Fall 2015

ENCE 5723

J. Alex McCorquodale
University of New Orleans

Syllabus for 2015 Ocean and Coastal Engineering with Learning Outcomes

Class Room: LA 236/Online
Time: Tuesday 5 pm to 7:40 pm

ENCE 4723 and 5723 Ocean and Coastal Engineering **3 cr.**

(**ENCE 4723**, ENME **4723**, and NAME **4723** are cross-listed). Prerequisite: ENME 3720 or **ENCE** 3310 or consent of the department. Linear and non-linear wave mechanics. Elements of wind and wave generation and forecasting, tidal phenomena, hurricanes, storm surge, tsunamis, interaction of waves and wind with coastal and offshore structures, coastal and estuary processes. Design aspects of various topics are discussed and analyzed: e.g., offshore structures, coastal protection, beach formation, harbor resonance, littoral transport and control. A design project is required. (3 units min / 3 units max, Lecture 3 hours)

ENCE 5723 Ocean and Coastal Engineering **3 cr.**

Prerequisite: ENME 3720 or **ENCE** 3310 or equivalent or consent of the department. Linear and non-linear wave mechanics. Elements of wind and wave generation and forecasting, tidal phenomena, hurricanes, storm surge, tsunamis, interaction of waves and wind with coastal and offshore structures, coastal and estuary processes. Ship wave mechanics. Design aspects of various topics are discussed and analyzed: e.g., offshore structures, coastal protection, beach formation, harbor resonance, littoral transport and control. A design project and laboratory/field study report is required. (3 units min / 3 units max, Lecture 3 hours)

PREREQUISITES
ENME 3720 or **ENCE** 3310 or Equivalent or consent of the department.

TEXTBOOKS AND OTHER MATERIAL

TEXT: **Coastal Engineering Manual EP 1110-2-1100 (Parts I thru IV)**

This document can be down loaded from:

Part I http://www.usace.army.mil/usace-docs/eng-manuals/em1110-2-1100/PartI/PartI.htm

Part II http://www.usace.army.mil/usace-docs/eng-manuals/em1110-2-1100/PartII/PartII.htm

Part III http://www.usace.army.mil/usace-docs/eng-manuals/em1110-2-1100/PartIII/PartIII.htm

Part IV http://www.usace.army.mil/usace-docs/eng-manuals/em1110-2-1100/PartIV/PartIV.htm

Lecture Tapes, Lecture Notes and Slide Presentations will be available through Moodle and the UNO Media Center.

Additional References:

Dean, R. G. &Dalrymple, R. A. (1984), "Water Wave Mechanics for Engineers and Scientists", Prentice-Hall.
Herbich, J. B. (1999), "Handbook of coastal engineering", McGraw-Hill.
Per Brune, (1981). "Port Engineering", Gulf Publishing, Houston, TX.
Silvester, R., (1974). "Coastal Engineering", Vol. I and II, Elsevier Sc. Publ. Co., New York, NY.
Sarpkaya, T. and Isaacson, M., 1981. "Mechanics of Wave Forces on Offshore Structures", van Norstrand Reinhold, New York, NY.
US Army Corps of Engineers, 1984 or 1987. "Shore Protection Manual", Coastal Engineering Research Center. [SPM]
Wiegel, R. (1964) "Oceanographical Engineering", Prentice-Hall.
Le Méhauté, B. (1976), An Introduction to Hydrodynamics and Water Waves, Springer-Verlag,, New York.
Wantanabe, A., Isobe, M. & Kraus, N. (1999), International Handbook Of Coastal Engineering and Management, Academic Press.

STUDENT LEARNING OBJECTIVES ENCE 4723

The successful student on completion of this course should be able to:

1. Classify gravity waves in the ocean and coastal zones.
2. Determine linear wave characteristics.
3. Compute wave transformations in the coastal zone.
4. Estimate wave heights and periods from wind and bathymetric information.
5. Estimate longshore transport in the coastal zone.
6. Complete a preliminary design of a breakwater or seawall.
7. Estimate wave forces on coastal and ocean structures.

STUDENT LEARNING OBJECTIVES ENCE 5723

The successful student on completion of this course should be able to:

1. Classify gravity waves in the ocean and coastal zones.
2. Determine linear wave characteristics.
3. Determine non-linear wave characteristics.
4. Compute wave transformations in the coastal zone.
5. Estimate wave heights and periods from wind and bathymetric information.
6. Estimate longshore transport in the coastal zone.
7. Complete a preliminary design of a breakwater or seawall.
8. Estimate wave forces on coastal and ocean structures.
9. Estimate wave heights due to ships

