Liverpool John Moores University

Title:	Naval Architecture
Status:	Definitive
Code:	**5123MECH** (125071)
Version Start Date:	01-08-2018
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Allan Carrier	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	68
Total Learning Hours:	200	**Private Study:**	132		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	44
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	60	2
Portfolio	AS1	Portfolio	40	

Aims

To develop knowledge and understanding of:

Concepts and principles of naval architecture.
Theory and practical applications of ship stability.
Implications of large angle stability in design and operation.
The physical phenomena, basic fluid mechanics and relevant theory of ship resistance, including numerical and experimental techniques used to estimate sea

keeping and hull resistance.
The concept of general arrangement of ship and methodologies for the construction of different types of vessel.

Learning Outcomes

After completing the module the student should be able to:

1	Understand and communicate using standard notations used in naval architecture.
2	Predict ship heel, list, trim, sea keeping and resistance.
3	Apply design methodology to analyse ship stability, sea keeping and hull resistance problems.
4	Discuss and illustrate significant features of ship construction.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	2	3	4	
Portfolio	1	2	3	4

Outline Syllabus

Basic definition of naval architectural terms and concepts.
Calculations of ship forms and basic hydrostatic quantities using numerical integration, Simpsons First, Second and Third Rules; first and second moments or area; volume and centroids and waterplane area.
Longitudinal centre of floatation (LCF), transverse and longitudinal second moment; calculation of displaced volume, KB and LCB; Metacentric theory and stability; calculation of metacentric radius, metacentric height and righting level; calculation of KG and influence of adding or removing mass.
Ship stability covering hydrostatic particulars, calculation of centers of gravity – shift, adding, or removing a mass; suspended weights, tanks and free surface effects; flooding calculations; added mass and lost buoyancy methods; longitudinal stability and trim; draught analysis; hogging and sagging, the layer correction; the inclining experiment; introduction to static stability, the Wall Sided formula, cross curves of stability, curves of static stability; stability evaluation; IMO criteria, the Stability Booklet.
Relationship of principle parameters to displacement and stability; Static stability including the presentation of heeling lever arms; standard stability cases: the loll ship, wind heeling and crane ships.
Ballast and form stability;
stability at all angles of heel (up to 180 degrees) and influence of geometry on static stability curve;
stability in extreme conditions of lifeboats, yachts and multihulls; stability evaluation for small craft.
Flow around a submerged body; various methods for estimation of sea keeping and resistance including empirical, experimental, standard series and an introduction to

numerical approach.
Ship Construction; discuss and identify different ship types and identify significant features. Water and weather tightness; Structural terminology for different framing systems, bulkheads and Hatches. The function and structure of tanks; double bottoms, sides, wings and peaks.

Learning Activities

A combination of lectures and tutorials.

Notes

This module will provide a good grounding for those students wishing to pursue a career in the following marine related disciplines or industries: Marine Engineering Operations, Marine Engineering Design, marine Superintendent, Surveying and Shipbuilding.