.edu.au/c.php?g=472948&p=3246720

Students are encouraged to develop a professional and holistic bibliographic library via use of the available Endnote software.

This could allow equally easy use of a numbered endnote referencing style such as Vancouver with intext [#] or (#) citations.

Grading Basis

Standard

Requirements to pass course

The overall passing mark is set at 50% by the university. Achievement of a minimum of 50% in the viva/examination is required to pass the course.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 15 July - 19 July	Lecture	Tuesday: Design philosophies: approaches, codes and terminology. Thursday: Design philosophies: introduction to propulsion. Introduce week 2 quiz requirements.
Week 2 : 22 July - 26 July	Lecture	Tuesday: Design methodologies: the preliminary design process. Decision based design. Thursday: Quiz on propulsion. Design methodologies: hull lines definition, Maxsurf Modeller.
Week 3 : 29 July - 2 August	Lecture	Tuesday: Powering & Propulsion, Bentley and Hydrocomp. Thursday: Propulsion - Machinery and systems (Mr Sean McCracken).
Week 4 : 5 August - 9 August	Lecture	Tuesday: Powering & Propulsion, Bentley and Hydrocomp. Thursday: Powering & Propulsion, Bentley and Hydrocomp and consolidation of machinery and systems.
Week 5 : 12 August - 16 August	Lecture	Tuesday: Design of high speed vessels. Thursday: Design of high speed vessels and software intensive.
Week 6 : 19 August - 23 August	Lecture	Tuesday: Rules and classification: commercial (applied). Thursday: Commercial ship design, loadlines and tonnage. Assistance with assignment 2 as needed.
Week 7 : 9 September - 13 September	Assessment	Assessment 2 Concept Development due
	Lecture	Tuesday: Rules and classification - naval (guest). Thursday: Naval ship design - vulnerability & survivability (guest). Note - may be re-scheduled to suit guest availability.
Week 8 : 16 September - 20 September	Tutorial	Tuesday: Software intensive. Thursday: Software intensive.
Week 9 : 23 September - 27 September	Lecture	Tuesday: Naval ship design: construction aspects. Thursday: Naval ship design - design for seakeeping and trials.
Week 10 : 30 September - 4 October	Lecture	Tuesday: Mass properties engineering, margins and allowances. Thursday: Submarine design (guest).
Week 11 : 7 October - 11 October	Tutorial	Tuesday: Software intensive. Thursday: Military Training Day. Day lost.
Week 12 : 14 October - 18 October	Lecture	Tuesday: Nuclear propulsion considerations (guest). Thursday: Re-cap of all content weeks 1 to 12.
	Assessment	Assessment 3 Preliminary Design due
Week 13 : 21 October - 25 October	Tutorial	Tuesday: Tutorial - course contingency and review/prep for viva. Thursday: Tutorial - course contingency and review/prep for viva.

Attendance Requirements

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

General Schedule Information

As per the published timetable, generally:

Tuesday 12noon to 3pm (nominated lecture plus a 1-hour tutorial as needed).

Thursday 1pm to 4pm (nominated lecture plus a 1-hour tutorial as needed).

Some days may be swapped with ZEIT3751 and ZEIT3752 to suit teaching staff and guest availability, without loss of hours or clashes.

Missed or changed classes (e.g. due to public holidays, compensation dates and military training days): affected days/dates - Week 11 Thu 10 Oct (Military Training Day) - day lost.

Detailed week-by-week schedule may be altered to suit near-term exigencies, as above for for other reasons.

Course Resources

Prescribed Resources

Compulsory Texts:

Principles of Naval Architecture | SNAME

6 chapter set (at SNAME Student Member price[1])

Tupper, E.C. (2013), *Introduction to Naval Architecture*, 5th ed., Butterworth Heinemann, London.
Introduction to Naval Architecture | ScienceDirect (unsw.edu.au)

[1] SNAME student membership:

Add - BNE SNAME Online Membership Individual Information

Recommended Resources

Reference may be made to several supporting sources throughout this course, which are available in electronic and/or physical form via the UNSW Canberra library. Also see the subject guide at ADFA Library subject guide – Naval Architecture. These include:

1. Lamb, T.C. (Ed.) (2003 and 2004), *Ship Design and Construction*, v.1 and 2, Society of Naval Architects and Marine Engineers, Jersey City, USA.
2. Rawson, K.J. and Tupper, E.C. (2001), *Basic Ship Theory*, Butterworth Heinemann, London.

Other resources are available on this course's Teams/Moodle site.

Useful websites:

- Lloyd's Register www.lr.org
- DNV https://www.dnv.com/rules-standards/index.html
- BV https://marine-offshore.bureauveritas.com/rules-guidelines

Additional Costs

Students are strongly encouraged to purchase a mouse for their own device and always bring it to class for CAD work.

Course Evaluation and Development

This is the third year that this course has been conducted. The guest lecture program has been further developed and has been a report highlight in student feedback. Integration of CAD skills has been further developed to reinforce the industry-standard design approach taken in this introduction to the fundamentals of ship design. The inclusion of an introduction to nuclear powering has been implemented for this year.

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.

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.unsw.edu.au/planning-assurance/conduct-integrity/conduct-unsw/student-conduct-integrity/student-code-conduct

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	David Lyons		B21 368	0290659480	Teams message, email or phone for an individual appointment.	Yes	Yes
Program director	Warren Smith		B20 135	0251145208	Teams message, email or phone for an individual appointment.	No	No