

ESSM 633: Coastal Processes and Ecosystem Management

Spring 2018

Instructor:

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Department of Ocean Engineering

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Office hours by appointment, please email or call for a time.

Course website: <http://ecampus.tamu.edu>

Google Hangout: <http://hangouts.google.com>

Credits: 3. This course has been assigned three credit hours based upon the work represented by verifiable student achievement of institutionally established learning outcomes, direct faculty instruction, and academically engaged time. (Federal Rule GEN 11-06).

Prerequisites: Graduate classification.

Required text: None for purchase, all readings will be posted on course website.

Course description: This course examines coastal processes and science with an integrated view across the sub-fields of coastal geology, geomorphology, biology, law, policy, economics, and engineering. A major focus is on how to best utilize the latest knowledge from these fields to manage and restore ecosystems.

The course requirements are equivalent for all sections, whether in person or via distance. You must choose how to best approach the class to receive instruction, whether in person or via distance, but you are responsible for the three lecture, discussion, and field trip components described below. Your grade will be based on the material learned during lecture and field trip, and the products developed and presented during discussion. You will need to identify the route that you expect to follow to Dr. Feagin during the first week of class. Readings and other materials are drawn from contemporary reviews and the primary literature, and include 15 journal articles or book chapters, 2 technical reports, and 2 topical videos.

Direct engagement in the course with the instructor will require three hours per week, for all students regardless of section. The specific times outlined above are distributed during Lecture (1 hour per week), Discussion (1 hour per week), but also via the discussion board conversations in eCampus and during the mandatory field trip time (1 hour per week, averaged across the entire semester). The two field trips will involve 10 direct contact hours, and the discussion board work involves 5 hours, to average to 1 hour per week over the semester. Any material missed during

these times, regardless of mode of instruction, will be made up by writing a report to be emailed to Dr. Feagin by 4:00 am Wednesday.

Lecture (critical to performance on the test and final project):

Tuesdays 10:45-11:30 at WFES 317 OR online via Google Hangout at same time
OR View it online in eCampus by following Wednesday

Discussion (critical to discussion and participation-related points of grade):

Meet on Tuesdays 9:35-10:35 WFES 317 OR meet online via Google Hangout on
Tuesdays 11:30-12:20

Mandatory Field Trip (critical to performance on the test)

Galveston Field Trip (College Station students leave in van at 6:00 am Feb. 28 from WFES 317, return by 9:00 pm. Galveston or other students meet at Galveston Island State Park - Beach side parking lot at 10:00 am to 5:00 pm on Feb. 28. This field trip has a total of at least 7 hours contact time.

College Station Field Trip (Galveston students leave in van at 5:45 am from Sea Aggie parking lot, return by 4:00 pm. College Station or other students meet in WFES 317 at 9:35, then travel over to Wave Lab, return by 12:20. Alternate materials will be given for those who cannot attend). This field trip has a total of at least 3 hours contact time.

Learning Outcomes:

- Integrate the latest knowledge from multiple disciplines to manage and restore coastal ecosystems, including from geology, geomorphology, biology, ecology, law, policy, economics, and engineering
- Evaluate natural and social processes on the coast, and competing public and private stakeholder interests, and formulate solutions that reduce inherent conflicts
- Lead class discussions while demonstrating a capability to organize materials and communicate with fellow classmates in a responsible manner
- Deliver a technical presentation in a team and ethical business-oriented context

Grading: Letter grades will be assigned based as follows:

Leading discussions: 20%
Participation in discussions: 20%
Mid-term test: 30%
Applied final project presentation: 30%

A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = 0-59

Attendance and Late-Work 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 on-line at <http://student-rules.tamu.edu/rule07>. Regular attendance in this class is necessary for success, and students who have excused absences should contact the instructor as soon as possible to arrange for make up work.

Academic Integrity: Aggie Code of Honor: An Aggie does not lie, cheat or steal or tolerate those who do. Please see the Honor Council Rules and Procedures on the web <http://aggiehonor.tamu.edu>

Plagiarism or copying from the internet will result in a failing grade for the course, and all associated individuals will be reported to the Aggie Honor System Office.

Americans with Disabilities Act: 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>

Schedule of Topics

Coastal Geology and Geomorphology

Jan. 16. Global Overview of Coasts
(Global distribution of coastal types; sea level change; storms and tsunamis, hypoxia, ocean acidification, urbanization)

Discussion Readings: Martinez et al. 2007, Woodruff et al. 2013

Jan. 23. Physical Drivers of Change
(Littoral drift, tidal, wave, and Aeolian dynamics; tectonics; sedimentary accretion and erosion)

Discussion Readings: Watch movie, 'Shored Up'

Coastal Ecosystems

Jan. 30. Beach and Nearshore Ecosystems

(Nearshore and intertidal zonation; algal subsidies; invertebrates)

Discussion Readings: Dugan et al. 2003, Michel et al. 2016

Feb. 6. Dune Ecosystems

(Sedimentary change; vegetation succession, disturbance)

Discussion Readings: Cowles 1899, Feagin et al. 2015

Feb. 13. Saltwater Wetland Ecosystems

(Seagrass, marshes, and mangroves; fisheries support; nutrient cycling)

Discussion Readings: Morris et al. 2002, Osland et al. 2016

Feb. 20. Freshwater Wetland and Coastal Upland Ecosystems

(Bayous, riverine and tidal freshwater wetlands; coastal prairies and forests; habitat usage; conflicts with urban environments)

Discussion Readings: None.

Lab and Field Trips

Feb. 27. *Galveston Field Trip (College Station students leave in van at 6:00 am Feb. 28 from WFES 317, return by 9:00 pm. Galveston or other students meet at Galveston Island State Park - Beach side parking lot at 10:00 am to 5:00 pm on Feb. 28. Alternate materials will be given for those who cannot attend)*

Discussion Readings: Field Guide to Galveston Island Statepark

March 6. *College Station Field Trip (Galveston students leave in van at 5:45 am from Sea Aggie parking lot, return by 4:00 pm. College Station or other students meet in WFES 317 at 9:35, then travel over to Wave Lab, return by 12:20. Alternate materials will be given for those who cannot attend)*

Discussion Readings: Watch wave flume videos and download data sets

Coastal Laws, Policy, and Economics

March 20. *Test 1 Due – Upload to eCampus site.*

Coastal Laws

(Local, state, and federal jurisdiction and agencies; maritime and coastal economic zones; private versus public property; Texas Open Beaches Act; Texas Dune Protection Act; FEMA 540 rule; Section 404 Clean Water Act; regulatory and administrative law; mitigation banking; international carbon law; RAMSAR Convention)

Discussion Readings: Gardner 2011 Chapters 3 and 7

March 27. Coastal Policy and Economics

(Coastal development; economics of sea level rise; flood protection and resiliency; ecosystem services)

Discussion Readings: Costanza et al. 1997, Robertson et al 2014

Coastal Engineering and Restoration

April 3. Beach and Dune Construction and Restoration

(Re-nourishment; dune construction; re-vegetation)

Discussion Readings: Houston et al. 2013, Bayraktarov et al. 2016, Armstrong et al. 2016

April 10. Wetland and Regional Scale Construction and Restoration

(Dredging; beneficial use of sediment; traditional wetland restoration; tidal hydrological restoration; freshwater and inflow management; artificial island construction; regional sediment management; climate change adaptation, sustainable practices, integrated coastal protection)

Discussion Readings: Texas Resiliency Master Plan

April 17. Work on Final Projects in Groups

April 24. *Applied Final Project Presentation Due – Upload to E-campus site. Project also will be presented to class during both Lecture and Discussion times.*