OGEE-370 Offshore Engineering Course Syllabus

Course Code	Course Title	ECTS Credits
OGEE-370	Offshore Engineering	6
Prerequisites	**Department**	**Semester**
MENG-280	Engineering	Fall
Type of Course	**Field**	**Language of Instruction**
Required	Oil & Gas Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st cycle	Dr Constantinos Hadjistassou	3rd/4th
Mode of Delivery	**Work Placement**	**Corequisites**
Online	N/A	None

Course Objectives:

The main objectives of the course are to:

- Outline elements of physical oceanography including temperature, salinity, and heat budget;
- Introduce students to the mechanics of the marine environment including water waves, wind, surface and subsea currents and coastline erosion;
- Present the engineering and scientific principles of fixed and floating offshore oil and gas and wind energy installations;
- Explain sea loads, structural and hydrodynamic characteristics of jacket platforms, jack-up rigs, compliant platforms, gravity based structures, tension leg platforms, Floating, Production, Storage and Offloading (FPSO) vessels, and subsea production systems;
- Detail anchoring systems, common structure failure mechanisms, material selection, corrosion mechanisms and control;
- Identify the operational and environmental hazards and risks to personnel related to near-shore and offshore structures;
- Cover safety issues, pollution avoidance and mitigation measures of offshore engineering and platform decommissioning.

Learning Outcomes:

After completion of the course students are expected to:

- Become familiar with some aspects of physical oceanography;
- Appreciate the dynamics of the water-air interface, the characteristics of water waves, wind and currents and the issues of coastal erosion;
- Understand the technical aspects of fixed foundation and floating oil & gas and energy systems;

- Comprehend the specifics of sea loads and hydrodynamics on fixed and floating platforms as well as subsea systems;
- Familiarize with floating systems' anchoring systems, structural failure mechanisms (e.g., buckling), select appropriate materials, identify corrosion mechanisms and propose corrosion control strategies;
- Recognize risks to equipment, personnel and the environment associated with coastal and offshore operations;
- Assess the safety, pollution prevention and mitigation strategies as well as offshore structure abandonment.

Course Content:

- Variation of salinity, temperature, light penetration, and thermal energy budget in seawater;
- Characteristics of ideal water waves, basic fluid mechanics concepts, water currents and elements of offshore wind;
- Climate change, rising sea level, causes of coastline erosion, remediation strategies;
- Modelling of fixed structures and floating platforms, material behaviour under direct and shear stresses;
- Jacket platforms, jack-up rigs, compliant towers, gravity based structures, tension leg platforms, spars; Floating, Production, Storage and Offloading (FPSO) vessels; Floating, Storage and Regas Units (FSRUs) and subsea systems;
- Fluid-structure interaction, sea states, calculation of wave loads, vibration, resonance modes;
- Forces on anchor lines, chains, wires, synthetic lines, structural failure modes, corrosion chemistry, corrosion control, coatings;
- Operational and environmental hazards of offshore oil & gas and energy projects, hazards to personnel, contingency planning, protection and avoidance measures, escape routes, rescue boats, etc.;
- Safety considerations, pollution conventions and local legislation, protection gear, mitigation strategies, firefighting and pollution fighting options, platform decommissioning.

Learning Activities and Teaching Methods:

Lectures, exercises, examples, exams

Assessment Methods:

Coursework, problem sheets, mid-term exam, final exam

Required Textbooks/Readings:

Title	Author(s)	Publisher	Year	ISBN
Faltinsen, O. M.	Sea loads on Ships & Offshore Structures	CUP	1993	0521458706

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Gerwick Jr, B. C.	Construction of Marine and Offshore Structures	CRC Press	2007	0849330521
Garrison T.	Essentials of oceanography	Brooks/Cole	2012	9780840061553
Douglas J.F., Gasiorek J. M., Swaffield J.A., Jack L.B.	Fluid Mechanics, fifth ed.	Pearson/Prentice Hall	2005	0131292935