



## ESS 190 Selected Topics: Coastal Hazards & Sustainability Syllabus Summer 2020

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### **Course Description:**

Provides a global perspective of the geology and geography of coastal landscapes, the processes responsible for their formation, diversity, and change over time. Content includes a review of human impacts and responses (i.e. engineering, mitigation, adaptation, emergency response, land use planning, etc.) to coastal hazards affecting millions of people living in coastal zones. Historic and late-breaking case studies will be integrated, especially studies of the Eastern U.S. Students will collect and analyze real data to apply critical thinking and problem-solving skills to real-world issues affecting human populations today and in the future. Students will consider options to improve resiliency and sustainability in these dynamic environments.

### **REVISED Course Schedule, Location, and Logistics FOR 2020:**

- This course will meet **online** via [www.d21.ship.edu](http://www.d21.ship.edu) from **June 5 to June 20** and **face-to-face** from **June 21 to June 27** **at the Chincoteague Bay Field Station** in Wallops Island, Virginia. Students should plan to arrive at the field station on Sunday June 21 Prior to 3:00 p.m. for check-in, orientation, and class.
- Students will need to **provide their own transportation** to the field station (or work with the instructor to arrange transportation from Shippensburg University ahead of time).
- Students should be prepared for approximately 20 hours of instructional time in online lectures, discussions, and lab activities during the online component (first 2 weeks) of the course, and for 5.5 days of lab and field-based instructional time in and around the Eastern Shore of VA and MD through the face-to-face week of the course.
- Students should expect to allocate at least 2 hours of independent time (for each hour of instruction) on course-related objectives (reading, completing online activities, formative/summative assessment activities, etc.).
- Hands-on **field and laboratory experiences will be central components of the course**. Some lectures and guest speakers will be included. These will take place in the lab, others will take place in the field, or at other off-site locations. Students should expect ~60% of class time to be in field in the face-to-face week.
- Depending on travel time (via boats, canoes, vans, etc.), students **should expect to dedicate 8 hours per day** to class. Students will need to dedicate additional time outside of class to complete readings, complete assignments, and other work in the lab and on projects as necessary.
- As with all courses at the field station, **students may only enroll in one class** during each 3-week term.
- A detailed course itinerary with daily activities and assignments will be provided at the outset. It is developed in coordination with staff at the Chincoteague Bay Field Station and other programs.
- Students are advised that the instructor and the staff are dedicated to ensuring the course objectives are met in a safe and effective manner. As such, the **course itinerary may have to change due to unforeseen circumstances (i.e. weather, equipment/boat/transportation issues, launch activities at NASA, etc.)** that are beyond the control of the instructor, the university, the Chincoteague Bay Field Station, or its partners. We request that students **be flexible and accommodating** in the event that schedule modifications arise.

### **Mission & Goals of Category C General Education Courses (STUDENTS ENTERING SHIP BEFORE Fall 2018).**

“Basic scientific literacy is necessary for knowledge of ourselves as a species and of the universe in which we live. The courses in this category have two comprehensive objectives: a) to make clear what kinds of problems in the physical world are susceptible to scientific investigation and what kinds of solutions such investigation can produce; and b) to provide an appreciation of the practice of scientific research and methodology, with its interaction of experiment and hypothesis.”

Given the requirements above, students in this course will learn concepts and principles of modern geological science. Students will develop an understanding of geologic vocabulary, knowledge of Earth processes, and hone their observational, descriptive, and interpersonal (written and spoken) communication skills, so that they are able to communicate about the natural world around them. As this is **a science class**, students will use scientific methods and develop skills to collect relevant qualitative and quantitative data, analyze that data, and think logically and critically about the data and its implications for the world around them.

