NAVAL ARCHITECTURE EDUCATION IN AUSTRALIA

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1. INTRODUCTION

Australia is an island continent having a coastline of 20000 km. Australia's current population is around 16 million. Australia does not produce and manufacture all the items needed by Australians to maintain their living standards. However, Australia produces agricultural and dairy products and mines minerals for export purposes. Therefore, for import and export, a huge fleet of ships is required. At present, a very small amount of our total trade is carried by vessels under Australian flags. So we need more ships of various types if a considerable amount of the total trade is to be carried by vessels under Australian flags.

Australia needs a large fleet to defend her coastline, and to keep vigilance on the vast area of water of 200 sm in width around the coast. Also there is a need to operate a large fleet of fishing vessels to exploit the living marine resources for domestic consumption as well as for export. A fleet of offshore vessels is also required to exploit the mineral resources available or to be developed. Due to the nature of Australian coastlines, small vessels (sailing yachts, pleasure craft, ferries, etc.,) are used extensively by the Australians. At present small vessels are being built in the country for domestic use as well as for export purposes. Unfortunately, large vessels are not being built in the country. The present frigate and submarine projects are expected to increase our ship building activities. For all these activities we need qualified Naval Architects to design the vessels and, as well as to construct and maintain them. Qualified Naval Architects are produced through university education. At present in the country, only the University of New South Wales offers a degree course for this purpose.

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In this paper the present course is described briefly and a proposed course is outlined to train Naval Architects to meet the future needs of the country.

2. PRESENT COURSE*

2.1.0 Degree

The Faculty of Engineering offers a course leading to the award of the degree of Bachelor of Engineering (BE) in Naval Architecture on a full-time (normally) over a period of four years. The Faculty offers a full-time combined course for the award of a double degree: Bachelor of Engineering/Bachelor of Science (BE/BSc) in Naval Architecture.

2.2.0 Admission Requirements

Students are selected for the course offered by the Faculty according to the scaled aggregate mark obtained in the NSW HSC. Furthermore, the students are required to reach the following standard in the NSW HSC subjects.

NSW HSC SUBJECTS (prerequisites for First-Year Subjects)		**NSW HSC Score**
4U	Science (multi-strand)	1-150
2U	English (general)	49-100

2.3.0 Course Outline

The first half of the course of Naval Architecture is identical with the Mechanical, Industrial and Aeronautical Engineering courses. The students attend classes together. The latter half of the course contains a number of common core subjects with the other courses as mentioned above and the departmental specific subjects, e.g. Ship Management Economics, Ship Hydrostatics, Ship structures 1, Ship Hydrodynamics, Principles of Ship Design 1, Ship Structures 2, Principles of Ship Design 2, Ship Design Project and Ship Propulsion and Systems. The Faculty of Engineering allows admission of students of Mechanical Engineering who successfully completed the first two years of the full-time degree course in any Australian tertiary institution to the final two years of the BE degree course in Naval Architecture.

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* Details are available from the U.N.S.W. Engineering Faculty Handbook 1989.

3 PROPOSED COURSE

3.1.0 Introduction

In view of the present shipbuilding, shipping and offshore activities in Australia, the proposed course must contain technical electives in the Year 4.

An industrial training of eight (8) full weeks (40 working days) in a shipbuilding yard will be a prerequisite to the registration to the Year 3 Naval Architecture subjects or admission to the Year 3 Naval Architecture course in the U.N.S.W. from the other tertiary institutions. The industrial training may be done during the summer recess after the Year 1 and/or Year 2.

3.2.0 Course Description

Year 1 and Year 2 will be the same as that of the existing course except the industrial training. Before admission or registration a student is to produce a certificate of training from the employer.

Year 3

Over and above the existing subjects, a new subject of Naval Architecture, Computer-Aided Ship Drawing and Calculation (three hours in the Session One (S1) is included. Other subjects are:

Principles of Ship Design 1,
Ship Management Economics,
Ship Hydrostatics ,
Ship Structures, and
Ship Hydrodynamics

Year 4

Over and above the core subjects, the subjects of Naval Architecture are as follows:

Ship Structures 2 ,
Principles Ship Design 2,
Ship Resistance,
Ship Propulsion ,
Ship Propulsion Machinery ,
Instrumentation and Control , and
Technical Electives any one group

Group		
A	Small craft	Design Template
		Design Project
B	Ocean going ships	Design Template
		Design Project

C	Offshore Marine Vehicles & Platforms	Design Template Design Project
D	Naval Construction	Design Template Design Project

3.3.0 Salient Features

3.3.1 Industrial Training

Over and above the existing industrial training. As industrial training of 40 working days in a shipyard is essential to understand the basis of Naval Architecture. During this training a student is expected to learn the terminology of shipbuilding and Naval Architecture and construction of ships and small vessels. This training will help the students to learn the subjects when they come to the University, quickly and effectively.

3.3.2 Computer-Aided Ship Drawing and Calculation

Students are expected to use computers for drawing ships' lines, general arrangements and other drawings and make necessary calculations. This training will help a student to complete the design project efficiently and quickly.

3.3.3 Principles of Ship Design 1 and 2

Basic principles of ship, mathematical modelling to solve ship design problems, single objective and multiple objective (Decision Support Problem Technique) optimisation and general requirements will be taught.

3.3.4 Design Template

Preparation of a design template which depends on the type of ship, will be taught. This is to be treated as an elective: i.e. one course for each of the four sections, e.g. small craft, ocean going ships, offshore marine vehicles and platforms and naval construction. A template is required to solve a preliminary design problem with the help of a computer.

3.3.5 Design Project

This also will be treated as done with Design Template.

3.3.6 Instrumentation & Control

Modern ships are designed and constructed with full/partial automation. An efficient instrumentation and control system is essential for successful operation. A Naval Architect, being the chief co-ordinator during the design and construction, must have a good knowledge of this subject. This subject will be treated as a core subject.

3.3.7 Use of a Computer

The course structure will be such that extensive use of computers will be necessary.

3.3.8 Naval Construction

As this course caters for the needs of the Defence Department and some classified materials will be involved, it is anticipated that experienced Defence personnel will be involved in teaching the Design Template and the Design Project as a part-time teacher on secondment from the Defence Department.

3.3.9 Course Details

Course details are not discussed here. The details may be prepared if, in principle, the course is accepted by the University.

CLOSURE

The proposed course will definitely meet the maritime engineering demands of the country by producing Naval Architects with specialisation in any of the following sections:

Small craft,

Sea going ships,

Offshore vehicles and Platforms, and

Naval Construction

Industrial training in shipyards in the Year 1 and/or Year 2 is an extra addition.

Due to introduction of computer-aided ship drawing calculations and Instrumentation and Control, five hours extra teaching will be necessary. i.e. In Year 3, in Session 1, 25½ hours, and in Session 2, 25 hours (instead of 22 hours) and Year 3 in Session 1 23 hours, and in Session 2 24 hours (instead of 22 hours). Depending on the availability of teachers, the elective subjects will be offered.