UNSW AUSTRALIA

Course Outline

Semester 1 2016

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

NAVL3610

Ship Hydrostatics and Practice

Contents

Course Outline

NAVL3610 Ship Hydrostatics and Practice

1. Staff Contact Details

Contact details and consultation times for Course Convener

Mr David Lyons FRINA
Naval Architecture Stream Coordinator
Room 208D, Ainsworth Building J17
Email david.lyons@unsw.edu.au
Tel (02) 9385 6120 or 0418 208370 (send SMS or leave voicemail on mobile if unattended)

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	Weeks 1-5: Mathews Bldg (F23) Room 227* Weeks 6-12: UNSW Business School (E12) Room 130*
			**when not on excursion (see 4. Course schedule)*
	Thursday	9am-12noon	UNSW Business School (E12) 205 or ME204

Summary of the course

This course focuses 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.

In summary:

Learning Outcome		EA Stage 1 Competencies (PE)
1.	Be familiar with ship yards and/or 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 hydrostatics and 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 Weeks 1-5: Mathews (F23) 227 **or** Weeks 6-12: UNSW Business School (E12) 130 **or** excursion
Thursday (Part B Hydrostatics) 0900–1200 UNSW Business School (E12) 205 **or** ME204

Week	Day	Part A – Practice: lectures/excursions	Part B – Hydrostatics: lectures/labs
1	Wed 2Mar	Lecture: Ship terminology and report-writing (F23) 227	
	Thu 3Mar		Ship geometry and hydrostatic concepts (E12) 205
2	Wed 9Mar	Lecture: Consultancies and survey authorities (F23) 227	
	Thu 10Mar		Integration methods; intro to Maxsurf suite (E12) 205
3	Wed 16Mar	Excursion: Consultancy	
	Thu 17Mar		Coefficients of form; more Maxsurf (ME204)
4	Wed 23Mar	Excursion: Consultancy	
	Thu 24Mar		Hydrostatics (1), Maxsurf (ME204)
MSB	28Mar-	Mid-semester break: Easter	

	4Apr		
5	Wed 6Apr	Excursion: Graving dock at Thales, Garden Island	
	Thu 7Apr		Hydrostatics (2), Maxsurf (ME204)
6	Wed 13Apr	Excursion: Commercial tug visit	
	Thu 14Apr		Transverse stability (1), Maxsurf (ME204)
7	Wed 20Apr	Excursion: Naval ship visit at Garden Island	
	Thu 21Apr		Transverse stability (2), Maxsurf (ME204)
8	Wed 27Apr	Lecture: Inclining experiment (E12) 130	
	Thu 28Apr		Longitudinal stability, Maxsurf (ME204)
9	Wed 4May	Excursion: Inclining experiment on a vessel at Rozelle Bay	
	Thu 5May		Launching calculations (E12) 205
10	Wed 11May	Lecture: Stability criteria (E12) 130	
	Thu 12May		Watertight subdivision (E12) 205
11	Wed 18May	Excursion: Classification society Lloyd's Register	
	Thu 19May		Damaged stability (E12) 205
12	Wed 25May	Revision and exam details tutorial (E12) 130	
	Thu 26May		Revision and exam details tutorial (E12) 205
13	Wed 1Jun		
	Thu 2Jun		

The schedule shown may be subject to change at short notice to suit exigencies (check with David 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 some 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 screening and search and there are no exceptions.

5. Assessment

General

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 school website:
https://www.engineering.unsw.edu.au/mechanical-engineering/forms-and-guidelines

All submissions are expected to be neat and clearly set out. All calculations should be shown as, 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)

Part A Practice

No.	Assignment	Mark	Learning outcomes assessed (see p.4)	Due Wed
1	Report on ship visit	10	1- Be familiar with ship yards and/or design/regulatory offices.	Week 3
2	Report on technical presentation	10	1- Be familiar with ship yards and/or design/regulatory offices	Week 6
3	Inclining experiment	10	2- Perform an inclining test and analysis.	Week 10
4	Stability criteria	10	2- Perform an inclining test and analysis.	Week 12
	Total	40		

Part B Hydrostatics

No.	Assignment	Mark	Learning outcomes assessed (see p.4)	Due Thu
1	Pressure, density, etc.	10	3- Become conversant with hydrostatics and software	Week 3
2	Centres of gravity	10	3- Become conversant with hydrostatics and software	Week 4
3	Integration methods	10	3- Become conversant with hydrostatics and software	Week 5
4	Hydrostatics	20	3- Become conversant with hydrostatics and software	Week 7
5	Transverse stability	20	3- Become conversant with hydrostatics and software	Week 9
6	Longitudinal stability	10	4- Perform launching and subdivision calculations	Week 11
	Total	80		

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 by email: 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, were appropriate, to support or illustrate the calculations.
- Use of tables, where appropriate, to support or shorten the calculations.
- Neatness.

Return of marks

Generally, assessments will be marked and returned within 2 weeks of the due date except those worth less than 5% of the final grade, which will be marked and returned within 1 week of the due date. The larger, more complicated assessments may take up to but no more than 3 weeks to mark.

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 being (re-)typed as of Feb 2016 and beta copies will be posted to Moodle as they are finalised. An archive of hand-written notes will remain available on the Course Moodle. The Course Convenor 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.

The discussion forum is intended for you to use with other students enrolled in this course. The course convenor may occasionally look at the forum and take note of any frequently-asked questions, but will not respond to questions on the forum. If you want help from the convenor then direct contact is preferred.

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	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:
http://info.library.unsw.edu.au/web/services/services.html

7. Course evaluation and development

Feedback on the Course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) 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 up of the extensive series of hand-written notes 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
25 February 2016

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