### **Specific General Education Goals**

1. Understand the role of scientific models, theories or laws as abstract representations of natural processes;
2. Understand how experimentation or empirical observations are used for the development, testing and application of these models, theories, or laws;
3. Learn about measurement and data analysis which are both necessary to quantify the outcome of experiments and observations;
4. Learn about the influence of science on everyday life;
5. Develop abilities to critically read and evaluate scientific results and reports;

**Mission & Goals of Category N General Education Courses (NEW STUDENTS SINCE FALL 2018).**

To understand the scientific method and resulting principles and theories, critically evaluating data to answer questions about the natural world **at Proficient and Mastery Levels**;

1. Students will understand how the scientific method involves experimentation or empirical observations that are used for the development, testing and application of models, theories, and laws
2. Students will demonstrate a broad understanding of scientific principles and theories specific to the discipline (Geology, Coastal Science, Environmental Sustainability) and can explain their origins.
3. Students will critically evaluate scientific information and solve problems using scientific data.

**Student Learning Outcomes Pertinent to the Department of Geography-Earth Science's Program Goals**

**At the end of this course, students will be able to demonstrate:**

1. proficiency in reading, and interpreting basic geologic, and oceanographic texts relative to the coastal ocean, its materials and processes including surface processes (i.e. tides, currents, storms and coastal flooding, erosion, etc.), and natural hazards that arise in association with societies and individuals that live, work, trade, and recreate in these coastal natural environments;
2. proficiency in observation, description, and communication (graphically, verbally and in writing) about the coastal zone, its materials and non-living and living resources (sediments, ground water, salt water, biologic communities, etc.), and their sustainability using appropriate terminology;
3. proficiency in the use of scientific methods (i.e. hypotheses testing, modeling, consilience, etc.) and geologic principles to assess geologic events/processes (i.e. hurricanes, nor'easters, sea-level rise, etc.) and engineering strategies employed to protect shorelines from these processes;
4. proficiency in the use of geotechnology (maps, compasses, apps, databases, etc.), and geologic laws to collect, analyze, and interpret geologic data from the literature, or directly from laboratory and field settings;
5. knowledge of geologic/geographic/engineering concepts to evaluate how the coastal zone and its processes function and impact life including the lives of humans, and likewise how humans are impacting the coastal zone and its diverse environments both positively and negatively;
6. how sustainability of society depends on stewardship choices to reduce our reliance on nonrenewable resources by development of renewable solutions that make it possible for all people to be adequately sustained on this planet.

**Course Content & Student Learning Outcomes:** This course is a general education science with lab course. This course has 4 sections/units with specific modules that will be explored through readings, lectures, lab, and field-based activities. These include:

1. Introduction to the Geography & Geology of the Coastal Zone, wherein students will:
  - a. discuss and analyze the geology and geography of coastal landforms globally and in the Mid-Atlantic, and
  - b. evaluate the processes that interact to produce these dynamic landscapes over various time scales
2. Long and Short-term Process of Change and Their Impacts on Society, wherein students will:
  - a. explore how humans and human landscapes in coastal settings are impacted by natural processes,
  - b. observe, quantify, and analyze tides, storms, and longer-term sea-level change records,
  - c. use these data to develop models to forecast how such processes are likely to impact our coastlines in the future,
  - d. evaluate the impact of sea-level change on coastal communities.
3. Coastal Engineering and Society Response to Coastal Hazards, wherein students will:
  - a. investigate coastal defense strategies employed around the world (and locally in the Mid-Atlantic) to protect our shorelines from marine threats, storms, sea-level rise, climate change, and other risks.
  - b. detail the mechanics of coastal erosion, measure shoreline erosion rates, and assess standard coastal engineering practices for shoreline stabilization, erosion reduction and mitigation using both "hard" structure and "soft" engineering approaches as well as layered defenses, and
  - c. address risk and hazard vulnerability and consider the concept of managed retreat and smart building and other approaches to mitigation and flood protection through case studies.
4. Society and Policy Making, wherein we will:
  - a. integrate the physical processes of coastal systems and emerging strategies for coastal management in order to inform the development of policies that address contemporary issues related to improving the resiliency and reducing the risk of living and working in the coastal zone ,
  - b. explore and evaluate the concept of vulnerability to prioritize protection of coastal people, places, and property
  - c. engage the disaster management cycle to better inform decisions about preparing for and responding to short-term coastal hazards such as tsunami and storm surges
  - d. consider techniques such as stakeholder analysis, cost benefit analysis, and adaptation pathways so that they might be used to plan for long-term changes to coastal vulnerability, especially as caused by sea-level rise.

