UNSW Course Outline

ZEIT3751 Ship Hydrodynamics - 2024

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General Course Information

Course Code : ZEIT3751
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

The broad area of vessel hydrodynamics as it relates to resistance, seakeeping and manoeuvring is explored. The physics of fluid flow around ships and the inherent mathematics behind the computation of wave resistance, sea spectra, motion analysis, directional stability and rudder

performance are addressed. Selection of hull form parameters and shape, seakeeping index, lift/drag forces and moments of appendages are discussed. Some of the limitations of using empirical methods/regression analysis in determination of hull resistance, seakeeping and manoeuvring are illustrated.

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 areas of:
Ship Resistance, Seakeeping and Manoeuvring.

Relationship to Other Courses

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

ASSUMED KNOWLEDGE:

Assumed knowledge is found in courses
ZINT2500 Thermofluids, and ZEIT2503 Fluid Mechanics.

PREREQUISITES:

ZEIT3750 Naval Architecture Practice, Ship Hydrostatics and Stability

Course Learning Outcomes

Course Learning Outcomes	Engineers Australia - Professional Engineer (Stage 1)
CLO1 : Understand theories of resistance and seakeeping to develop practical skills which are applicable to model testing and reporting.	• 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 • 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 • PEE3.5 : Orderly management of self, and professional conduct
CLO2 : Understand the nature of ship resistance and its components, and apply prediction and estimation methods.	• 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 • 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 • PEE3.5 : Orderly management of self, and professional conduct
CLO3 : Understand and apply theories of ocean waves and sea spectra, ship motions and response amplitude operators.	• 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 • 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 • PEE3.5 : Orderly management of self, and professional conduct
CLO4 : Understand the nature of ship manoeuvrability and its influence on ship control.	• 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 • 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 • PEE3.5 : Orderly management of self, and professional conduct

Course Learning Outcomes	Assessment Item
CLO1 : Understand theories of resistance and seakeeping to develop practical skills which are applicable to model testing and reporting.	• Report - Seakeeping • Coding Assignment • Report - Resistance • Final Exam / Viva
CLO2 : Understand the nature of ship resistance and its components, and apply prediction and estimation methods.	• Coding Assignment • Report - Resistance • Final Exam / Viva
CLO3 : Understand and apply theories of ocean waves and sea spectra, ship motions and response amplitude operators.	• Report - Seakeeping • Final Exam / Viva
CLO4 : Understand the nature of ship manoeuvrability and its influence on ship control.	• Report - Manoeuvring • Final Exam / Viva

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

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 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. Professional communication skills are developed in an individual class presentation.

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

Other Professional Outcomes

PROGRAM LEARNING OUTCOMES

This course contributes to the following PLO's of the Bachelor of Engineering (Hons) (Naval Architecture) (Program 4484):

PLO 1 Relate a quantitative, theory-based understanding of the sciences and rationally apply comprehensive knowledge of the fundamental principles underpinning maritime engineering, with advanced knowledge of both Naval and Ocean vehicle design, hydrodynamics, ship structures, and/or on-board systems and equipment specific to the naval architecture discipline, using critical thinking and judgement

PLO 2 Appropriately select and apply the mathematical, statistical, programming and computational tools and techniques which underpin naval architecture

PLO 3 Demonstrate a comprehensive understanding of ship design, construction, performance, maritime systems and sub-systems aboard surface ships and submarines, and articulate directions of research and knowledge development in naval architecture

PLO 4 Synthesise ship design practice, contextual factors, norms and accountabilities in and the limitations on naval architecture

PLO 8 Review personal performance, demonstrate independent initiatives and leadership as a means of managing continuing professional development and lifelong learning

Additional Course Information

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

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
Report - Seakeeping Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: 04/10/2024 05:00 PM
Coding Assignment Assessment Format: Individual	15%	Start Date: Not Applicable Due Date: 22/08/2024 05:00 PM
Report - Resistance Assessment Format: Individual	15%	Start Date: Not Applicable Due Date: 02/08/2024 05:00 PM
Final Exam / Viva Assessment Format: Individual	40%	Start Date: Not Applicable Due Date: TBA During Exam Week
Report - Manoeuvring Assessment Format: Individual	10%	Start Date: Not Applicable Due Date: 25/10/2024 05:00 PM

Assessment Details

Report - Seakeeping

Assessment Overview

Report - Seakeeping

Course Learning Outcomes

- CLO1 : Understand theories of resistance and seakeeping to develop practical skills which are applicable to model testing and reporting.
- CLO3 : Understand and apply theories of ocean waves and sea spectra, ship motions and response amplitude operators.

Detailed Assessment Description

All details will be available through Moodle.

Assessment Length

As appropriate

Submission notes

All details will be available through Moodle.

Assessment information

All details will be available through Moodle.

Assignment submission Turnitin type

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

Coding Assignment

Assessment Overview

Coding Assignment

Course Learning Outcomes

- CLO1 : Understand theories of resistance and seakeeping to develop practical skills which are applicable to model testing and reporting.
- CLO2 : Understand the nature of ship resistance and its components, and apply prediction and estimation methods.

Detailed Assessment Description

All details will be available through Moodle.

Assessment Length

As Appropriate

Submission notes

All details will be available through Moodle.

Assessment information

All details will be available through Moodle.

