

## BI 412/512 Marine Field Studies: Coastal Biology

### Instructors:

Dr. Stewart Schultz and Jeff Goddard

**Course description:** This course provides an overview of the physical and biological features of the major coastal habitats in Oregon, including rocky shores, sandy beaches, dunes, estuaries and forests. Field trips and lectures will introduce students to the major organisms occupying these habitats, highlighting adaptations and ecological relationships. Students will also investigate selected species through small field projects and laboratory study.

**Field trips:** Field trips are the backbone of this course, and students should be prepared for a few moderately stressful, all day hikes with rain gear, rite-in-the-rain notebooks, water bottles, good hiking shoes and, for the trips to the shore, rubber knee boots or some kind water shoe (summer coastal ocean temperatures off Oregon are usually in the 50's, so dress appropriately).

**Small field projects and oral presentations:** On some field trips, after we have introduced the habitat and major species, the class will break into small groups to investigate in more detail species chosen by each group. In consultation with us, students will develop a focused question or hypothesis, and then make the appropriate observations to answer the question or test the hypothesis. Back in the classroom, each group will then prepare a ten minute oral presentation, describing their study organism and particular question, the methods they used to investigate that question, their results, and their interpretation of those results. In addition to giving students a chance to directly investigate in the field organisms of their own choosing, these projects will give students experience in applying the scientific method and preparing a succinct, oral presentation of their results.

**Lab sections:** Lab sessions will allow the students to observe, individually or in groups of two or three, selected organisms collected during the field trips. The lab will be available for use around the clock and have a small library of reference and guidebooks.

**Notebooks:** Students will keep a notebook recording their field and laboratory observations of the species and their respective habitats. Notebooks will also contain a written version of their small projects and oral presentations.

**Evaluation:** Students will be evaluated on:

1. The quality and completeness of their lab/field notebooks (30%)
2. Lab practical/exam (short answer format) (30%)
3. Small projects and oral presentations (30%)
4. Participation during lectures and class field trips (10%)

**Required supplies:** 8.5 x 11" unlined paper, bound or in a ring binder, Rite-In-The-Rain notebook and pencils. Cameras are not required but come in handy for recording images of the organisms and their habitats.

## Schedule and overview

(Note depending on the tides there may be some change in the order of days)

### WEEK 1

#### Monday

**Field Trip:** Sunset Bay and Simpson Reef Overlook, Cape Arago.

**Lecture:** Introduction to Oregon coast (1) Geology (plate tectonics, subduction zone, volcanism, basalt flows and headlands, coastal terraces and formation of sandy beaches and sand dunes), (2) Climate (N. Pacific High and Aleutian Low, seasonal wind directions, winter rains, summer drought, coastal fog, maritime vs. continental climate, El niño/Southern Oscillation, Pacific Decadal Oscillation), and (3) Oceanography (surface circulation, waves [including tsunamis], tides, upwelling and downwelling, fronts, phytoplankton and primary production).

**Lab:** Keeping a lab and field notebook; preparation of a herbarium. Classification and diversity of organisms; use of dichotomous keys. Begin identification and examination of selected rocky shore organisms.

#### Tuesday

**Field Trip:** Rocky shore, South Cove, Cape Arago. Examine rocky shore organisms, especially sessile epibiota and their mobile predators, and then break into groups and conduct mini-projects.

**Lecture:** Introduction to the biology and ecology of rocky shores (physical and biological stresses, adaptations to stresses; patterns of zonation and their causes (larval settlement, physical factors, competition for space, predation, symbioses); sources of food and feeding adaptations.

**Lab:** Present results of mini-projects; identification and adaptations of rocky shore organisms.

#### Wednesday

**Field Trip:** Lighthouse Beach. Introduce sandy beach organisms and then break into groups and conduct mini-projects.

**Lecture:** Introduction to the biology and ecology of sandy beach and surf zone ecosystems (high energy environment occupied largely by organisms adapted for swimming and burrowing; beach types [reflective, dissipative and intermediate] and differences in their respective food webs; surf zone diatoms and primary production; importance for migratory and resident birds).

**Lab:** Present results of mini-projects; identification and adaptations of sandy beach organisms.

#### Thursday

**Field trip:** South Slough mud and sand flats. Examine eelgrass beds, macroalgae, infaunal diversity and their predators.

**Lecture:** Introduction to estuaries (salinity gradients, low energy environment with high sedimentation, nutrient inputs and productivity; important as nurseries [including for commercially important species] and as stopovers for migratory waterfowl; relatively low diversity but high abundance of organisms adapted to stresses of salinity fluctuation, sedimentation, and steep gradients in oxygen and sulfide; microbial communities in soft sediments; high human impact, including more many introduced species than on outer coast).

**Lab:** Identification and adaptations of mudflats organisms, including surface microorganisms.

Week 2

Monday

**Field trip:** Hidden Creek Marsh, South Slough. Overview of salt marsh plants, and then break into groups and conduct mini-projects.

**Lecture:** Salt marsh ecosystems (dominated by vascular plants, adaptations to salt water and anoxic sediments; high primary production, much of which enters detritus-based food web)

**Lab:** Present results of mini-projects; identification and adaptations of salt marsh plants.

Tuesday

**Field trip/Lecture:** Humbug Mountain (all day). Introduction to coastal temperate forests (dominance of evergreen conifers, identification of dominant plant species in overstory, understory, and herb layer, influence of oceanographic processes on coastal forest ecology, old growth ecology and vertebrate dependence on old growth).

**Lab:** Adaptations of coastal forest plants.

Wednesday

**Field trip/Lecture:** Eel Creek. Introduction to coastal sand dune ecosystems (geologic and atmospheric causes of coastal dunes, adaptations of dune plants, ecology of introduced species and their effects on the dune environment, identification of major dune plant species).

**Lab:** Adaptations of coastal dune plants.

Thursday

**Lab Practical,** evaluation of notebooks, lab cleanup.