

SEA LEVEL RISE AND COASTAL ECOLOGY: SCIENCE, POLICY AND PRACTICE
2017 SPRING BREAK FIELD COURSE
3 CREDITS

**AN INTERDISCIPLINARY COURSE OFFERED BY THE COLLEGES OF LIBERAL ARTS & SCIENCES,
AGRICULTURE AND LIFE SCIENCES AND LAW**

**COORDINATED BY THE
FLORIDA CLIMATE INSTITUTE**

COURSE SYLLABUS & DETAILED AGENDA

Faculty Core Team: Dr. Micheal Allen, School of Forest Resources & Conservation, College of Agriculture and Life Sciences (IFAS), Dr. Ellen Martin, Department of Geology, College of Liberal Arts & Sciences, Thomas T. Ankersen, College of Law

Field & Lecture Contributors: Dr. John Jaeger, Department of Geology, Dr. Jack Putz, Department of Biology, Dr. Peter Frederick, School of Wildlife Ecology & Conservation, Dr. Elizabeth Pienaar, Department of Wildlife Ecology and Conservation, Dr. Andrea Dutton, Department of Geology, Andrew Gude (USFWS), Leslie Sturmer & Savannah Barry, Florida Sea Grant, NRLI team

Coordinating Entity: Florida Climate Institute, Carolyn Cox

Student Cap & Composition: 15 Graduate and Professional degree students comprising 5 students each from programs in CLAS, CALS and LAW [For law students priority registration will be given to ELULP Certificate students who are 3Ls]

Course Listing: The course will be cross-listed with a graduate level course number but have different sections listed in each unit. CLAS (GLY), LAW, IFAS (SFRC)

Fees: There will be a \$50 materials and supplies fee for gas, van, and boats

Location: UF IFAS Nature Coast Biological Station, Cedar Key, Florida.

Course Objectives: To provide students a firm grounding in the science, law & policy, and economics associated with sea-level rise and climate change in the Nature Coast region through an interdisciplinary and experiential collaborative approach. This course will combine classroom lectures and disciplinary integration with an intensive field experience. Sessions will focus on ecological, coastal and marine issues through field-based immersion, practitioner lectures, and reflective discussions in an interdisciplinary context. Student teams will verbalize and defend their findings and recommendations in an open forum designed to highlight their learning.

Student learning outcomes:

At the conclusion of the course students will:

- Gain a basic understanding of the components of the climate and ecosystem and how they are connected and disrupted by climate change (atmosphere, hydrosphere, geosphere, biosphere, cryosphere)
- Understand the importance of data collection to predict the future, as well as its limitations
- Understand both ecological and societal risks and impacts of sea level rise, the interactions between these risks and options for adaptation
- Apply critical-thinking skills at the science / policy interface
- Learn to work in interdisciplinary teams to address specific problems and to effectively communicate science and policy to stakeholders

Grading: Students will be graded according to their individual college policies. Individual contributions to group work will be assessed individually. See rubric below.

General Format of Course

- a. This course will have 4 pre-spring break lecture sessions with lecture and background readings. After these sessions, there will be a predeparture exam on the lectures and readings.
(25% of grade)
- b. Students will be divided into 5 teams of 3 students representing each College and assigned pre-identified policy-relevant problems they must address during the field course
- c. During Spring Break 2017, students will participate in a 5-day field course centered at the UF IFAS Nature Coast Biological Station. The field experience will include practitioner lectures, field trips and time allocated for group work.
- d. Each team will be responsible for:
 - a. A public presentation in Cedar Key at the conclusion of the field experience
(25% of grade)
 - b. A 10-15 page white paper (policy analysis) with conclusions and future recommendations, due at the end of the semester
(50% of grade)

Attendance: Attendance is mandatory. Students are expected to read and attend all lectures and activities and be present for the duration of the field component.

Office Hours: By appointment.

Pre-Departure Lectures: Each of these components will correspond with a 1.5 hour evening session prior to departure.

- a. Sea level rise, marine and coastal dynamics and climate disruption (Dutton, Martin)
Reading:
 - IPCC Climate Change 2014 Synthesis Report. 2015 <http://ipcc.ch/report/ar5/syr/>
 - Sea Level Changes in the Southeastern United States Past, Present, Future. Mitchem, Gary T., University of South Florida 2011
http://floridaclimateinstitute.org/images/reports/201108mitchum_sealevel.pdf
 - Sea-level rise due to polar ice-sheet mass loss during past warm periods A. Dutton,* A. E. Carlson, A. J. Long, G. A. Milne, P. U. Clark, R. DeConto, B. P. Horton, S. Rahmstorf, M. E. Raymo. Science vol. 349 issue 6244. July 10, 2015
<http://science.sciencemag.org/content/349/6244/aaa4019>
- b. The Economics of ecosystems and climate disruption (Pienaar)
Reading:
- c. The law and Policy framework for marine and coastal management and climate change (Ankersen)
Reading:
- d. Methods, Models and Measurement: How research related to sea level rise and coastal ecology is designed, implemented, and reported; Use of models to predict changes in coastal environments. (Putz, Jaeger)
Reading:
 - Doyle, T.W., Chivoiu, Bogdan, and Enwright, N.M., 2015, Sea-level rise modeling handbook—Resource guide for coastal land managers, engineers, and scientists: U.S. Geological Survey Professional Paper 1815, 76 p., <http://dx.doi.org/10.3133/pp1815>.