Ultimately the content of this course will ask students to better understand the science of the coastal zone and will help them understand the dimensions necessary to find solutions to reduce the economic, social, and cultural vulnerabilities of these dynamic regions to societies around the world and in the Mid-Atlantic.

To assist students reach the learning objectives, I will make use of Desire2Learn and the course website (<https://www.education.psu.edu/earth107/>) where all course materials and learning support materials are available. The course materials are developed collaboratively with faculty from several universities who specialize in the topics of the course and three universities will be teaching the course simultaneously to evaluate the course materials and learning gains. All course assignments, quizzes, midterms, labs, and discussion boards will be administered and submitted through the D2L system, unless otherwise instructed.

**Text Book & Materials:** There is no required textbook for the course. All course content will be made available through the course website and [www.d2l.ship.edu](http://www.d2l.ship.edu) and through the course website links provided. Students should have a web-connected laptop for both in class and out-of-class work. Students will be required to work with several software programs (most are freeware or standard software) which include GeoMapApp, Google Earth, and the Microsoft Office suite (Microsoft Word, Excel, PowerPoint, One Note, etc.). Please consult with the instructor if you have challenges with hardware or software. Most software can be downloaded from the web, according to instructions provided on the course “orientation” website. You can also use computers in the computer lab at the field station.

**Grading:** Your grade is based only on the points you earn. I do not grade on a “bell curve.” Your final class grade is calculated per the breakdown below. When final grades are calculated, if your final grade is very close to a grade cutoff (i.e. less than 1.0 %), it is my prerogative to elevate a student’s grade to the next highest letter grade if that student’s participation and assignments were consistently above average and attendance was good. If your final letter grade is just below a grade cutoff, don’t come asking for a bump in grade.... you will already have received the bump if you earned it.

Module. Quizzes	= 20 %
Module Assignments:	= 40 %
Lab/Field Notebook	= 10 %
Course Participation and Discussion	= 10 %
Course Capstone: Coastal Vulnerability Audit:	= 20 %
Total: 100 pts	

*Note – I will drop the lowest score for the weekly quizzes and weekly blogs.*

**Grade Distribution:** A: >95 %, A-: 91-94.99 %, B+: 87-90.99 %, B: 83-86.99 %, B-: 80-82.99 %, C+: 76-79.99 %, C: 70-75.99 %, D: 60-69.99 %, F <60%

**Attendance:** It is a fact that students who miss class and do not keep up on assignments do poorly regardless of aptitude. Therefore it is in your best interest to be in class and stay up-to-date on all course work. It is the policy of the Department of Geography & Earth Science that students attend all class days. If you miss a class you must provide documentation of the absence, obtain all notes from a class mate, and turn in any assignments due by the assignment deadline.

**Quizzes (D2L):** Students are expected to be prepared for working on course materials having read the assigned materials. To ensure this happens students will take a quiz through the Desire2Learn website for the course.

**Assignments & Deadlines:** Students will be expected to hand in assignments ON TIME! Assignments need to be submitted via the course dropbox on D2L. Late assignments will be penalized 25% per day, and cannot be submitted after the assignment is graded and returned to the rest of the class. Deadlines for each assignment are not flexible, unless prior arrangements have been made and approved by the instructor– no exceptions!