COURSE TOPICS AND SCHEDULE		No. Class Hours
1. Introduction - Wave Classification.		1
2. Linear Gravity Wave Theory:		6
Deep water		
Shallow water		
Intermediate water		
Wave Energy		
Group Velocity		
3. Non-Linear* wave theory and wave breaking.		3
4.Wave transformations:		4.5
Shoaling		
Refraction		
Diffraction		
Reflection		
5. Wave Prediction:		6
Wave Statistics		
Wave Energy Spectrum*		
Non-hurricane waves:		
Corps of Engineers Formulae		
Young and Verhagen Equations*		
Hurricane waves and Storm Surge		
Corps of Engineers Formulae		
Wave Setup.		
Wind Setup		
6. Sediment Transport in the Coastal Zone:		6
Longshore		
Onshore-Offshore		
7. Tides		1
8. Design of Breakwaters and Seawalls including wave runup.		4
8. Design of Groins.		2
9. Forces on Ocean and Coastal Structures.		4.5
10. Other aspects of waves:		1
Ship waves.*	Self study	
Internal waves.*	Self study	
Currents and wave-current interaction*	Self study	

**For Graduate Credit.*

GRADUATE CREDIT

*Students taking this course for graduate credit will be required to complete an additional advanced topics, as indicated above, some of which are not included in the lectures (see items with * in the Table above). Graduate students will be required to complete a laboratory/Field Study Report.*

CONTRIBUTION OF THE COURSE TO MEETING PROFESSIONAL COMPONENT

1. Contribution to one and one-half years of engineering topics, consisting of engineering sciences and engineering design: this is an optional course consisting of equal content of engineering science and engineering design.

2. Contribution to proficiency in one of the four recognized major civil engineering areas: this course contributes to the students' design and analysis proficiency in water resources engineering.

3. Contribution to the ability to perform civil engineering design by means of design experiences: there is mandatory homework and a supervised design project.

RELATIONSHIP OF COURSE TO ABET PROGRAM OUTCOMES

a. An ability to apply knowledge of mathematics, science, and engineering

This course relates to outcome (a) because the students use calculus, algebra and trigonometry in determining coastal and ocean processes and structural loading due to waves. In addition, the principles of fluid mechanics are used in coastal design.

c) *Ability to design a system, …*

This course addresses this outcome by having students design a seawall/breakwater.

GRADING

1. Assignments and project: Undergraduates 25%. (Graduate Students, 30% includes advance project)
2. Mid-term tests (open book): Undergraduates 35%. Graduate Students 30%.
3. Final examination (open book): All 40%.

Letter grades are assigned based on the following ranges:

A 89.5-100
B 79.5-89.5
C 69.5-79.5
D 59.5-69.5
F Less than 59.5.

HOMEWORK POLICY:

Homework is must be submitted on or before the due date of the assignment. Marks will be deducted for late submission. All assignments must be submitted on the assignment form. In-class students should submit hardcopies of their assignments. Online students may submit via email and must include their last name and assignment number in the file name; the files can be in MS Word, or EXCEL or pdf formats (cell phone photos of assignments are not acceptable).

ATTENDANCE POLICY:

Class attendance is in accordance with the published university policy. Regular attendance is required in this course. You must sign in on a sign-on sheet passed around during the class. You are responsible for material identified in the Reading/Lecture schedule listed in the syllabus and covered in class, even if absent from class for authorized activities.

STUDENTS WITH DISABILITIES:
It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities should contact the Office of Disability Services as well as their instructors to discuss their individual needs for accommodations. For more information, please go to *http://www.ods.uno.edu*

ACADEMIC INTEGRITY:
Academic integrity is fundamental to the process of learning and evaluating academic performance. Academic dishonesty will not be tolerated. Academic dishonesty includes, but is not limited to, the following: cheating, plagiarism, tampering with academic records and examinations, falsifying identity, and being an accessory to acts of academic dishonesty. Refer to the Student Code of Conduct for further information. The Code is available online at ***http://www.studentaffairs.uno.edu***
To ensure academic integrity, all students enrolled in distance learning courses at the University of New Orleans may be required to participate in additional student identification procedures. At the discretion of the faculty member teaching the course, these measures may include on-campus proctored examinations, off-site or online proctored examinations, or other reasonable measures to ensure student identity. Authentication measures for this course are identified below and any fees associated are the responsibility of the student. The University of New Orleans partners with Proctor U, a live, online proctoring service that allows students to complete exams from any location using a computer, webcam, and reliable internet connection.

COMMUNICATIONS POLICY
As a matter of policy at UNO, all *Moodle* accounts are created using only UNO email addresses. If you wish to use a different email address other than your UNO address, it is up to you to set up forwarding from your UNO email account to your desired email address. To simplify matters in communication, I will only use your UNO email addresses. I will post important supplementary course information on Moodle.

OFFICE HOURS:
Tuesday 9 am to noon in CERM 315 or by appointment. Please call or arrange for an appointment at the time of the lecture.

PREPARED BY

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