- Allen, J. R. L. (2000), Morphodynamics of Holocene salt marshes: A review sketch from the Atlantic and southern North Sea Coasts of Europe, *Quat. Sci. Rev.*, 19, 1155–1231, doi:10.1016/S0277-3791(99)00034-7.
- Frey, R.W., and Basan, P.B., 1978, Coastal Salt Marshes, *in* Coastal Sedimentary Environments, New York, NY, Springer US, Coastal Sedimentary Environments, p. 101–169, doi: 10.1007/978-1-4684-0056-4_4.

e. Skills: Application of science to solutions; Stakeholder engagement and the law and policy interface (NRLI)

Reading:

Other readings:

- Purtlebaugh and Allen (2010) <http://www.tandfonline.com/doi/pdf/10.1577/T09-180.1?needAccess=true>
- Morrongiello et al. (2014) <http://onlinelibrary.wiley.com/doi/10.1111/gcb.12545/epdf>
- Whaley et al. (2015) <http://link.springer.com/article/10.1007/s12237-015-0027-3>
- Robins et al. (2005) http://www.publish.csiro.au/?act=view_file&file_id=MF04087.pdf

(6 Contact Hours)

DETAILED FIELD COURSE SCHEDULE

Day 1 (Sunday evening, March 5, 2017)

- Check in to hotel and meet up in lobby @ 5:00PM for ice breaker session and dinner

Day 2 (Monday, March 6)

AM Travel to Withlacochee Gulf Preserve

- Jack Putz will introduce coastal ecosystems, species, ecological interactions, and sea-level rise driven dynamics. Focus will be from the mean high tide (mangroves and saltmarsh) to coastal hammocks, with attention to both plants and animals as well as soils. Based this knowledge, students will be guided through the process of science, starting with hypothesis formulation, progressing through experimental design, data interpretation, and culminating with the creation of a concept model for how the observed shoreline will change with rising shoreline. These activities will be carried out in and near the Withlacochee Gulf Preserve in Yankeetown where the full coastal gradient is relatively accessible. No prior knowledge of ecology, biogeochemistry plant physiology, or climatology are expected, but each participant will be expected to dive into the experience at least to the knees.

(4 contact hours)

Readings: Selected readings on Gulf Coast ecosystems
Methods of shoreline change analysis (SLAMM model)

LUNCH & LECTURE Tom Ankersen will discuss the policy context for adaption planning in Florida and describe the work his Clinic has done in this area

(1 contact hour)

Readings: Town of Yankeetown Adaptation Action Plan
Sea Level Rise Ready: A Model Local Government Comprehensive Plan Element

PM Withlacochee Gulf Preserve

- John Jaeger will present a comparison of air photos from the 1940s and more recently to illustrate the variability of change over time. Students will compare that change with FEMA flood maps and NOAA storm surge maps to identify the most vulnerable locations. Students will learn to work with LIDAR elevation data sets to relate what they see along the shoreline with depositional features that create the elevation and consider how these features might change as sea level rises.

(3 contact hours)

Readings: Selected readings on Florida coastal geology and geography listed above

Return to Cedar Key: Dinner On Your Own

Day 3: (Tuesday, March 7)

AM

Students work on group projects

LUNCH & LECTURE – PETER FREDERICK & MIKE ALLEN (1.5 contact hours)

PM

- Peter Frederick will lead trip to one or more oyster reefs in the Cedar Key area, and discuss the role of reefs in estuarine environments including the ecosystem services they provide, and threats to oyster reefs both locally and worldwide. As a theme, he'll explore the likely intertwined effects of upstream freshwater management, estuarine health, and sea level rise on plant and animal communities in estuaries, and the projected outcomes for human communities. We'll go over the importance of elevation to oysters, the processes maintaining oyster reefs, the fauna and flora that dominate reefs, the interaction between harvest management and management for ecosystem services, the ability of reefs to vertically offset SLR and the potential importance of reefs for directing freshwater flow and controlling salinities in estuaries.

(3 contact hours)

Readings:

Oysters 101, Peter Frederick, Department of Wildlife Ecology and Conservation.

