UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Semester 2 2017

NAVL3120

DESIGN OF SHIPS AND HIGH SPEED CRAFT

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Mr David Lyons FRINA (teaching Part B: Design of Ships)
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 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 on Wednesdays.

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Mr Craig Boulton (teaching Part A: Design of High Speed Craft - HSC)
Tel (02) 9882 3844 or 0416 075439
Email craig.boulton@asomarine.com.au or craig@boulton.com.au

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 (usually less; see p.3).

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
Lecture: Part A – Mr Boulton	Tuesday Even Weeks: 2,4,6,8,10,12	9am – 12noon	Business School 205
Lecture: Part B - Mr Lyons	Tuesday Odd weeks: 1,3,5,7,9,11,13 and some even weeks (2, 4, …) as needed and advised.	2pm – 5pm	Business School 105

Summary of the course

This course focuses on the design process as it applies to ships and a special category of faster ships defined as high speed craft. It is divided into:

Part A – Design of High Speed Craft
Part B – Design of Ships

Aims of the course

Part A of this Course enables you to explore the design of high-speed craft from the viewpoint of the practising consultant looking at the rules embodied in the High Speed Craft Code 2000 and how they apply in practice. You are given practical insight into the analysis of the structure, and to the application of hydrodynamic principles to the prediction of resistance and performance.

Part B of this course enables you to explore the ship design process, commencing with the requirements of the owner and progressing to a new design which meets those requirements. You are given practical insight into the role of the various regulatory authorities, and application of the freeboard and tonnage rules and the seakeeping behaviour of ships, and how they all influence the design outcome.

The course uses the ship terminology which you learned or are learning in NAVL3610, and builds on the hydrodynamic principles which you are learning in NAVL3620. For those choosing a high-speed ferry for their design project in NAVL4120 and NAVL4130, this provides a good stepping stone for the final design iteration. The assignments also build on the report-writing skills which you commenced in ENGG1000.

You are given an introduction to the hands-on use of Maxsurf Modeller software to develop a ship's hull lines.

Student learning outcomes

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**
1.	Apply the HSC Code 2000 to the design of high-speed vessels and, in particular, the sections on buoyancy, stability and subdivision, operating compartment layout, and accommodation and escape measures, and analyse the vessel's structure in accordance with the rules of a classification society.	PE1.3, PE1.5, PE2.1, PE2.2, PE2.3
2.	Decide on the principal particulars for a new vessel which will meet the owner's requirements and those of the applicable regulations.	PE2.1-2.3
3.	Create a CAD hullform model of the new vessel and analyse the influence of the load line and tonnage regulations.	PE1.1, PE1.2, PE2.2

3. Teaching strategies

This Course is included to give you the skills to generate designs of ships and high-speed craft which will fulfil the owner's requirements and those of the regulatory authorities, and to be able to analyse the principal factors which contribute.

The content reflects the experience of the lecturers in drawing offices, in shipyards, and at sea on various vessels, and practical examples drawn from that experience are used throughout the lectures and tutorials.

Effective learning is supported when you are actively engaged in the learning process and by a climate of enquiry, and these are both an integral part of the lectures and tutorials.

You become more engaged in the learning process if you can see the relevance of your studies to professional, disciplinary and/or personal contexts, and the relevance is shown in the lectures and assignments by way of examples drawn from industry.

Dialogue is encouraged between you, others in the class and the lecturers. Diversity of experiences is acknowledged, as some students in each class have prior marine experience. Your experiences are drawn on to illustrate various aspects, and this helps to increase motivation and engagement.

Lectures in the Course are designed to cover the terminology and core concepts and theories in the design of ships and high-speed craft. 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.

4. Course schedule

Date	Week	Topic
25/7/17	1	Part B – Design of Ships – introduction to design and terminology; Features of specific ship types
1/8/17	2	Part A - Introduction, the HSC Code, g_{coll}, accommodation and escape measures, operating compartment layout
8/8/17	3	Part B - Principles and methods of design, first estimates of dimensions; Steps in preliminary design, the mass estimate
15/8/17	4	Part A - Accommodation design, intact and damaged stability, extent of damage, criteria
22/8/17	5	Part B - Other preliminary estimates; Generation of the lines plan
29/8/17	6	Part A - Stability, lifesaving, fire safety, structure and global loads
5/9/17	7	Part B - Lines plan tutorial; Variation of the lines plan (**in Ainsworth 204 CAD lab**)
12/9/17	8	Part A - Structure, DNV HSLC rules, LR SSC rules, and NSCV Category F rules
19/9/17	9	Part B - Load lines
23/9/17-2/10/17		Mid-semester break
3/10/17	10	Part A - Structural design of a web frame, seakeeping
10/10/17	11	Part B – Tonnage; Seakeeping
17/10/17	12	Part A - Wake wash, propulsion
24/10/17	13	Revision and exam details: Parts A & B by David Lyons

5. Assessment

Assessment overview

Parts A and B have equal weighting in the overall assessment for this Course.

