UNSW AUSTRALIA

Never Stand Still | Faculty of Engineering | School of Mechanical and Manufacturing Engineering

NAVL3610

Ship Hydrostatics and Practice

Contents

1. Staff Contact Details

Contact details and consultation times for Course Convener

Name: Mr David Lyons FRINA
Office Location: Room 208D, Ainsworth Building J17
Tel: (02) 9385 6120 or 0418 208370 (send SMS or leave voicemail if unattended)
Email: david.lyons@unsw.edu.au

Consultation concerning this Course is available by email, by phone or in person. For an in- person appointment, please contact David by email first or see him in class.

Contact details and consultation times for additional lecturers/demonstrators

Mr Phillip Helmore will accompany us on (some) excursions, providing his great expertise.

2. Course details

Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves up to 6 hours per week (h/w) of face-to- face contact.

The UNSW website states "The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week."

This means that you should aim to spend about 9 h/w on this Course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

There is no parallel teaching in this Course.

Contact Hours

	Day	**Time**	**Location**
Lectures	Wednesday	9am – 12noon	D16 Goldstein G07*
			**when not on excursion (see 4. Course schedule)*
	Thursday	9am-12noon	D16 Goldstein G07 or J17 Ainsworth 204

Summary of the course

This course focusses on ship terminology, the ship design office, construction and repair facilities, and ship operations, and the hydrostatic calculations required for design and analysis purposes. You have hands-on use of the Maxsurf software suite.

Aims of the course

This course enables you to explore the terminology unique to ships and then to use this as a stepping stone into how design consultancies, ship repair yards, naval and commercial vessels, and ship classification societies operate.

The course also provides you with a solid grounding in the ship hullform and numerical integration methods required to produce the hydrostatic particulars and stability characteristics of a vessel, practical insight into how stability criteria are applied to a range of vessels types, and the details of trim, flooding, subdivision and launching.

This course introduces ship terminology which will be used in all subsequent NAVL courses, and complements the overall view of the design process given in NAVL3120. It builds on the report-writing skills which you commenced in ENGG1000, and provides an introduction to the technical meetings of your professional society, the Royal Institution of Naval Architects.

Student learning outcomes

At the conclusion of this course, it is expected that you will be able to:

- Visit a ship or site and write a coherent technical report on what you have seen and learned.
- Conduct an inclining experiment, work the results up to the lightship condition, and assess the stability of a vessel against a specified set of criteria.
- Use principles of fluid statics, masses and centres of gravity, and numerical integration methods.
- Use numerical integration methods to calculate a ship's hydrostatic and stability characteristics.
- Perform launching and subdivision calculations to ensure the safety of the ship during launching or flooding.

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

Learning Outcome		**EA Stage 1 Competencies (PE)**
1.	Be familiar with ship yards and design/regulatory offices.	1.1, 1.5, 2.3, 3.4
2.	Perform an inclining test and analysis.	1.3, 2.2, 3.4
3.	Become conversant with modern hydrostatics software.	1.1, 1.2, 1.3, 2.2, 3.4
4.	Perform launching and subdivision calculations.	1.1, 1.2, 2.1, 2.3, 3.4

3. Teaching strategies

Lectures in the course are designed to cover the terminology and core concepts and theories in the design, construction and operation of ships, and in the terminology and calculations relating to the hydrostatic properties of ships. They do not simply reiterate the texts, but build on the lecture topics using examples taken directly from industry to show how the theory is applied in practice and the details of when, where and how it should be applied.

Tutorials are designed to provide you with feedback and discussion on the assignments, and to investigate problem areas in greater depth to ensure that you understand the application and can avoid making the same mistake again. Extensive use is made of the Maxsurf software suite available on the School's computers.

4. Course schedule

All lectures in this course are given by Mr David Lyons.

Wednesday (Part A Practice) 0900–1200 D16 Goldstein G07 **or** excursion
Thursday (Part B Hydrostatics) 0900–1200 D16 Goldstein G07 **or** J17 Ainsworth 204

