Fall 2015

EES 5900

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University of New Orleans

EES 5900 Coastal Processes (3)
Course Title: **Coastal Processes and Sedimentation**
Instructor: Ioannis Georgiou, Associate Professor, Department of Earth and Environmental Sciences
Meeting times: Thursday 5:00 – 7:45 pm, LA 236 (in Liberal Arts Building)
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Office Hours: will be posted on my door shortly, or by appointment

Course Description: This course will focus on the physical processes operating in the coastal environment. Key elements of this course include wind waves - their generation and transformation processes, coastal hydrodynamics and transport processes, coastal water level fluctuations (short-term and long-term), and governing processes on beach/barrier, deltaic, wetland and estuarine environments. Introductory concepts in coastal morphodynamics will be presented through case studies that cover topics of land building, deltaic and estuarine sedimentation, marsh edge erosion, longshore transport and shoreline change, run-up and inundation over wash during storms, and inlet backbarrier interactions. The course will also emphasize on presenting modeling tools available for the study of such environments, and review observation techniques and analysis tools currently used.

Learning goals: The learning goals for this course are: 1. to introduce to students the main processes that operate on the coast, both quantitatively, and qualitatively, 2. introduce fundamental hydrodynamic and transport processes responsible for driving and shaping coastal change, both short-term and long-term, and 3. learn to parameterize and quantify the outcome of physical forcing on coastal systems.

Student Learning Outcomes:
After successful completion of this certificate, students should be able to:

1. Develop a basic understanding of surface processes governing the evolution of coastal systems
2. Utilize basic principles of wind and wave generation to understand coastal sediment transport
3. Compute sediment load using principles of sediment transport.
4. Utilize principles of coastal morphodynamics to predict delta evolution, shoreline change, and marsh edge erosion.

Attendance Policy: Attendance will greatly increase you success for learning and ultimately help receive a good grade for the class. If you cannot attend class for some reason, you are responsible for obtaining material, assignments, notes etc. from other students. I will make every effort to make materials for missed classes available but final assessments will cover all aspects of class content, including class discussions that cannot be made up.

Class structure: The class meets once weekly. Although I will often follow the standard lecture format followed by examples and or short problems, we will occasionally devote part or all of a lecture day to carry out in-class discussions, view slides or videos, or spent time in the lab (some working labs may take place in the Kech lab, others in other facilities). I will attempt to let you know in advance of any plans I have for the format in upcoming days.

Course evaluation and grading format: Students will be assessed using exams, homework assignment, reviews, and a final project at the end of class. All work will reinforce the materials presented in lecture and topics discussed or selected for projects. During the semester, a midterm and a final exam will be administered representing 30 % (each) of the student's total grade, as well as assignments and a final individual project that will represent respectively 30% and 10 % of the student's grade. *Class Project:* The project will require additional resources beyond course documents (ie journal articles for introducing theory, data from online data sources, as well as other data sources). The students will be responsible to present their work to the entire class at the end of the semester (most likely on the scheduled day of the final exam – see registrar schedule). More details on project will be presented in class and distributed through moodle.

Midterm Exam 1: 30 % (exam will be in-class – two page sheet of notes allowed but closed book)
Final Exam 1: 30 % (exam will be in-class – two page sheet of notes allowed but closed book)
Homework Assignments (short and long exercises; paper reviews; data interpretation and analysis) 30 %
Project: 10 % (Abstract (early in the semester, and short paper, accompanied by a PowerPoint presentation– more details later)

Grading: Total class grade: equal or above 90% = "A", 80% = "B", 70% = "C", and 60% = "D".

Texbook: A book is not required; I will provide some reprinted chapters in pdf; If you have any of the books listed below they can be a good source of additional information for the course.

