Unit Specification

Unit Code: JEE 458  Unit Title: Design of Marine Machinery Systems

Pre-Requisites: JEE113 Design and Computer Aided Drafting, JEE115 Engineering Mechanics

Semester: 1  Year: 2008

Course: BE (NavArch), BE(MarOffSys)

Dept/Sch: Department of Maritime Engineering

Campus: Newnham

Fraction of an EFTSL: 0.125

Academic Staff:

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Office</th>
<th>Email</th>
<th>Phone</th>
<th>Consultation days &amp; times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Co-ordinator</td>
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</tr>
</tbody>
</table>

Aim of the Unit:
To provide students with the ability to select, specify and design marine machinery systems, components and pipe-work within national and international statutory and regulatory frameworks.

Learning Outcomes:
Upon successful completion of this unit, students should be able to:

- Select and specify the appropriate equipment for marine power plant.
- Explain the design features and practical constraints of marine machinery systems and components.
- Apply the national and international classification and statutory regulations in the design of marine machinery systems, components and pipe-work.
- Produce 2D and 3D drawings/models of ship’s machinery, piping, and systems, with due consideration to classification and statutory regulations.
- Apply considerations of professional ethics, occupational health and safety, environmental protection and ecologically sustainable development issues to the design of marine machinery systems.
Generic Graduate Attributes:
The following generic attributes are addressed:

- ability to apply knowledge of basic science and engineering fundamentals;
- ability to communicate effectively, not only with engineers but also with the community at large;
- in-depth technical competence in at least one engineering discipline;
- ability to understand problem identification, formulation and solution;
- ability to utilise a systems approach to design and operational performance;
- ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member;
- understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development;
- understanding of the principles of sustainable development;
- understanding of professional and ethical responsibilities and commitment to them; and
- expectation of the need to undertake lifelong learning and the capacity to do so.

Primary Delivery Mode:
On Campus

MyLO: No

Teaching and Learning Approaches:
Lectures, tutorials, practical work and assignments.

Text Books:
None

Reference Text:


Required Materials:
A non-programmable scientific calculator (Casio fx-82AU, Casio fx-100AU or equivalent) is required at all times.

Extra Costs:
None

Materials to be provided by AMC:
Some printed notes
**Health and Safety requirements:**
Where appropriate, eg with regard to field trips, laboratory work, work aboard AMC vessels, etc, the health and safety requirements are to be strictly adhered to. No food and drink is allowed in lecture rooms or CAD laboratories. Correct posture and procedures should be observed when using the CAD PCs. No activity must be done without correct OH&S clearance and compliance. See your full OH&S obligations on the AMC Website.

**Class times:**

<table>
<thead>
<tr>
<th>Class</th>
<th>Day</th>
<th>Time</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture</strong></td>
<td>Monday</td>
<td>11:00-12:50</td>
<td>G80</td>
</tr>
<tr>
<td><strong>(First 3 weeks)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Lecture</strong></td>
<td>Monday</td>
<td>13:10-15:00</td>
<td>G83</td>
</tr>
<tr>
<td><strong>(First 5 weeks)</strong></td>
<td>Tuesday</td>
<td>11:00-12:50</td>
<td>G80</td>
</tr>
<tr>
<td><strong>CAD Lecture</strong></td>
<td>Friday</td>
<td>09:00-11:50</td>
<td>G37</td>
</tr>
<tr>
<td><strong>(From 7 April)</strong></td>
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</table>

**Attendance Requirements:**
Attendance at all assigned class times is expected. You are responsible for all information (both academic and administrative) presented during class times. Should you miss a class for whatever reason it is your responsibility to obtain information and content that was missed.

**Syllabus**

1. **Marine Machinery Systems and Components (26 Hours):**
   
a) Marine Power Plant
   Overview of resistance curves and propulsion devices such as propellers, water jets, and electric pods. Combined options such as diesel-electric or diesel-gas turbine. Selection criteria. Prime mover types and configurations, including matching hull resistance curves to engine performance maps. Design features and practical constraints of marine machinery including marine diesel engines, steam turbines, boilers, gas turbines, oil separators, air compressors and pumps.

b) Marine Auxiliary Systems
   Electric generators, engine and auxiliary space requirements and general arrangements. Ballast and bilge systems, fire and general service systems, fresh water and sea water cooling systems, centralized cooling system, waste management, lubricating oil and fuel oil systems, compressed air systems, steam generation and distribution system. Optimisation of machinery space lay out.

c) Design Considerations
   Ecologically sustainable design and development, efficiency and environmental considerations for marine machinery and systems.

d) Marine Electrical Systems
2. Computer Aided Design (26 Hours):


2. Apply a commercial CAD package to the graphical design and modelling of marine machinery systems, components and pipe-work.