Part A: Design of High Speed Craft						
No.	**Assignment**	**Weight**	**Learning outcomes assessed**	**Assessment criteria**	**Due date and submission requirements**	**Marks returned:**
1	(a) Field-of-vision requirements	2%	1,2	Material in lectures weeks 2,4	Week 6: 28/8/17	2 weeks after submission
	(b) General arrangement layout	5%	1,2	Material in lectures weeks 2,4	Week 8: 12/9/17	2 weeks after submission
	(c) Stability of multihull craft	5%	1,2	Material in lectures week 6	Week 10: 4/10/17	2 weeks after submission
2	Frame structure of a catamaran	28%	1,2	Material in lectures weeks 8, 10	Week 12: 17/10/17	2 weeks after submission
Exam		60%	1,2	All Part A content.	Examination period: 4-19/11/17	After release of results
Part B: Design of Ships						
No.	**Assignment**	**Weight**	**Learning outcomes assessed**	**Assessment criteria**	**Due date and submission requirements**	**Marks returned:**
1	Design of a particular vessel	8%	2	Material in lectures weeks 1,3	Week 4: 15/8/17	2 weeks after submission
2	Prelim. design of HS vessel	8%	2	Material in lectures weeks 1,3	Week 6: 29/8/17	2 weeks after submission
3	Prelim. design of cargo vessel	8%	2	Material in lectures weeks 1,3, 5	Week 8: 12/9/17	2 weeks after submission
4	Load line calculations	8%	2,3	Material in lectures weeks 7,9	Week 10: 4/10/17	2 week after submission
5	Tonnage calculations	8%	2,3	Material in lectures weeks 11	Week 12: 17/10/17	2 week after submission
Exam		60%		All Part B content.	Examination period: 4-19/11/17	After release of results

Assignments

Presentation

All submissions should have a standard School cover sheet which is available from this course's Moodle page.

All submissions are to be neatly typed and clearly set out. Presenting them clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Submission

Part A: By hard copy in-class to Mr Boulton.
Part B: By email to *david.lyons@unsw.edu.au*

Late submissions will be penalised 5% of the available marks 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.

Examinations

You must be available for all tests and examinations. The final 3 hour School examination paper for this Course will be held during the University examination period 4-19 November 2017.

Provisional examination timetables are generally published on myUNSW in September for Semester 2.

For further information on exams, please see the Exams section on the intranet and contact the Course convenor.

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

Part A – Design of HSC
Students are given extensive lecture notes by the lecturer which are uploaded to Moodle.

Part B – Design of Ships
The Bentley Systems *Maxsurf Modeller* software is available for use in Ainsworth 204. Lecture notes are also uploaded to Moodle.

General Textbooks

Ghose, J.P. and Gokarn, R.P. (2004), *Basic Ship Propulsion*, Allied Publishers, New Delhi.

Lewis, E.V. (Ed.) (1988), *Principles of Naval Architecture*, v.2, Resistance, Propulsion and Vibration, Society of Naval Architects and Marine Engineers, Jersey City.

Kerwin, J.E. and Hadler, J.B. (2010), *The Principles of Naval Architecture Series: Propulsion,* Society of Naval Architects and Marine Engineers, Jersey City.

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

All of these are available in the UNSW Library.

The first is available via the Internet from the Bookshop of India at www.bookshopofindia.com for about $30 posted (depending on exchange rate).

The others are 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 (of any one book) 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 convenor for an application form if you wish to do this.

Suggested additional readings

Rawson, K.J. and Tupper, E.C. (1969), *Basic Ship Theory*, v.I and v.2, Longman, London.

This text is available in the UNSW Library and is useful as additional reading material, giving good descriptions.

Additional materials provided in Moodle

This course has a website on UNSW Moodle which includes:

- copies of assignments (as they are issued, in case you missed the hand-out in class);
- previous examination papers in this course from 2010 onwards;
- answers to the numerical questions in examinations from 2010 onwards; and
- a discussion forum.

The discussion forum is intended for you to use with other enrolled students. The course convenor will occasionally look at the forum, monitor the language used 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 and design. Try searching for “ship design” (including the quote marks.

Principal particulars of many different types of vessels are available on the Internet. You might like to try the following for a start:

Austal Ships	www.austal.com
Incat Crowther	www.incatcrowther.com.au
Incat Australia	www.incat.com.au
One2Three Naval Architects	www.one2three.com.au

or a general site (containing links to many marine sites) such as

AIMEX	www.aimex.asn.au
MarTV	www.martv.com

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.

UNSW Library website: https://www.library.unsw.edu.au/

7. Course evaluation and development

Feedback on the course is 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 alignment of component parts within the course that complement each other. To that end, the ship's entire powering and propulsion train from the engines to the propeller are treated as a whole in order to meet the powering requirements that are assessed in order to overcome the vessel's resistance.

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 and links

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

David Lyons FRINA
20 June 2017

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	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