

SYLLABUS

OCEN 682 – Coastal Sediment Processes – Fall 2017

| Campus | Section | Days | Time | Room |
|-----------------|---------|-------|----------------|----------------------|
| College Station | 600 | M/W/F | 3:00 – 3:50 pm | RICH 1009 (via TTVN) |
| Galveston | 601 | M/W/F | 3:00 – 3:50 pm | PMEC 144 (in person) |

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| Instructor | Dr. Jens FIGLUS Assistant Professor Department of Ocean Engineering Office Location: Powell Marine Engineering Complex (PMEC), Rm. 218, Galveston Campus Office Hours: M/W 10:00 am – 12:00 pm or by appointment Phone: 409-741-4317 E-mail: figlusi@tamu.edu |
| Course Website | As a registered student for this course you can access posted material on the course website through the E-Campus tab in the HOWDY portal. Visit the website frequently for updates and additional resources. In addition, you will have access to the class online discussion board “Piazza” at http://www.piazza.com/tamu/fall2017/ocen682 for continued engagement in class discussions and exchange of ideas. |
| Prerequisites | OCEN 671 or approval of instructor. |
| Textbook and Resource Materials | <p>D&D Coastal: Dean, Robert G. and Dalrymple, Robert A. (2002). <i>Coastal Processes with Engineering Applications</i>, Cambridge University Press, ISBN: 052160275</p> <p>CEM: U.S. Army Corps of Engineers. (2002). <i>Coastal Engineering Manual</i>. Engineer Manual 1110-2-1100, U.S. Army Corps of Engineers, Washington, D.C. (in 6 volumes). Free download available online at: http://www.publications.usace.army.mil/USACE-Publications/Engineer-Manuals/udt_43544_param_page/4/</p> <p>Additional notes and relevant manuscripts will be made available digitally. While not mandatory, the following books are provided as a reference with helpful background information and can be used as an additional resource:</p> <p>F&D: Fredsøe, Jørgen and Deigaard, Rolf (2012). <i>Mechanics of Coastal Sediment Transport</i>, Advanced Series on Ocean Engineering – Vol. 3, World Scientific, ISBN: 9810208405</p> <p>D&D Waves: Dean, Robert G. and Dalrymple, Robert A. (2000). <i>Water Wave Mechanics for Engineers and Scientists</i>, Advanced Series on Ocean Engineering – Vol. 2, World Scientific, ISBN: 9810204205</p> <p>PK: Komar, Paul D. (1998). <i>Beach Processes and Sedimentation</i>, 2nd Ed., Prentice-Hall, ISBN: 0137549385</p> <p>PN: Nielsen, Peter (2009). <i>Coastal Bottom Boundary Layers and Sediment Transport</i>, Advanced Series on Ocean Engineering – Vol. 4, World Scientific, ISBN: 9810204736</p> |
| Course Catalog Description | <i>Coastal Sediment Processes</i> (3-0). Credit 3. Sediment properties and size distribution, fluvial sediment transport equations, movement of material by the sea, review of pertinent wave theories, littoral drift, inlet stability, coastal protection structures, similarity in sediment transport, movable bed models, sediment tracing, aeolian sand transport, case studies. |

Learning Objectives

After successfully completing this course, you will be able to ...

- a) ... analyze coastal sediments and infer sediment engineering properties;
- b) ... understand the mechanics of fluvial and coastal sediment transport;
- c) ... apply knowledge of fluid and wave dynamics to analyze sediment transport problems;
- d) ... analyze wave-shoreline interactions, coastal morphology, and beach profiles;
- e) ... evaluate and design suitable coastal engineering approaches to solve a variety of coastal sediment transport problems;
- f) ... distinguish between and explain all forms of coastal sediment transport processes and associated morphodynamics

ABET Student Outcomes

The following student outcomes listed under general ABET criterion 3 are addressed by this course:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (e) an ability to identify, formulate, and solve engineering problems
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

<http://www.abet.org/accreditation/accreditation-criteria/>

Course Rationale

Coastal systems are highly dynamic and are constantly evolving. Sediment processes are the main driver for the evolution of coastal systems, yet the details of sediment processes are highly complex and hard to predict. This course is intended to familiarize students with the characteristics of coastal sediments and the processes by which they are transported. Forcing mechanisms based on fluid transport will be reviewed (currents and waves) but the main focus of the course is on the sediment response. Students will gain detailed knowledge of sediment transport fundamentals and applications to solve pertinent coastal engineering problems related to coastal erosion, sedimentation, and morphodynamic evolution of coastal systems. Primarily, cohesionless sediments such as sand will be covered, but a brief discussion of cohesive sediments is intended toward the end of the course.

Grading

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|----------------------------|-----|--------------|
| Homework and Participation | 15% | A (90 -100%) |
| Midterm Exam | 30% | B (80 – 89%) |
| Research Project/Paper | 20% | C (70 – 79%) |
| Final Exam | 35% | D (60 – 69%) |
| | | F (<60%) |

Homework

Irregularly-spaced homework assignments are part of the course (see Course Outline below).

Research Project/Paper

Each student will be required to work on a research project related to course content. Details will be discussed in class. Each project requires a final report and a brief in-class presentation (see Course Outline below).

Exams

One take-home mid-term examination and a take-home final examination are scheduled (see Course Outline below).

