ESS 451 - Coastal Environmental Oceanography
Wallops Island, Virginia & Long Key, Florida
Tentative Course Syllabus

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Course Description:
This course examines the interaction of biological, chemical, physical, geological and ecological ocean processes as applied to coastal environments. Additional emphasis is placed on environmental management issues of the coastal zone. Topics include, but are not limited to: water quality and estuarine pollution, barrier island geology and ecology and their implications for beach defense. Advanced topics in coastal geomorphology and environmental issues pertinent to coastal settings, including human impacts on coastal landforms, shoreline erosion, wetland loss, sea-level fluctuations, nutrients in estuaries, metals in bays, and climate change will be covered. Lecture, field trips, and laboratory exercises are designed to provide students with hands-on experience with field and laboratory equipment used to solve real-world problems in diverse coastal settings.

Course Rationale:
As is clearly documented by the U.S. Census over the past 6 decades, and indeed censuses around the world, more than half of the World's population lives within a short distance of the world's coastlines. This pattern of population growth exerts an ever increasing demand for infrastructure, housing, employment, and recreation opportunities. Municipalities in coastal areas face the ever increasing demands of providing safe water, food, and transportation and access to the ocean front. Recently communities are looking to establish policies for the well-being of citizens that: 1) protect waterways from nutrient enrichment and pollution, 2) protect agricultural areas from urban/suburban sprawl, and 3) protect homes and properties from the effects of coastal processes. Unfortunately political and social conditioning to coastal zone management has lagged behind science in terms of providing for not only an understanding of the need for environmental protection but also for the legislation to attain meager goals that would protect and preserve biodiversity in these ecosystems, but also protect human life. At a time when sea-level is rising, the ability of coastal zone systems to function effectively against the impacts of storms, and other processes depends on the very fact that these systems are allowed to function naturally – a concept that directly impacts how humans interact with these systems currently. This course will ask students to develop an understanding of the physical and biological processes that drive the functioning of these systems and will require that they consider the implications associated with living, learning, and playing in these coastal systems. How will we need to act in the future in order to preserve human life and property?

Objectives:
There are several principle objectives for this course as listed below.

1. To introduce students to basic principles of coastal ecosystem biology, geology, and ecology in nutrient-rich systems (Chincoteague, Virginia area) and in nutrient-poor systems (Florida Keys, Florida).
2. To acquaint students with both laboratory and field equipment that are employed in coastal studies.
3. To provide students the opportunity to investigate strategies for monitoring coastal ecosystems and processes in estuary, lagoons, barrier islands, and in shallow oceanic settings.
4. To provide opportunities for students to carryout research and service-learning projects that encourage them to collect field data, develop techniques for recording and analyzing field data and producing appropriate maps, diagrams and cross-sections that accurately reflect the nature of natural systems.
5. To introduce students to primary literature dealing with management and protection of coastal ecosystems and the reasons for coastal zone management practices.

6. To provide students with opportunities to compile their results and showcase their learning via presentations to a general audience.

Evaluation/Grading:
Grades will be assigned as follows: A (>90 pts), B (80-89.99 pts), C (70-79.99 pts), D (60-69.99 pts), or F (<60 pts). Students will need to ACTIVELY participate in each activity as required by the instructor. This means that students will attend ALL class/laboratory/field trip events – unless previous accommodations have been arranged with the instructor. If a student is unable to participate in field opportunities – it will reflect in the final grade with 5 points subtracted for each missed activity. After 4 missed activities, the highest grade a student will earn would be a C.

Points will be earned as follows:

Participation/Attendance:	20 pts
Field Notebook	25 pts
Final Project	25 pts
Weekly Labs, Assignments, & Quizzes	15 pts
Readings & Group Discussions	15 pts

Notebook:
Students will be provided with a field notebook that must accompany them into the field at all times. Students must take detailed notes of each field location and any observations and data that are collected in the field. Notebooks will be periodically checked for detail, and at the instructor's discretion, early notebook grades may be assigned – especially if it appears that students are not keeping up with daily entries. Students are expected to draw, and describe all organisms collected and should include entries with that information. Organisms should be placed within their ecological framework (habitat, niche, trophic structure etc.). Each environment that we visit should be described chemically, physically, and biologically and integrated into a big-picture diagram for each region (VA and FL).

Although notebook set up depends on personal preference, legibility and clarity of entries are critical. All pages in the notebook need to be numbered. The first 4 pages of the notebook should be reserved for a Table of Contents that is filled in each day as new stops and localities are visited. Entries in a notebook should include: 1) written descriptions of each field stop including direction how to get to that site, 2) main purpose or context of each stop, 3) what was done at each stop, 4) drawings (A MUST), 5) hand sketches, pictures/maps from each stop, as well as 6) any additional information or data colleted from that stop.

In addition, a good notebook will include an appendix near the rear of the notebook that will record a list of species observed in the field and/or identified in the lab, and any reference information that will be useful in the field. Notebook entries must be unambiguous so that other people can read and understand what is written. It is crucial that general data such as habitat, date, tidal condition, time, etc. be associated with any specimens or samples collected. It is recommended that the date and location be written at the top of each page, and when either changes, broad dividing lines be used to distinguish such changes. It is best to avoid abbreviations, if they are used a key must be included in the field notebook or permanently attached to it. See additional handout for more information.

Final Project:
Teams of two will collaborate on a final research project. Details will be forthcoming, but these will be planned and completed under advisement of the instructor.

Pop Quizzes:
To ensure that students are keeping up with material presented in lecture, and any group readings, in the field, in lab, etc. an occasional quiz might be utilized to keep track of student learning. These quizzes may

not take place, however if students are not using their time effectively to continue to develop their projects, they could face a pop quiz that could result in a reduction of points on participation and assignment work.

Weekly Readings and Laboratory Work:
All students will be asked to keep up with the readings and other primary literature articles as assigned. These will be available online through D2L. https://d2l.ship.edu/. In addition, all students will be required to work in the laboratory to design and build experimental protocols, collect field data including GPS & GPR readings, process samples, identify specimens, perform photographic/microscopic analyses, download data, analyze data etc. If a student does not work regularly in the laboratory outside of class times and help their colleagues – their grade will be reduced at the discretion of the instructor.

This is a collaborative learning environment and everyone needs to chip in and do their part. Even if someone else collects the data, or analyzes a portion of it – all students need to record all data or obtain records of it for later use. This is an upper-level course with a significant focus on qualitative and quantitative research and data collection, therefore it is expected that some of the data collected and or experimental protocols developed during this course will be of publishable quality – or will be used in the future to document geoenvironmental trends when coupled with data collected in previous course years.

Course Schedule:
As is typical of any field course, where significant field work is involved – flexibility is required. Depending on weather, travel, or other factors the course schedule may be changed at any time. Students will be given some time each day for down-time – but a regular time-table will not likely be established.

A final schedule will be provided at the course onset. We will spend roughly 1.5 weeks at the MSC, prior to an 8-9 day trip to Florida. We will return to the MSC prior to the last day of the term. Day-to-day activities and assignments will be determined on an ongoing basis. Our activities will include kayaking – both in the Florida Keys and at the Marine Science Consortium, boating activities on board the monitors, the R/V Phillip Parker, and boats operated by the Keys Marine Laboratory. We will also hike and access other field sites on foot, so be prepared for a lot of field activity.

Final Notes:
We will be working together for this course. We will spend a significant amount of time together (including during our Florida Keys component) and it is important that all students recognize that responsible behavior and safety awareness is expected at all times. In the event that a student becomes a problem for themselves or other students, the culpable student(s) will be required to leave the course at their expense.