Learning Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25,26 Feb</td>
<td>Introduction to Unit Marine Power Plant machinery, prime mover types and configurations. Marine electrical generation and distribution systems and subsystems</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3,4 March</td>
<td>Marine auxiliary systems and equipment (Simulator-aided) Marine electrical systems documentation</td>
<td>Assignment given 4 March</td>
</tr>
<tr>
<td>3</td>
<td>11 March</td>
<td>Design features and practical constraints</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17,18 March</td>
<td>Statutory and classification regulations. ESD, efficiency and environmental considerations Electrical load profiling</td>
<td>Class Test (18 March) (11:00am – 12:30pm)</td>
</tr>
<tr>
<td>5</td>
<td>20-26 March</td>
<td>EASTER BREAK</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>31 March, 1 April</td>
<td>Overview of resistance curves &amp; propulsion devices. Engine and propeller matching</td>
<td>Assignment (Due: 7 April)</td>
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</table>

Elaboration of Marine Machinery Systems and Components

Elaboration of CAD Session

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>11 April</td>
<td>Introduction to CATIA Sketcher Basic Solid Shapes Spec Tree, Sketcher constraints Sketch, Analyses, Adding Features to Solids</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>18 April</td>
<td>Shell, 3D Geometry and Material Simple Formulas More 3D Geometry, Rib, Draft and Re-Order</td>
<td>CAD Assignment given 18 April</td>
</tr>
<tr>
<td>9</td>
<td>25 April</td>
<td>Assembly- CATProduct Filing, Drafting, ISO &amp; Aus Standards Major Project given 2 May</td>
<td>CAD Assignment Due 28 April</td>
</tr>
<tr>
<td>10</td>
<td>2 May</td>
<td>Generative Shape Workbench Wireframe, Pipework</td>
<td>Major Project given 2 May</td>
</tr>
<tr>
<td>11</td>
<td>9 May</td>
<td>Working on Project</td>
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<tr>
<td>12</td>
<td>16 May</td>
<td>Working on Project</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>23 May</td>
<td>Working on Project</td>
<td>Due date for project submission 26 May</td>
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Assessment:

<table>
<thead>
<tr>
<th>Coursework</th>
<th>Unit Mark</th>
<th>Week/Date</th>
<th>Examination</th>
<th>Unit Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Test</td>
<td>20</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment</td>
<td>20</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAD Assignment</td>
<td>20</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Project</td>
<td>40</td>
<td>13</td>
<td>3 hrs final exam</td>
<td>100</td>
</tr>
<tr>
<td><strong>Coursework Total:</strong></td>
<td><strong>100</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Combined Total:</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>100</strong></td>
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The final mark for the unit will be obtained by a weighting of 40% coursework & 60% final examination.

To pass this subject a student must achieve a minimum of 50% each in the Course Work, the major project and the final examination, and achieve an overall average of 50% for the subject.

Students must submit all assignments and the final project on time.

**Note:**
The week/date column indicates the (provisional) semester week number and the date that an assignment is due for submission. These may be varied slightly if there is a substantial reason and a majority student consensus.

**Submission of assignments:**

Assignments will be submitted to the Student Academic Support Hub (room F75 first floor Swanson Building). Late submissions will receive up to a 50% penalty. Electronic submissions are not acceptable. The assessed work will be returned in lecture.

CAD Assignments to be printed on A3 paper to Australian Standards and submitted with the Assignment and Cover Sheet.

The first version only will be accepted of your assignment.

**Final grade:**

The grade that you receive for this unit will be determined by a committee of examiners. The raw marks that you receive from each piece of assessable material will be combined in order to determine a letter grade for the unit. The raw marks may undergo a scaling process to ensure meeting AMC policies on the distribution of grades.
Problems with your assessment:

If you have questions or problems with your assessment, you should undertake discussion with the following people until you have received a resolution of the issues. (1) The person who marked the assessment. (2) Unit Coordinator. (3) Head of Department/School in charge of the unit. (4) Director, NCMEH– Professor Tom Hardy. If this does not resolve the issue you may file formal appeal by contacting the office of the Registrar.

Course Rules:

More information with regard to content, assessments, grading, etc. is found in the Course Rules Document at:
http://www.amc.edu.au/maritime.engineering/be.course.content.rules

Plagiarism*

Plagiarism is a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own; for example, using an author's words without putting them in quotation marks and citing the source, using an author's ideas without proper acknowledgment and citation, copying another student's work.

If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at http://www.utas.edu.au/tl/supporting/academicintegrity/index.html. The intentional copying of someone else’s work as one’s own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see http://www.utas.edu.au/universitycouncil/legislation/

The University and any persons authorised by the University may submit your assessable works to a plagiarism checking service, to obtain a report on possible instances of plagiarism. Assessable works may also be included in a reference database. It is a condition of this arrangement that the original author's permission is required before a work within the database can be viewed.

For further information on this statement and general referencing guidelines, see http://www.utas.edu.au/plagiarism/ or follow the link under ‘Policy, Procedures and Feedback’ on the Current Students homepage.

Further information and assistance

If you are experiencing difficulties with your studies or assignments, have personal or life planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

There is a range of University-wide support services available to you including Teaching & Learning, Student Services, and International Services. Please refer to the Current Students homepage at: http://www.utas.edu.au/students/

Should you require assistance in accessing the Library visit their website for more information at http://www.utas.edu.au/library/