ME168 Mechanics of Offshore Systems

Fall 2017
University of California, Berkeley

Instructor
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Office: 6111 Etcheverry Hall,
Office Hour: Mondays 2:00pm-3:00pm, or By Appointment

Course Description
This course covers basics of mechanics of offshore structures. It includes wave, wind, and current forces on the structure and the response of the structure to these forces. It also covers mooring dynamics, and discusses wave and current forces on mooring cables. Underwater acoustics and issues offshore structures face in the arctic environment will be covered to some extent. The aim is to present students with analytical and (some) computational background necessary to model and analyze offshore structures in the ocean and the arctic environment, and to make them prepared to tackle real challenges the industry is facing today.

Lectures
Tuesdays and Thursdays 2:00pm-3:30pm,
3113 Etcheverry Hall.

Recommended Readings
- Water Wave Mechanics for Engineers and Scientists, Dean and Dalrymple.
- Wave Forces on Offshore Structures by Turgut 'Sarp' Sarpkaya (Feb 26, 2010)
- Dynamics of Offshore Structures by James F. Wilson
- Offshore Structure Modeling (Advanced Series on Ocean Engineering ; V. 9) by Subrata Kumar Chakrabarti (Feb 21, 1994)
- Sea Loads on Ships and Offshore Structures (Cambridge Ocean Technology Series) by O. Faltinsen
- Offshore Structures: Design, Construction and Maintenance, Mohamed A. El-Reedy
- Underwater Acoustics: Analysis, Design and Performance of Sonar by Richard P. Hodges (Jul 19, 2010)
- An Introduction to Underwater Acoustics: Principles and Applications (Springer Praxis Books /Geophysical Sciences) Xavier Lurton
- Fundamentals of Ship Acoustics by Harrison T. Loeser (Jan 6, 1999)
- Underwater Acoustic Modeling and Simulation Third edition by Paul C. Etter
- Arctic Offshore Engineering by Andrew Palmer and Ken Croasdale (Dec 4, 2012)

Grading (tentative)
Homework (30%),
Midterm exam (30%),
Final exam (40%).
• Introduction
  - Characteristics of Offshore and Coastal Systems, Maritime Operations,
• Ocean Wave Environment
  - Linear Potential Theory, A Review,
  - The equation of motion and Response Amplitude Operator, Review,
  - Shallow water hydrodynamics,
  - Bathymetry effects,
  - Some nonlinear effects,
• Loads on Offshore Structures
  - Cantilever beams
  - Beam vibration & natural modes,
  - Transient response,
  - Wind and Current loads on offshore structures,
  - Vortex induced vibration,
  - Extreme environment,
• Cables & mooring
  - Basic catenary in air,
  - Catenary in water,
  - Mooring systems configuration and design,
  - Wave-drift forces,
  - Low frequency damping,
  - Dynamic Positioning,
  - Numerical computations,
• Underwater Acoustics
  - Introduction to Sonar (Acoustic Waves, Doppler shift, intensity and Decibels), Sonar Equations,
  - Transducers, Directionality and Arrays,
  - Ambient noise,
  - Underwater guidance and navigation,
• Arctic Marine Structures
  - Ice structure,
  - Arctic Stratification,
  - Ice load on structures,
  - Wave-ice interactions,
Wood has immediate openings for Offshore Mechanics, A Operators and B Operators working the GoM shelf!!! Pay is dependent on experience. Are you a Wood employee and have someone experienced youâ€™d like to refer? Donâ€™t forget Wood has a Employee Referral Program!! Ask me for details! If youâ€™re interested in joining the best team in the Gulf of Mexico with an amazing benefit package email your resume to nicole.pleasant@woodplc.com. #wood #offshore. Related. Post navigation. Offshore Mechanics covers traditional and more recent methodologies used in offshore structure modelling (including SPH and hydroelasticity models). It also examines numerical techniques, including computational fluid dynamics and finite element method. Additionally, the book features easy-to-understand exercises and examples. Provides a comprehensive treatment for the case of recent applications in offshore mechanics for researchers and engineers Presents the subject of computational fluid dynamics (CFD) and finite element methods (FEM) along with the high fidelity numerical analysis of recent A possible systematic approach for the complete system and various simplifications available for an efficient practical solution will be elaborated. The paper will conclude with a discussion of the present-day deep water design challenges that remain and the research that is needed to meet these challenges. Proceedings of Offshore Mechanics Arctic Engineering Conference OMAE28056 2002. [4] Chaudhury G. A new method for coupled dynamic analysis of platforms. ISOPE Conference June 2001. Transactions of the Society of Naval Arch Marine Eng 1989; 97: 139-168. [25] Langley RS. Second order frequency domain analysis of moored vessels. Dynamics and Control of Mechanical Systems in Offshore Engineering is a comprehensive treatment of marine mechanical systems (MMS) involved in processes of great importance such as oil drilling and mineral recovery. A general method and strategy for realizing the control objectives of marine systems with guaranteed stability the effectiveness of which is illustrated by extensive numerical simulation; and. Approximation-based control schemes using neural networks for installation of subsea structures with attached thrusters in the presence of time-varying environmental disturbances and parametric uncertainties. The Mechanics of Jointed Structures. Matthew R.W. Brake. $168.89. Progress in the Analysis and Design of Marine Structures. Carlos Guedes Soares.