**ASSIGNMENTS:** We will complete assignments for each module of the course. These assignments will be hands-on, data-rich and focused on developing observational and critical thinking skills, using a variety of geotechnology. Each assignment MUST be submitted on D2L unless otherwise noted. **These will be due by 9:00 p.m. on the deadline dates unless otherwise noted.**

**FIELD/LAB NOTEBOOK:** Each student will be required to complete a daily entry into their field/lab notebook. Not only should it include detailed description of course notes and field trip sites, but it should also include data collected and other pertinent information. It is critical that each of you spend time reflecting on what you are learning in each module and apply concepts from the course to case studies and your personal experiences.

**FIELD/BOAT TRIPS:**

These are required and important components of the course. Students will be required to participate in all field trips and will be required to have appropriate gear and their field notebook (put it in a Ziploc bag to keep it dry). This includes bug spray, sun block, hat, appropriate footwear (closed toed shoes for all boat trips- MANDATORY), water bottles, day pack, etc. Do NOT miss these trips.

**Additional Information:**

- 1.) For your privacy, I will not discuss your grades over the telephone or via E-mail (with you or any other person), so please do not ask! If you have a question about your grade, I expect that you will make arrangements to visit me during office hours or at another pre-arranged time.
- 2.) Academic integrity is tantamount to the pursuit of scholarly activity in an open, honest, and responsible manner. All members of this class are expected to act with personal integrity, and MUST respect the dignity of other students and this includes their intellectual rights and intellectual property as well as the intellectual rights of other people. **All students should work to create**

**and maintain an environment that is based on mutual respect so that all students can succeed through their own hard work and efforts.** Thus your work, in all aspects of this course, should be your own and adhere to the Universities policies on academic honesty. Plagiarism detection software will be employed on submitted assignments to ensure students are employing academic integrity. Should it be suspected that an assignment is not one's own, it will be handled according to procedures outlined in the undergraduate catalog (found online at [www.ship.edu/catalog/ug/](http://www.ship.edu/catalog/ug/)). ***This may include, but is not limited to: receiving a zero grade for the assignment, failure of the course, and/or other sanctions assigned by the university.***

## Tentative Course Schedule

Subject to Change at Instructor's Discretion and Based on Weather or Other Unforeseen Circumstances:

