The Hong Kong Polytechnic University

Subject Description Form

Subject Code	LGT3526
Subject Title	Machinery and Control Systems
Credit Value	3
Level	3
Normal Duration	1-semester
Pre-requisite / Co-requisite/ Exclusion	Nil
Role and Purposes	The role of this subject is to enable students to develop the ability of evaluating the relationship between the effective management of vessels and the characteristics of their design, including cargo, propulsion and control systems. An emphasis is on correct and safe procedures.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain the operation of all ship machinery and safe operating procedures. b. Analyse the functions of machinery and control systems that are essential to the normal and safe operation of a ship. c. Be aware of the greater importance attached to cost-effective operation of ships in terms of equipment reliability, more fuel-efficient engines and the ever-increasing shift towards automatically operated machinery. d. Evaluate the performance of shipboard engineering systems in the context of complying with the international standards. e. Formulate appropriate operational standards to meet the requirement of effective management of a vessel and the obligations of ensuring maritime safety. f. Communicate with engineering professionals effectively. Studying this subject will also help develop students' skills in critical thinking and arouse their interest in life-long learning to keep abreast of automated control system technology, and enhance their awareness of social responsibility in maritime safety.

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Differences in ship design - bulk carrier, tanker, and container ship; resistance of displacement and non-displacement systems; mono-hull and multi-hulls design; dynamically supported crafts; the economics of choice; Marine Engineering Systems: Propulsion; power and performance of various alternative systems; steering, electrical, auxiliary and refrigeration systems, survey and certification requirements of machinery and control systems; Control Systems: Principles and applications of automatic control; important performance parameters; control devices and examples; characteristics of PID control action; servomechanism; integrated monitoring systems.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures will be used to introduce to students the concepts, principles, theories, application issues and descriptive cases for the topics. Different teaching materials will be used to cover the most updated development and applications of machinery and control systems. Laboratories will be used to provide students with hands-on practice using simulation experiments.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr>
<tr><td>1. Coursework</td><td>40 %</td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Examination</td><td>60 %</td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Weekly laboratory tasks, practical test, and written examination are the typical assessment methods used in this subject. The tasks of laboratory ensure students to acquire essential knowledge in technical contents. Mini-project can test students’ mastery of technical knowledge in selected topics.

Since the course focuses on technical knowledge, written examination is designed to assess student’s overall understanding of technical concepts and correct use of terminologies for effective communication with professionals.

To pass this subject, students are required to obtain Grade D or above in BOTH the Continuous Assessment and Exam components.
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<tr><td>Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td></td><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td></td><td>▪ Laboratory</td><td>21 Hrs.</td></tr>
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	Other student study effort:	
	▪ Self study / research for self-learning tasks	28 to 56 Hrs.
	▪ Self practice for practical tests / preparation for examination	20 to 30 Hrs.
	Total student study effort	97 to 135 Hrs.
Reading List and References	Dokkum, Klaas van (2010), Ship Knowledge: Covering Ship Design, Construction and Operation, Enkhuizen: Dokmar Dokkum, Klaas van (2010), *Ships' Electrical Systems*, Enkhuizen: Dokmar Seamanship (2009), *Engineering Knowledge*, Livingston: Witherby Seamanship International Clark, I.C. (2005), *Ship Dynamics for Mariners: A Guide to the Theory of Hull Resistance, Power Requirements, Propulsion, Steering, Control Systems and Ship Motion in a Seaway*, London: The Nautical Institute Taylor D.A. (1996), *Introduction to Marine Engineering*, Oxfo Butterworth Heinemann McGeorge, H.D. (latest edition), *General Engineering Knowledge*, Oxf Butterworth-Heinemann. Taylor D.A. (latest edition), *Marine Control Practice*, London: Butterwortl Embleton, W. and Morton, T.D. (2002), *Reed's Engineering Knowle Instruments & Control Systems for Deck Officers*, Thomas Reed Publicatio Morgan, N. (ed.) (latest edition), *The Marine Technology Reference Book*, Butterworth Scientific Hall, D.T. (1999), *Practical Marine Electrical Knowledge*, Livingston: Witherby Seamanship International	