Assignment submission Turnitin type

This is not a Turnitin assignment

Report - Resistance

Assessment Overview

Report - Resistance

Course Learning Outcomes

- CLO1 : Understand theories of resistance and seakeeping to develop practical skills which are applicable to model testing and reporting.
- CLO2 : Understand the nature of ship resistance and its components, and apply prediction and estimation methods.

Detailed Assessment Description

As the first assignment it will be returned before Census Date.

All details will be available through Moodle.

Assessment Length

As appropriate

Submission notes

All details will be available through Moodle.

Assessment information

All details will be available through Moodle.

Assignment submission Turnitin type

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

Final Exam / Viva

Assessment Overview

Final Exam

Course Learning Outcomes

- CLO1 : Understand theories of resistance and seakeeping to develop practical skills which are

applicable to model testing and reporting.
- CLO2 : Understand the nature of ship resistance and its components, and apply prediction and estimation methods.
- CLO3 : Understand and apply theories of ocean waves and sea spectra, ship motions and response amplitude operators.
- CLO4 : Understand the nature of ship manoeuvrability and its influence on ship control.

Detailed Assessment Description

All details will be available through Moodle.

Assessment Length

Nominally 30 minutes

Submission notes

All details will be available through Moodle.

Assessment information

All details will be available through Moodle.

Assignment submission Turnitin type

Not Applicable

Hurdle rules

Requires minimum achievement of 50%

Report - Manoeuvring

Assessment Overview

Report - Manoeuvring

Course Learning Outcomes

- CLO4 : Understand the nature of ship manoeuvrability and its influence on ship control.

Detailed Assessment Description

All details will be available through Moodle.

Assessment Length

As appropriate

Submission notes

All details will be available through Moodle.

Assessment information

All details will be available through Moodle.

Assignment submission Turnitin type

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

General Assessment Information

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.**

Submission of all written assignments, which **should be typed,** will be via Moodle or as identified on each assessment item.

Feedback on A1 will be provided before the census date.

REFERENCING

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.

LATE SUBMISSION

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

These Statements are designed to clarify the University's position on assessment integrity, given the rise in access to generative AI platforms.

1. NO ASSISTANCE – NOT anticipated to be relevant for course as structured.

(This is most relevant for invigilated exams.) It is prohibited to use any software or service to search for or generate information or answers.

2. SIMPLE EDITING ASSISTANCE – acceptable use in A1-A4 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.).

3. PLANNING ASSISTANCE – acceptable use in A1-A4 for course as structured.

As this assessment task involves some planning or creative processes, you are permitted to use software to generate initial ideas. However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work, i.e. only occasional AI generated words or phrases may form part of your final submission. It is a good idea to keep copies of the initial prompts to show us if there is any uncertainty about the originality of your work. If significant outputs of generative AI such as ChatGPT form a part of your submission, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion. You are encouraged to go to primary sources with appropriate attribution.

4. FULL ASSISTANCE WITH ATTRIBUTION – NOT anticipated to be relevant for course as structured.

You can use generative AI software in this assessment to the extent specified in the assessment instructions. Any output of generative software within your assessment must be attributed with full referencing. If the outputs of generative AI such as ChatGPT form part of your submission and is not appropriately attributed, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

* To cite: OpenAI (Year Accessed). ChatGPT. OpenAI. https://openai.com/models/chatgpt/

* Please note that the outputs from these tools are not always accurate, appropriate, nor properly referenced. You should ensure that you have moderated and critically evaluated the outputs from generative AI tools such as ChatGPT before submission.

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 examination / viva is required to pass the course.

Course Schedule

Attendance Requirements

Please note that lecture recordings are not available for this course. Students are strongly encouraged to attend all classes and contact the Course Authority to make alternative arrangements for classes missed.

General Schedule Information

MONDAY 1200 - 1500 SL5

FRIDAY 1200-1500 SL5

Note that ZEIT3751, ZEIT3752 and ZEIT3753 engage the same Naval Architecture staff and student groups, and the flexibility afforded may lead to some swapping of content within the scheduled class times.

A detailed schedule of activities will be provided and maintained on the Class Moodle site.

Course Resources

Prescribed Resources

Texts:

1. Lars Larsson (2010) *Ship Resistance and Flow*
   Principles of Naval Architecture | SNAME
   1 of 6 chapter set (at SNAME Student Member price[1])

Available electronically via the ADFA Library subject guide – Naval Architecture.

[1] SNAME Student Membership

Recommended Resources

Use may be made of supporting resources throughout this course, which are also available in

electronic and/or physical form via the UNSW Canberra library. See the subject guide. These may include:

1. Harvald, SV. A A (1983), *Resistance and Propulsion of Ships*, John Wiley & Sons, A Wiley Interscience Publication, New York
2. Lewis, E., (1990), *Principles of Naval Architecture*, SNAME publication, New York
3. Bertram, V. (2000), *Practical Ship Hydrodynamics,* Butterworths-Heinemann, Oxford
4. Harold Eugene Saunders (1965), *Hydrodynamics in Ship Design* (3 volumes), SNAME
5. Carlton, J.S., (1994), *Marine Propellers and Propulsion*, Butterworths-Heinemann, Oxford
6. Technical papers on Resistance and Propulsion from various Journals and Conference Papers.

Other resources are available on this course's Teams/Moodle site and useful websites include:

- Researchgate.net
- SNAME.org

Additional Costs

Nil

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.

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	Warren Smith		Room 135, Building 20	02 5114 5208	Monday - Friday	No	Yes
Lecturer	David Lyons		Room 368, Building 21	9065 9480	By arrangement	No	No