Week	**Day**	**Part A – Practice: excursions**	**Part B – Hydrostatics: lectures/labs**
1	Wed 1Mar	Lecture: Ship terminology and report-writing Goldstein G07	
	Thu 2Mar		Ship geometry and hydrostatic concepts D16 Goldstein G07
2	Wed 8Mar	Excursion: Naval ship visit at Garden Island	
	Thu 9Mar		Intro to Maxsurf suite J17 Ainsworth 204
3	Wed 15Mar	Excursion: Ship building and repair yards	
	Thu 16Mar		Coefficients of form; J17 Ainsworth 204
4	Wed 22Mar	Excursion: Graving dock at Garden Island	
	Thu 23Mar		Hydrostatics (1), Maxsurf J17 Ainsworth 204
5	Wed	Lecture: Consultancies and	
	29Mar	survey authorities Goldstein G07	
	Thu		Hydrostatics (2), Maxsurf D16
6	Wed	Excursion: Commercial tug visit	
	Thu		Transverse stability (1), Maxsurf
7	Wed	Excursion: Consultancy	
	Thu		Transverse stability (2), Maxsurf
MSB		Mid-semester break & Easter	
8	Wed	Lecture: Inclining experiment	

	Thu		Longitudinal stability, Maxsurf J17
9	Wed	Excursion: Inclining experiment	
	Thu		Launching calculations D16
10	Wed	Lecture: Stability criteria	
	Thu		Watertight subdivision D16
11	Wed	Excursion: Consultancy	
	Thu		Damaged stability D16 Goldstein
12	Wed	Excursion: Classification society	
	Thu		Revision and exam details tutorial
13	Wed	Contingency; no new material	
	Thu		Contingency; no new material

The schedule shown may be subject to change at short notice to suit excursion availability (check with David Lyons or the Course Moodle site).

IMPORTANT

All excursions require:

- shirts/tops with long sleeves-no short sleeve T-shirts/singlets etc.;
- long trousers/jeans-no shorts;
- closed-in footwear (safety boots preferable)-no thongs/flip- flops/sandals (the latter is a fashion crime anyway);
- photo identification (driver's licence or passport);
- UNSW student ID card.
- Punctuality: it is essential that you arrive at each excursion by 08:45am. There is **no parking** at most sites. Plan your journey.

If you don't follow these site requirements you will not be able to participate! In particular, the Garden Island facility is a Department of Defence site where you will be subject to security screening and search and there are no exceptions.

5. Assessment

Assessment overview

Part A Practice

No.	Length	Assignment	Mark	Learning outcomes assessed	Due Wed
1	Ship visit + 2.5h	Report on ship visit	10	1 – see sec. 2	Week 3
2	1.5h	Report on technical presentation	10	1 – see sec. 2	Week 6
3	½-day field experiment + 3.5h	Inclining experiment	10	2,3 – see sec. 2	Week 10
4	6h	Stability criteria	10	2,3 – see sec. 2	Week 12
		Total	40		

Part B Hydrostatics

No.	Length	Assignment	Mark	Learning outcomes assessed	Due Thu
1	2.5h	Pressure, density, etc.	10	3 – see sec. 2	Week 3
2	2.5h	Centres of gravity	10	2, 3 – see sec. 2	Week 4
3	3h	Integration methods	10	3 – see sec. 2	Week 5
4	6h	Hydrostatics	20	3 – see sec. 2	Week 7
5	5h	Transverse stability	20	2, 3 – see sec. 2	Week 9
6	3.5h	Longitudinal stability	10	3, 4 – see sec. 2	Week 11
		Total	80		

You will be assessed by way of short assignments and an examination, both of which involve calculations and descriptive material.

The parts of the course contribute towards the overall grade as follows:

	Part A Practice	**Part B Hydrostatics**
h/w	3	3
Assignments	40%	40%
Examination	60%	60%
Total	100%	100%
Scaled	50%	50%
Overall	100%	

In order to pass the course, you must achieve an overall mark of at least 50%.

Assignments

The set assignments during the semester are shown on the following page. Assignments will be handed out in hard copy in class, and will be available on the Moodle website in case you miss the hand-out in class.

Presentation

All submissions should have a standard School cover sheet, which is available for download on the student intranet website.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect. All calculations should be shown; in the event of incorrect answers, marks are awarded for method and understanding.

The preferred set-out of any numerical calculation is similar to the following:

$\Delta = \rho\nabla$	(Equation in symbols)
$= 1.025 \times 200$	(Numbers substituted)
$= 205$ t	(Answer with units)

Submission

Assignments in Parts A and B are due on the scheduled day of the class in the week nominated above. Assignments *must* be typed and submitted in soft copy Adobe Acrobat pdf to david.lyons@unsw.edu.au

Late submissions will be penalised 5% per calendar day (including weekends). An extension may only be granted in exceptional circumstances. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the Course Convenor ***before the due date***. Special consideration for assessment tasks of 20% or greater must be processed through student.unsw.edu.au/special-consideration.