Week 1	Section 1: Introduction to the Coastal Zone: Society, Landforms, and Processes		
<b>Fri - Sun 6/3 to 6/5</b>	Online Course Orientation Activities Get up and running	Google Earth Introductory Tutorials (Learn how to really use it!) Course Materials: Watch syllabus video, find everything, how to access it, what tools (hardware & software) do you need? Prepare your e-Introductions and post on D2L – Discussion Board <ul style="list-style-type: none"> <li>• Read Module 1 for Monday</li> <li>• <a href="https://www.e-education.psu.edu/earth107/node/3">https://www.e-education.psu.edu/earth107/node/3</a></li> </ul>	
<b>Mon, 6/8</b>	<b>Module 1: The Societies and Economics of Coastal Regions</b>	Online Lecture Complete Module 1 Assignments: <ul style="list-style-type: none"> <li>• Read Module 2 and associated readings for tomorrow</li> <li>• <a href="https://www.e-education.psu.edu/earth107/node/6">https://www.e-education.psu.edu/earth107/node/6</a></li> </ul>	Submit Module 1 Work to D2L
<b>Tues, 6/9</b>	<b>Module 2: A Global Glance at Coastal Landscapes (Geology &amp; Plate Tectonics of Coastlines)</b>	Online Lecture Complete Module 2 Assignments <ul style="list-style-type: none"> <li>• Read Module 3 and associated readings for tomorrow</li> <li>• <a href="https://www.e-education.psu.edu/earth107/node/517">https://www.e-education.psu.edu/earth107/node/517</a></li> </ul>	Submit Module 2 Work to D2L
<b>Wed, 6/10</b>	<b>Module 3: Coastal Systems: Landscapes and Processes</b>	Online Lecture Complete Module 3 Assignments	Submit Module 3 Work to D2L
<b>Thurs, 6/11</b>	Google Earth Virtual Field Trip & Section 1 Wrap-up	Online Lecture: Capstone Project Initiation & Planning Capstone Project Stage 1: <a href="https://www.e-education.psu.edu/earth107/node/1036">https://www.e-education.psu.edu/earth107/node/1036</a> <ul style="list-style-type: none"> <li>• Read Module 4 and associated readings for tomorrow</li> </ul> <a href="https://www.e-education.psu.edu/earth107/node/517">https://www.e-education.psu.edu/earth107/node/517</a>	
<b>Section 2: Intro. to Coastal Hazards: Long &amp; Short-term Processes of Change &amp; Their Impacts on Society</b>			
<b>Fri, 6/12</b>	<b>Module 4: Understanding Sea Level Change</b>	Online Lecture: Read Section 2 overview: <a href="https://www.e-education.psu.edu/earth107/node/821">https://www.e-education.psu.edu/earth107/node/821</a> Complete Module 4 Assignments <ul style="list-style-type: none"> <li>• Read Module 5 and associated readings for Monday</li> </ul>	Submit Module 4 Work to D2L
Week 2	Section 2: Intro. to Coastal Hazards Continued..		
<b>Mon, 6/15</b>	<b>Module 5: Coastal Catastrophes: Storms and Tsunamis</b>	Online Lecture Complete Module 5 Assignments <ul style="list-style-type: none"> <li>• Read Module 6 &amp; associated readings for tomorrow</li> <li>• <a href="https://www.e-education.psu.edu/earth107/node/526">https://www.e-education.psu.edu/earth107/node/526</a></li> </ul>	Submit Module 5 Work to D2L
<b>Tues, 6/16</b>	<b>Module 6: Impacts on the Societies and Economics of Coastal Regions</b>	Online Lecture Complete Module 6 Assignments <ul style="list-style-type: none"> <li>• Revisit Capstone Project Materials for tomorrow</li> </ul>	Submit Module 6 Work to D2L
<b>Wed, 6/17</b>	Google Earth Virtual Field Trip & Section 2 Wrap-up	Online Lecture: Capstone Project Stage 2: <a href="https://www.e-education.psu.edu/earth107/node/1037">https://www.e-education.psu.edu/earth107/node/1037</a> Read Section 3 overview for tomorrow <a href="https://www.e-education.psu.edu/earth107/node/517">https://www.e-education.psu.edu/earth107/node/517</a> Read Module 7 and associated readings for Monday <ul style="list-style-type: none"> <li>• <a href="https://www.e-education.psu.edu/earth107/node/527">https://www.e-education.psu.edu/earth107/node/527</a></li> </ul>	

