The Hong Kong Polytechnic University

Subject Description Form

Subject Code	LGT3004
Subject Title	Navigation and Communication Systems
Credit Value	3
Level	3
Normal Duration	1-semester
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The role of this subject is to provide students with a broad knowledge in navigation and communication systems that enables them to appreciate the latest technologies that are applied to the effective management of a vessel with emphasis on maritime safety and emergency responses.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand and correctly apply the functions of navigation and communication systems that are essential to Safety of Life at Sea (SOLAS). b. Evaluate the performance of navigation and communication systems in the context of complying with the international standards of SOLAS. c. Formulate appropriate operational standards to meet the requirement of effective management of a vessel and the obligations of ensuring maritime safety. Studying this subject will also help develop students' skills in critical thinking and life-long learning about modern navigation/communication technologies, and enhance students' awareness of social responsibility in maritime safety.
Subject Synopsis/ Indicative Syllabus	Basic principles of radio communication; principles of hyperbolic position fixing systems; concept of digital technology; principles of satellite orbits and use in the maritime context; satellite position-fixing systems. General concept of Global Maritime Distress and Safety System (GMDSS); procedures of distress, search and rescue; basic principles and operational knowledge of all mandatory GMDSS equipment – DSC, EPIRB, SART, Inmarsat, Navtex, and radiotelex; reserve power systems; use of relevant publications. Shipboard Radar and Electronic Charting Systems: System design, functions, limitations and characteristics; Automatic Identification System; Automatic Radar Plotting Aids; Applications for collision avoidance and navigation; Elements of safe navigational watch; blind pilotage techniques; ship reporting systems and VTS procedures; navigation using ECDIS.

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<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 shipboard navigation and communication systems. Laboratories will be used to provide students with hands-on practice with the aids of marine simulator and GMDSS simulator.</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></td><td></td><td></td></tr>
<tr><td>Coursework</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>Examination</td><td>60%</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, presentation and written examination are the typical assessment methods used in this subject. The tasks of laboratory ensure students to acquire essential practical skills through adequate amount of hands-on practice. The process of acquiring the skills provides students with the opportunity to understand the functions of navigation and communication systems and to correctly apply them in different scenarios relevant to safety of life at sea. Practical test can assess students' skill level in using communication systems. The assessment on the skills directly reflects students' abilities of evaluating the performance of the systems against the SOLAS standards. Therefore laboratory tasks and practice test can serve to measure the learning outcome (a). With the achievement on the learning outcome (a), students should be familiar with relevant functional requirements to a large extent. Use of student presentation allows the lecturer to evaluate students' acquaintance with the overall performance standards of some navigation systems. This is to measure the learning outcome (b). Q&A after presentation can test how good students can accurately justify the success in meeting the goals of effective ship management. This is to measure partly the learning outcome (c).

Written examination can allow students to demonstrate their abilities of understanding and correctly apply the functions of some selected systems; allow the lecturer to test students' abilities of evaluating the performance of relevant systems in a hypothetical case; and allow students to formulate the standard communication / navigation procedures in some cases that require safeguarding maritime safety. Both written examination and coursework can serve to measure the learning outcomes (a), (b) & (c) but they may have emphases on different areas.
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Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Laboratory	20 Hrs.
	Other student study effort:	
	▪ Self-study / research for self-learning tasks	35 to 58 Hrs.
	▪ Self-practice for practical test / preparation for presentation and examination	25 to 35 Hrs.
	Total student study effort	107 to 140 Hrs.
Reading List and References	Bréhaut, D. (2017), *GMDSS - A User's Handbook*, Adlard Coles Nautical Lees, G.D. & Williamson, W.G. (2022), *Handbook for Marine Radio Communication,* Seventh Edition, Abingdon, Oxon : Informa Law from Routledge IMO (2019), *GMDSS manual: manual on the global maritime distress and safety system,* London Australian Maritime Safety Authority (2018), *Australian Global Maritime Distress and Safety System (GMDSS) handbook: the Australian GMDSS training and operations manual,* Canberra, A.C.T. Wallin, B. (2016), *Ship Navigation*, Enkhuizen: Dokmar Waugh, I. (2007), *The Mariners Guide To Marine Communications*, London: The Nautical Institute Monroe, J.W. (2009), *Marine Radionavigation and Communications*, Cornell Maritime Press Wall, A., Bole A.G. and Dineley W.O. (2014), *Radar and ARPA Manual,* Oxford: Butterworth-Heinemann. National Geospatial-intelligence Agency. (2019), *The American Practical Navigator: Bowditch*, Paradise Cay Publications/Celestaire, Inc. Bagshaw, I.W. (2001), *Worked Examples in Relative Radar Plotting*, Brown, Son & Ferguson Gale, H. (2013), *From Paper Charts to ECDIS: A Practical Voyage Plan*, London: The Nautical Institute Weintrit, A. (ed.) (2013), *Marine Navigation and Safety of Sea Transportation: Advances in Marine Navigation*, London: CRC Press UKHO (2016), *Admiralty Guide to ECDIS Implementation, Policy and Procedures*, Somerset: United Kingdom Hydrographic Office Norris, A. (2008), *Integrating ship bridge systems. Volume 1, Radar and AIS : A Practical Guide,* London: The Nautical Institute Norris, A. (2010), *Integrated bridge systems. Volume 2, ECDIS and Positioning,* London: The Nautical Institute Dokkum, Klaas van (2022), *The Colregs Guide – Seventh Edition*, Enkhuizen: Dokmar	

	Cockcroft, A..N. (2012), *A guide to the collision avoidance rules: International Regulations for Preventing Collisions at Sea*, London: Elsevier Butterworth-Heinemann IMO (2020), *Performance Standards for Shipborne Radiocommunications and Navigational Equipment,* London: International Maritime Organization NIMA (latest edition), *International Code of Signals*, Maryland: National Imagery and Mapping Agency IMO (2022), *IAMSAR Manual*, Volume III, Mobile Facilities, London: International Maritime Organization *SEAVIEW*, http://www.seatransport.org