Course Outline

Semester 1 2016

NAVL4140

Design of Yachts and High Speed Craft

Contents

Course Outline

NAVL4140 Design of Yachts and High Speed Craft

1. Staff Contact Details

Contact details and consultation times for Course Convener

Mr David Lyons FRINA
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.

Contact details and consultation times for additional lecturers

Mr Craig Boulton
Tel (02) 9882 3844 or 0416 075439
Email craig.boulton@asomarine.com.au or craig@boulton.com.au

Dr Rozetta Payne
Tel 0438 602459
Email rozetta_payne@hotmail.com

2. Course details

Contact Hours

	Day	Time	Location
Lectures	Tuesday (even & odd weeks)	9am – 12noon	UNSW Business School (E12) 105
	Day TBA (even weeks)	9am-12noon	TBA
	Tuesday (odd weeks)	1pm-4pm	UNSW Business School (E12) 205

Summary of the course

Australia achieves very highly in sailing yacht and high-speed craft design and construction. This Course focuses on how these vessels are designed, the materials used, the analyses which are required, specifically the hydrodynamics and the rules and regulations which are applicable.

Aims of the course

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.
>
> The Course also provides you with the terminology and tools unique to the design of monohull ballasted sailing yachts, the majority of which is now constructed in composites. You are also given the tools to analyse the sail and rig of the yacht, the fin and ballast requirements, the resistance and, hence, the performance of the yacht using a velocity-prediction program.

This Course uses the ship terminology which you learned in NAVL3610, and builds on the hydrodynamic principles which you learned in NAVL3620. For those choosing a yacht or 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.

Student learning outcomes

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

> 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.

Calculate the resistance and powering requirements of a range of high-speed vessels (including monohulls, catamarans and hydrofoils), and judge whether the craft is performing efficiently in relation to others.
Decide the principal dimensions for the design of a new monohull sailing yacht to suit an owner's requirements, and be able to advise on the appropriate selection of materials for construction.
Analyse the influence of sailing yacht rating rules and wind/sea conditions by way of a velocity-prediction program, and analyse the scantlings of the hull structure, the aerodynamics of the sails and rigging, and the hydrodynamics of the hull, keel and rudder.

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.	Apply the HSC Code 2000 and Classification Soc. rules	1.1, 1.5, 2.3, 3.4
2.	Calculate resistance and powering of HSC	1.3, 2.2, 3.4
3.	Derive initial design sizing for a monohull sailing yacht	1.1, 1.2, 1.3, 2.2, 3.4
4.	Understand sailing yacht VPPs and derive scantlings	1.1, 1.2, 2.1, 2.3, 3.4

3. Teaching strategies

This Course is included to give you the skills to generate designs of sailing yachts 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.

It is expected that assignments will be marked and handed back in the week following submission. You will have feedback and discussion while fresh in your mind to improve the learning experience.

Lectures in the Course are designed to cover the terminology and core concepts and theories in the design of yachts 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.

The work in the yacht design assignments involves both self-directed work, in being creative in the design of your component, and teamwork, in integrating your component into the overall design.

Tutorials in Parts A and B are designed to provide you with feedback and discussion on the assignments as the design progresses, and to investigate problem areas in greater depth to ensure that you understand the application and can avoid making the same mistake again.

Tutorials in Part C are arranged on both a one-to-one basis with the lecturer, and group sessions with the lecturer, to assist in the analysis at each stage of the design process. Designs of components are discussed as they evolve, with a view to successful integration of the parts into the whole.

Part C Yachts Tuesday 0900-1200 E12 105 and 1300-1600 E12 205

All lectures in this part are given by Mr David Lyons in odd weeks.

Week	Topic
1	(a) Introduction, course outline, resistance (b) Yacht hydrodynamics (1): resistance upright and heeled, unappended and appended

Part A High Speed Craft Design

No.	Assignment	Mark	Learning outcomes assessed (see p.4)	Due Tue
1	(a) Field-of-vision requirements	5	1-Use of HSC Code	Week 3
	(b) General arrangement layout	10	1-Use of HSC Code	Week 5
	(c) Stability of multihull craft	10	1-Use of HSC Code	Week 5
2	Frame structure of a catamaran	50	1-Use of classification society rules	Week 12
	Total	75		

Part B High Speed Craft Hydrodynamics

No.	Assignment	Mark	Learning outcomes assessed (see p.4)	Due Tue

Part C

Assignments in Part C are each a part of a typical team project to design a 20 m yacht. You will be expected to undertake one part of the project (i.e. one assignment). You should coordinate your work in this assignment with your yacht in NAVL4120 if you have chosen the yacht in that Course.

It is expected that each assignment will take at least 16 h to complete, including background reading, calculations, drawing (sketch or CAD), and a written overview of about 200 words. These assignments give a practical application of the design methodology, and further practice in written communication skills.

Presentation

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

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

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

$A_{bow} = 0.0035AmfV$	(Equation in symbols)
$= 0.0035 \ \ 480 \ \ 0.95 \ \ 1.0 \ \ 18.00$	(Numbers substituted)
$= 28.7 \text{ m}^2$	(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 should be submitted direct to the lecturer in class.

Assignments in Part C are due for submission to the lecturer at the start of the class in Week 13.

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.

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.

All of these are available in the UNSW Library and are useful as additional reading material.

Papers from SNAME's annual Chesapeake Sailing Yacht Symposia (not available in the UNSW Library) are also useful reading material:
http://www.sname.org/chesapeakesailingyachtsymposiumcsys/home .

Additional materials provided in Moodle

This Course has a website on Moodle which may include:
- copies of assignments (as they are issued);
- previous examination papers in this Course from 2011 onwards;
- answers to the numerical questions in examination papers from 2010 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 and may respond to questions on the forum. If you want help from the Course Convenor then direct contact is suggested.

Recommended Internet sites

Parts A and B

Principal particulars and design details of many different types of vessels are available on the internet. You might like to try the following:

Austal Ships	www.austal.com
Incat Crowther Design	www.incatcrowther.com
One2three Naval Architects	www.one2three.com.au

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

AIMEX	www.aimex.asn.au

Part C

There are many websites giving lectures, papers and data on yachts and yacht design.

You might like to try the following:
http://www.sailyachtresearch.org/tech-resources/library-syrf
http://www.orc.org/index.asp?id=8
http://www.sailing.org/documents/index.php

Beneteau	www.beneteau.com
McConaghy	www.mcconaghyboats.com
Gurit Composites	www.gurit.com
Reichel-Pugh Yacht Design	www.reichel-pugh.com
Farr Yacht Design	www.farrdesign.com

or, for news of what's happening in the yacht-racing world:

Sail World	http://www.news.sail-world.com/

Other useful websites (for all parts) may be advised in class.

Other Resources

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.