Working texts used in the course:
1. Gerhard Masselink, Michael G. Hughes, 2003, **Introduction to Coastal Processes and Geomorphology**, Oxford Univ. Press
2. Davidson-Arnott, R., 2010, **Introduction to Coastal Processes and Geomorphology**, Cambridge (Part one)

Reference textbooks used:
Davis J. Richard, FitzGerald M. Duncan, 2004, Beaches and Coasts, Blackwell Publishing
Robert G. Dean, Robert A. Dalrymple, 2002, Coastal Processes with Engineering Applications, Cambridge University Press.
Komar, P.D., 1998, Beach Processes and Sedimentation, 2nd Edition, Prentice Hall.
Short, A.D., 2000, Handbook of Beach and Shoreface Morphodynamics, Wiley Publishing
Additional material from handouts and other sources as well will be available.

Tentative Lecture Schedule (subject to change with notice):
Week of 8/20: Explanation of syllabus and grading format, class requirements and other housekeeping (Introductory concepts).

Week of 8/27: Introduction: The coastal environment, coastal features, Coastal classification, coastal cells; terminology of the coast, overview processes.

Week of 9/3: Sea level fluctuations, past present and future, subsidence, and associated processes.

Week of 9/10: Tides; tide generating force, tide classification, tidal analysis and predictions and tidal dynamics.

Week of 9/17: Waves. Atmospheric boundary layers, wave generation, introduction to basic Linear Wave theory, wave mechanics, Waves in oceanic and coastal waters, wave analysis methods (wave spectrum, wave groups).

Week of 9/24: Sediments, boundary layers and transport; Sediment Characteristics; sand composition, grain sizes, shapes, porosity, fall velocity; other sediment types in the coastal environment and their characteristics.

Week of 10/1: Catch up session – Review for Midterm Examinations

Week of 10/8: Exam 1

Week of 10/15: FALL BREAK, (**no class on Thursday**)

Week of 10/22: Coastal Hydrodynamics and Costal Transport Processes (longshore and cross shore transport, overwash processes, aeolian transport) – this section could be covered as part of environments and topics that follow next as needed.

Week of 10/29: Fluvial dominated coastal environments; Deltas (networks, scaling laws, mouth bar evolution, delta alometry, simple delta building models)

Week of 11/5: Tide-dominated coastal environments; Estuaries (**inlets and estuaries**), tidal creek networks, tidal bars, laterally accreting surfaces, residual circulation, fine sediment transport processes, estuarine mud sedimentation)

Week of 11/12: Wave-dominated coastal environments: Barriers (beach processes, spit formation, reworking of deltas, backbarrier environments)

Week of 11/19: Wave-dominated coastal environments: Marsh Edge Erosion Processes (erosional and depositional processes along marsh edge boundaries)

Week of 11/26: Thanksgiving Holiday

Week of 12/3: Last Day of Classes (Summary, Catch up session, Review for final examination)

Additional special topics if time allows may include:
Hurricane induced erosion in wetlands (comparative arguments to longer term erosion such as SLR)

Tidal Inlets. Hydrodynamics, transport, inlet-backbarier relationships, stability analysis, sedimentary relationships

Field analysis methods; analysis of profiles, shoreline historical change analysis, seafloor change, surface and subsurface methods of analysis of coastal response.

Guest speakers:
It is possible that we will have at least one guest speaker, to discuss a subset of a topic, or a topic that appears in the syllabus. I will again let you know in advance. In many instances, we may organize this with the department and open the lecture to the entire department and College.

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.

Accommodations

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.

Verification for Online Students

To ensure academic integrity, all students enrolled in distance learning courses at the University of New Orleans may be required to verify their identity when completing exams or other high-stakes assignments. At the discretion of the faculty member teaching the course, verification may include on-campus proctored examinations, off-site or online proctored examinations, or other reasonable measures to ensure student identity. If students cannot attend an on-campus proctored exam, UNO partners with ProctorU, a live, online proctoring service that allows students to complete exams from any location using a computer, webcam, and reliable internet connection. Verification measures for this course are identified below and any fees associated are the responsibility of the student.

Use of Moodle:

Moodle will be used for this course, primarily to post handouts, exercises, programs, solutions to equations, algorithms and other class related material. Students are responsible for checking moodle frequently. Any information posted on moodle is considered an official notification.