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

Criteria

The following criteria will be used to grade assignments:

For reports:

- Identification of key facts and the integration of those facts in a logical development.
- Clarity of communication—this includes development of a clear and orderly structure and the highlighting of core arguments.
- Sentences in clear and plain English—this includes correct grammar,

spelling and punctuation.
- Correct referencing in accordance with the prescribed citation and style guide.

For numerical calculations:
- Accuracy of numerical answers.
- All working shown (see *Presentation* above).
- Use of diagrams, where appropriate, to support or illustrate the calculations.
- Use of graphs, where appropriate, to support or illustrate the calculations.
- Use of tables, where appropriate, to support or shorten the calculations.
- Neatness.

Examinations

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

There will be one three hour examination at the end of the semester.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see the Exams section on the intranet.

Calculators

You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at student.unsw.edu.au/exam-approved-calculators-and-computers

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an "Approved" sticker for it from the School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an "Approved" sticker will not be allowed into the examination room.

Special Consideration and Supplementary Assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the School intranet, and the information on UNSW's Special Consideration page.

6. Expected resources for students

Textbooks and Course notes

Letcher, J.S. (2009), *Principles of Naval Architecture Series: The Geometry of Ships*, Society of Naval Architects and Marine Engineers, Jersey City.

Moore, C.S. (2010), *Principles of Naval Architecture Series: Intact Stability*, Society of Naval Architects and Marine Engineers, Jersey City.

These books are available in the UNSW Library. They are also available for purchase from the Society of Naval Architects and Marine Engineers, Jersey City, USA. However, the price to non-members exceeds the member price plus the cost of student membership, so it is advisable to join the Society and order the books at the same time. Please see the course convener for an application form if you wish to do this.

Course notes are posted to the Course Moodle page. The Course Convener will confirm which material is examinable.

Suggested additional readings

Lamb, T.C. (Ed.) (2003 and 2004), *Ship Design and Construction*, v.1 and 2, Society of Naval Architects and Marine Engineers, Jersey City.

Rawson, K.J. and Tupper, E.C. (2001), *Basic Ship Theory*, Butterworth Heinemann, London.

These are all available in the UNSW Library and are useful as additional reading material.

Lamb (2003 and 2004) are also text books for other naval architecture courses at UNSW and are available for purchase from the Society of Naval Architects and Marine Engineers, Jersey City, USA. However, the price to non-members (of any one book) exceeds the member price plus the cost of student membership, so it is advisable to join the Society and order the books at the same time. Please see the course convener regarding the application process.

Additional materials provided in Moodle

This course has a website on Moodle which includes:

- The assignments;
- Previous examination papers in this course from 2011 onwards;
- Answers to the numerical questions in examination papers from 2011 onwards; and
- A discussion forum.

Recommended Internet sites

There are many websites giving lectures, papers and data on ship terminology, hydrostatics, stability, and naval architecture in general. Try searching for “ship terminology”, hydrostatics, stability, or “naval architecture”.
Information about some of the topics in hydrostatics may be found at:
Free Marine www.free-marine.com/i8transtab.htm
Ultramarine www.ultramarine.com/hdesk/runs/samples/hystat/doc.htm

Information about some of the sites and ships we visit in the Practice component may be found at:

Incat Crowther Design	www.incatcrowther.com
Lloyd's Register	www.lr.org
Navy ships	http://www.navy.gov.au/fleet/ships-boats-craft
One2three Naval Architects	www.one2three.com.au
Svitzer Australia	www.svitzer.com
Thales Australia	www.thalesgroup.com/countries/australia/home

Many videos of launchings and side-launchings of vessels may be found on YouTube by searching for "launching ships" or "side launching ships".

Other Resources

If you wish to explore any of the lecture topics in more depth, then other resources are available and assistance may be obtained from the UNSW Library.

One starting point for assistance is:
https://www.library.unsw.edu.au/

7. Course evaluation and development

Feedback on the Course may be gathered periodically using various means, including the myExperience process, informal discussion in the final class for 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.

In this Course, recent improvements resulting from student feedback include the typing of the extensive series of (previously) hand-written notes, originally authored by Mr Phillip Helmore.

8. Academic honesty and plagiarism

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: 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.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

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) even suspension from the university. The Student Misconduct Procedures are available here:
www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Further information on School policy and procedures in the event of plagiarism is available on the intranet.

9. Administrative matters

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

- Attendance, Participation and Class Etiquette
- UNSW Email Address
- Computing Facilities
- Assessment Matters (including guidelines for assignments, exams and special consideration)
- Academic Honesty and Plagiarism
- Student Equity and Disabilities Unit
- Health and Safety
- Student Support Services

D. Lyons *FRINA*
Naval Architecture Stream Coordinator
2 February 2017

Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership