Syllabus: Marine Physiology (SIO 281)

Instructor
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Office hours By appointment
Time (*Lectures)* Wednesday/Friday 3.30 - 4.50 pm
Location (*Lectures*) IGPP 4301
Required textbooks
None, reference material will be uploaded to TED

Course Goals
To educate about physiological adaptations in diverse marine organisms, covering a wide spectrum from the biochemical to the cellular to the whole-organism level. To understand and be able to predict how adaptations are relevant in the natural environment and in relation to anthropogenic activities.

Learning Objectives
By the conclusion of the course, the students should be familiarized with biochemical and physiological adaptations in marine organisms. In particular, they should have learned principles on essential topics such as:
-ATPases (sodium/potassium, proton, calcium)
-Carbonic anhydrase
-Carbon concentrating mechanisms
-CO_2, pH and HCO_3^- sensing and regulation
-Epithelial ion transport
-Physiological responses to Ocean Acidification in phytoplankton, corals, mollusks and fish.
-Aerobic and anaerobic metabolism
-Comparative immunology
-Oxygen transport by respiratory pigments (hemocyanin, hemoglobin)

SIO 281 discusses classic and modern experimental techniques and research papers.

Course Website
Course materials will be available through the course website (http://ted.ucsd.edu). All students will need to be able to access this site. Be sure to check the course website frequently for announcements and updates.

Grading
Grades will be based on a 5-page (+references) research project due on December 12th (70%) and bi-weekly quizzes (30%).

Student choice
Undergraduate students: letter grade or Pass/No Pass
Graduate students: Letter grade or Satisfactory/Unsatisfactory

Schedule

Fri Oct 3	Introduction to the course
Wed Oct 8	Aerobic and anaerobic metabolism
Fri Oct 10	pH in biological systems
Wed Oct 15	(*) Carbonic anhydrase
Fri Oct 17	Biofluorescence & bioluminescence (Dimitri Deheyn)
Wed Oct 22	ATPases (e.g. Na^+/K^+-ATPase, V-H^+-ATPase)
Fri Oct 24	Molecular sensors of CO_2, pH and HCO_3^-
Wed Oct 29	*(*) Osedax* and hagfish physiology
Fri Oct 31	Comparative epithelial ion transport and regulation
Wed Nov 5	Effects of OA on fish
Fri Nov 7	(*) Effects of OA on invertebrates
Wed Nov 12	Coral physiology
Fri Nov 14	Comparative Immunology (Lena Gerwick)
Wed Nov 19	Effects of OA on corals
Fri Nov 21	(*) Ecophysiology of the deep sea environment (Tony Koslow)
Wed Nov 26	Effects of OA on phytoplankton
Fri Nov 28	THANKS GIVING
Wed Dec 3	Respiratory pigments
Fri Dec 5	Hypoxia in the aquatic environment (Horst Felbeck)
Wed Dec 10	(*) Cellular and molecular adaptations to hypoxia
Fri Dec 12	***Research project due***

Note: 1.20 h lectures
(*) indicates that a quiz will be given at the beginning of the class