Section 3: Coastal Engineering, Mitigation, and Society Response to Coastal Hazards				
Thurs, 6/18	<b>Module 7: Hard Structures and Coastal Modifications through Mimicking Natural Processes</b>	Online Lecture: Section 2: <a href="https://www.e-education.psu.edu/earth107/node/821">https://www.e-education.psu.edu/earth107/node/821</a> Complete Module 7 Assignments • Read Module 8 and associated readings for tomorrow <a href="https://www.e-education.psu.edu/earth107/node/694">https://www.e-education.psu.edu/earth107/node/694</a>		Submit Module 7 Work to D2L
Fri, 6/19	<b>Module 8: Managed Retreat/Multi-Layered Protection</b>	Online Lecture: Section 2: <a href="https://www.e-education.psu.edu/earth107/node/821">https://www.e-education.psu.edu/earth107/node/821</a> Complete Module 8 Assignments Pack and get everything ready for the trip to Wallops		Submit Module 8 Work to D2L
<b>Week 3</b>	<b>Section 3: Coastal Engineering, Mitigation, and Society Continued</b>			
		<b>Morning</b>	<b>Afternoon</b>	<b>Evening</b>
Sun, 6/21	Arrive at CB Field Station for Face-to-Face	Drive Safely!	Arrive Prior to 3:00 p.m.	<b>Capstone Project Progress Updates and Benchmarking and Schedule Overview</b>
Mon, 6/22	<b>Field Trip 1: Coastal Zone: Landforms, and Processes</b>	8:30 a.m. Wallops Island – Land/Marsh Trip	1:30 p.m. Assateague Island – D-Dike Land/Marsh Trip	6:30 – Field Data Analysis Lab Work & Capstone Project Work
Tues, 6/23	<b>Field Trip 2: Coastal Zone: Processes of Change &amp; Their Impacts</b>	8:00 a.m. <b>Kayak Trip Gargatha Landing, Metompkin Inlet, Kegotank Bay</b>	1:30 <b>Kayak Trip</b> Cont'd <b>Gargatha Landing, Metompkin Inlet, Kegotank Bay</b>	6:30 Guest Lecture – CNWR/NASA STAFF Read Module 9 & associated readings: <a href="https://www.e-education.psu.edu/earth107/node/695">https://www.e-education.psu.edu/earth107/node/695</a>
Wed, 6/24	<b>Module 9: Smart Building</b> <b>Field Trip 3: Coastal Zone: Engineering</b>	8:00 a.m. <b>Kayak Trip Cape Charles and Southern Delmarva</b>	1:30 <b>Kayak Trip</b> Cont'd <b>Cape Charles and Southern Delmarva</b>	<b>Complete and Submit Module 9 Work to D2L</b> Read Section 4 & associated readings: <a href="https://www.e-education.psu.edu/earth107/node/819">https://www.e-education.psu.edu/earth107/node/819</a>
Thurs, 6/25	<b>Field Trip 4: Coastal Zone: Society and Policy Making</b>	8:00 a.m. <b>Boat Trip: Assateague Channel and around Chincoteague Island</b>	1:00 <b>Boat Trip Continued: Assateague Channel and around Chincoteague Island</b>	6:30 Section 3 Wrap-up Field Data Analysis Lab Work & Capstone Project Work
<b>Section 4: Society and Policy Making – Sustainability and Vulnerability</b>				
Fri, 6/26	<b>Field Trip 5: Capstone Survey Work</b>	8:30 a.m. <b>Van Trip to Chincoteague Island as needed</b>	1:00 <b>Final Capstone Project Work</b>	6:30 Clean Lab, Load Van, Prepare Dorms & Your Belongings for Departure Tomorrow
Sat, 6/27	Course Wrap-Up	8:30 a.m. Capstone Presentations,	1:00 Departure	Ensure all final project documents (audit materials, presentation, etc.) are uploaded to D2L for grading before departure. <b>Turn in Field/Lab Notebooks by 1:00 p.m.</b>
<p><i>We know we're going to have sea rise. This is literally a one-way street now. The only thing we're discussing now is how fast, it's not whether it is going to happen anymore, it is however how much.</i></p> <p>—Harold Wanless, Professor Emeritus, Department of Geological Sciences at the University of Miami</p> <p><i>“You'll need to think about buying a home the way you think about buying a car. You purchase it, use it for a while, and as time goes on, it stops being an asset. The idea of legacy and the idea of investment, those won't apply here anymore.”</i></p> <p>—Nancy Gassman, Ph.D., Natural Resources Administrator, Energy and Sustainability Program, Broward County Natural Resources Planning and Management Division</p> <p><i>“It's not just a matter of real estate. And it's not just a matter of enjoying the land. It's a matter of sustaining the whole economy in the area. We obviously have to plan on building with great land use. However, building is still possible.”</i></p> <p>—Bonnie Lazar, Keller Williams Realty Services, Boca Raton; past President. Realtors Association of the Palm Beaches</p>				

