Liverpool John Moores University

Title:	Offshore Engineering Analysis
Status:	Definitive
Code:	**7100MECH** (125118)
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:	FHEQ7	**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	22
Tutorial	44

Grading Basis: 50 %

Assessment Details

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

Aims

Analytic and semi-analytic methods of hydrodynamic analysis for estimating fluid loads in offshore structures and systems.
Appreciate numerical methods for the analytic integration of Froude-Krilov and diffraction loads for simple geometries of offshore structures and systems.
Appreciate different numerical methods of formulating and solving fluid-structure-interaction problems for a variety of different distinct scenarios.
Provide an appreciation of how numerical methods are used for underpinning

principles of fluid-structure-interaction problems of single body and multi-body situations. Provide the students an insight of how to undertake applications of such techniques using offshore structures of their interest.
Use of algebraic methods and numerical analysis tools to estimate the response and assess the structural integrity of offshore structures and systems.

Learning Outcomes

After completing the module the student should be able to:

1	Apply the concepts of mathematical and numerical modelling of offshore structures.
2	Identify and develop the appropriate motion hydrodynamic analysis requirement for offshore structures.
3	Apply appropriate numerical integration modelling techniques to solve the equations of fluid-structure-interaction problems.
4	Assess the structural integrity of offshore designs and devices.

Learning Outcomes of Assessments

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

Examination	1	2	3	
Portfolio	1	2	3	4

Outline Syllabus

Overview of wave theories in inviscid fluids.
Application of wave theories for the analytic integration over simple cylindrical shaped structures to derive Froude-Krilov wave loads and diffraction wave loads.
Introduction of further analytic integrations to provide Morison type equation of loads on structures composed of slender cylindrical parts. Indicate clear dependence of inertia and drag coefficients of Morison formula on influences of Reynolds and Keulegan Carpenter numbers and surface roughness.
Demonstrate engineering applications of Morison method to fixed and moving offshore members. Demonstrate the dangers of using over simplified analysis methods and hence Morison equation correction. Consider application of such Morison based techniques to jacket structures, semisubmersibles, spars and Jackups.
Formulate general multi-body radiation and diffraction analysis based on conversation of partial differential equation formulation.
Use of Green identity to establish Haskind relationship for the numerical modeling of fluid-structure-interaction problems of offshore structures and systems.
Development of realistic and appropriate fluid-structure-interaction numerical analysis of the selected shape/structure.
Assessment of structural integrity of fixed bottom and floating type offshore structures and systems. Recommendations and regulations that are used globally.

Learning Activities

Combination of lectures and tutorials.

Notes

The module will provide a good grounding for those students wishing to pursue a career in the following related disciplines or industries: Offshore Engineering, Marine Engineering, Mechanical Engineering, Offshore Engineering Operations, Offshore Engineering Structural Analysis.