Ecosystem services related to oyster restoration. Loren D. Coen^{1,*}, Robert D. Brumbaugh^{2,**}, David Bushek³, Ray Grizzle⁴, Mark W. Luckenbach⁵, Martin H. Posey⁶, Sean P. Powers⁷, S. Gregory Tolley⁸. Marine Ecology Progress Series vol. 341: 303-307, 2007.

- Mike Allen will lead session on: Description of drivers influencing abundance of the most important fish and shellfish for recreational and commercial fisheries, Importance of freshwater flow, and description of how changes in flow could influence fisheries (with climate change implications), and demonstration of how fish stocks are monitored with sampling gears, and sampling considerations (biases, design issues, etc.)

(3 contact hours)

Readings:

GROUP DINNER

Day 4 (Wednesday, March 8)

AM

- Elizabeth Pienaar will discuss economists value ecosystem services, and how should these values be integrated into policy/management design? How do we assess economic tradeoffs for different coastal policies/programs? For example, if priority is given to oyster reef restoration, in order to support the oyster fishery, then what implications does that have for other industries that are directly/indirectly affected? Does this preclude other economic activities? And if so, how do we assess and tradeoff between the various benefits and costs of alternative policies/programs? What is the economically efficient solution, and is that solution politically feasible?

(1.5 contact hours)

Reading:

- Leslie Sturmer will lead students on a tour of “Clamelot,” describing the role of science and policy in the emergence of a new water-dependent industry in the wake of the controversial “net ban.” She will discuss the current and future challenges to the industry due to climate change.
(1.5 contact hours)

Reading:

- Sea Grant Regional Specialized Agent Savannah Barry will describe the role of ecotourism on the Nature Coast and her work with Florida Sea Grant
- (.5 contact hours)

Reading:

- Tom Ankersen will discuss the role his Clinic has played over the years to support Cedar Key and other “working waterfronts,” including tax policy, community planning and flood plain regulation.
(1 contact hour)

Reading:

LUNCH – Meeting with local stakeholders (Opportunity for students to get public perceptions about SLR and impacts to local communities)

(1.5 contact hours)

-Clam industry (Leslie Sturmer to help organize)

-Ecotourism leaders

-Cedar Key water district (John McPherson)

-local NGO’s (Alan Pither, The Nature Coast Conservancy, Doug Maple, Audubon Society)

-City commissioners (Sue Colson, Heath Davis).

PM:

Students work on group projects

DINNER – On you own

Day 6 (Thursday, March 9)

AM: Work groups and products planned. Time allotted to interact with rotating faculty team for advice.
(2.5 contact hours)

Lunch on own

PM: Recreational Activity led by Carolyn Cox (kayaking to Antsie Otie

group dinner (Clam bake on the beach))

Day 7: Friday, March 10

AM:

Group Work - Finalize presentations

LUNCH on your own

PM

Student presentations to faculty and stakeholders (4 contact hours)

DEPARTURE

Post field component:

- White paper due by April 1 (well before exam period)
- Evaluations

Evaluation Rubric

Name: _____ ; Scoring scale below

| | | | | | | | |
|---|--|--|--|--|--|--|--|
| Grader | | | | | | | |
| Written Work Product | | | | | | | |
| Substantive Quality | | | | | | | |
| Identifies and addresses key issues | | | | | | | |
| Synthesizes complex information | | | | | | | |
| Includes analysis | | | | | | | |
| Executive summary sufficient for decision maker to understand without more | | | | | | | |
| Concise, targeted conclusions and recommendations | | | | | | | |
| Fair Share Contribution Evidenced | | | | | | | |
| Stylistic Quality | | | | | | | |
| Followed formatting requirements | | | | | | | |
| Organization | | | | | | | |
| Writing quality (sentence, paragraph structure, grammar) | | | | | | | |
| Executive summary | | | | | | | |
| Footnotes internally consistent | | | | | | | |
| Fair Share Contribution Evidenced | | | | | | | |
| Oral Presentation | | | | | | | |
| Demonstrated command of subject matter | | | | | | | |
| Professional demeanor (eye contact, body language etc.) | | | | | | | |
| Questions professionally addressed | | | | | | | |
| Presentation slides support oral presentation | | | | | | | |
| Conclusions and recommendations provided | | | | | | | |
| Fair share contribution evidenced | | | | | | | |
| Classroom & group work | | | | | | | |
| Demonstrated interest in subject matter through demeanor or participation in discussion | | | | | | | |
| Minimized distractions | | | | | | | |
| Demonstrated that course materials had been read | | | | | | | |
| Timely to class and field activities | | | | | | | |
| Appeared to work well within group | | | | | | | |
| Fair Share Contribution Evidenced | | | | | | | |

Scoring scale: Excellent = 5; Very good = 4; Average = 3; Poor = 2; Unacceptable = 1

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see:

<http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students career or academic goals, which interfere with their academic performance.

☎ *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,*

www.counseling.ufl.edu/cwc/

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Training Programs

Community Provider Database

☎ *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/