Tentative Course Outline*:

| Week | Day | Date | Lesson Topics | Graded Assignments | Reading Preparation |
|------|-----|-------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------|
| 1 | M | 8/28 | HURRICANE HARVEY | | |
| | W | 8/30 | Lost face-to-face instruction time will be made up in between lectures via online discussion board sessions on dropped content. | | |
| | F | 9/1 | | | |
| 2 | M | 9/4 | Introduction to sediment properties, sources, classification, and analysis techniques | | D&D Coastal Ch.2 CEM Part III Ch.1 |
| | W | 9/6 | | | |
| | F | 9/8 | | | |
| 3 | M | 9/11 | Review of hydrodynamics, wave theories, and wave properties relevant for sediment transport | HW 1 assigned | D&D Coastal Ch.5.1-3 CEM Part II Ch.1,2 |
| | W | 9/13 | | | |
| | F | 9/15 | | | |
| 4 | M | 9/18 | Wave averaged motion, wave breaking, surf zone energy dissipation | HW 1 due | D&D Coastal Ch.5.4-6 CEM Part II Ch.3,4,5 |
| | W | 9/20 | | | |
| | F | 9/22 | | | |
| 5 | M | 9/25 | Nearshore hydrodynamics, alongshore current distribution, undertow | | D&D Coastal Ch.5.4-6 CEM Part II Ch.3,4,5 |
| | W | 9/27 | | | |
| | F | 9/29 | | | |
| 6 | M | 10/2 | Cross-shore and alongshore considerations of large-scale sediment processes, equilibrium beach profile theory, littoral drift estimation | HW 2 assigned | D&D Coastal Ch.7 |
| | W | 10/4 | | | |
| | F | 10/6 | | | |
| 7 | M | 10/9 | Wave and current boundary layers; boundary layer streaming; fluid-sediment interactions | HW 2 due | CEM Part III Ch.6.2-3 |
| | W | 10/11 | | | |
| | F | 10/13 | | | |
| 8 | M | 10/16 | Cross-shore and alongshore transport | MIDTERM EXAM (Take-Home) | D&D Coastal Ch. 8.1-2,4 CEM Part III Ch.3 D&D Coastal Ch. 8.3,5 CEM Part III Ch.2 |
| | W | 10/18 | | | |
| | F | 10/20 | | | |
| 9 | M | 10/23 | Bed load concepts and transport mechanisms | Student projects assigned HW 3 assigned | D&D Coastal Ch. 8.3.2 CEM Part III Ch.6.4 |
| | W | 10/25 | | | |
| | F | 10/27 | | | |
| 10 | M | 10/30 | Suspended load concepts and measurements | HW 3 due | D&D Coastal Ch. 8.3.3 |
| | W | 11/1 | | | |
| | F | 11/3 | | | |
| 11 | M | 11/6 | Suspended load transport mechanisms | | CEM Part III Ch.6.5 |
| | W | 11/8 | | | |
| | F | 11/10 | | | |
| 12 | M | 11/13 | Beach morphology; bed forms | HW 4 assigned | D&D Coastal Ch. 7, Ch. 9 CEM Part IV Ch.3.2 |
| | W | 11/15 | | | |
| | F | 11/17 | | | |
| 13 | M | 11/20 | Aeolian sediment transport | HW 4 due | D&D Coastal Ch. 8.7 CEM Part III Ch.4 |
| | W | 11/22 | THANKSGIVING – NO CLASSES | | |
| | F | 11/24 | | | |
| 14 | M | 11/27 | Cohesive and mixed sediment introduction (stresses, flocculation, selective entrainment, effects on waves and hydrodynamics) | Student project presentations | D&D Coastal Ch. 8.9 CEM Part III Ch.5 |
| | W | 11/29 | | | |
| | F | 12/1 | | | |
| 15 | M | 12/4 | | Student project presentations | |
| | W | 12/6 | | | |
| | | TBD | | FINAL EXAM (Take-Home) | |

* This schedule is subject to modification if necessary and will be updated throughout the semester.

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat, or steal or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

For additional information, please visit: <http://aggiehonor.tamu.edu>.

Course Evaluations

The PICA (Personalized Instructor/Course Appraisal) is an online course evaluation for Texas A&M. We highly encourage you to complete an evaluation for each course on your schedule. Student input is a critical component used to improve curriculum and teaching. Each faculty member values your input to improve his/her methodology. Your comments can also significantly impact the mix and membership of faculty. The PICA website is available at <http://pica.tamu.edu>, your Howdy portal, or by scanning:



University Statements:

Attendance Policy

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located online at <http://student-rules.tamu.edu/rule07>

Disability Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit <http://disability.tamu.edu>
If you are located on the Galveston Campus and you believe you have a disability requiring an accommodation, please contact the Counseling Office, Seibel Student Center, or call 409-740-4587. For additional information visit <http://www.tamug.edu/counsel/Disabilities.html>

Family Educational and Rights to Privacy Act (FERPA)

FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. To obtain a listing of directory information or to place a hold on any or all of this information, please consult the Admissions & Records Office.
Items that can never be identified as public information are a student's social security number or institutional identification number, citizenship, gender, grades, GPR or class schedule. All efforts will be made in this class to protect your privacy and to ensure confidential treatment of information associated with or generated by your participation in the class.