

Dates: May 24th – June 4th
Credits: 3 credits
Prerequisites: None
Instructors: **Dr Edd Hammill & Dr Trisha Atwood**
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Office hours: By appointment

******YOU MUST PASS A SWIM TEST BEFORE GOING ON THIS TRIP******

Course Description

This course offers a unique hands-on opportunity to study the biology and ecology of coral reefs and their many inhabitants in Australia's Great Barrier Reef. To fully immerse students in the study of coral reefs, this program will be conducted at the Heron Island Research Station on the Great Barrier Reef. The duration of the course is 12 days. While at Heron Island students will participate in daily lectures about where and how coral reefs are formed, who lives on coral reefs, the species interactions that maintain coral reefs, and what are the major threats facing coral reefs today. Students will also be required to take part in daily reef walks and snorkel adventures where we will get up close and personal with many of the reefs' inhabitants and learn some of the techniques for studying coral reefs. Students will complete the course by undertaking a short-term original research project concerning some aspect of coral reef ecology.

OBJECTIVES:

To develop an understanding of and an appreciation for coral reefs through:

- 1) Gaining factual knowledge about the cultural, societal, and economic importance of coral reefs to humans
- 2) Gaining factual knowledge about the physical and biological properties of coral reefs
- 3) Learning and exploring the diversity of organisms and species interactions (symbiosis, predation, herbivory) that make up coral reef ecosystems
- 4) Learning and applying some of the different techniques used to study corals, fishes, and invertebrates in coral reef ecosystems.
- 5) Researching current issues and threats to coral reef ecosystems
- 6) Applying the scientific method to answer a research question
- 7) Successfully working in small groups to address a research question and effectively present your results to an audience

Required Materials:

As part of your course fees you will be given a field manual. This manual will include information on species identification, instructions on field and lab techniques, and other important readings. If you lose your field manual there will be an electronic one on Canvas. If you lose your manual and want a reprint you will be charged an additional \$75.

Canvas

We will use Canvas regularly for sharing announcements, accessing readings, accessing assignments, checking your grades, and submitting assignments.

Learner Outcomes:

At the conclusion of this course, you should be able to:

- 1) Describe how coral reefs ecosystems are formed
- 2) Explain how coral reef ecosystems function
- 3) Understand why coral reefs are important to humans
- 4) Identify the major threats coral reefs face
- 5) Develop research questions surrounding coral reef ecosystems and their ecology

Assessment:

5 points	Fish, coral, and invertebrate ID test (before trip)
15 points	Lab/Field analyses
5 points	Blogs
15 points	Participation
5 points	Group project pre-proposal
15 points	Group project presentation
30 points	Individual project report
<u>10 points</u>	<u>Video project</u>
100 points	Total

Fish, coral, and invertebrate ID test (5 points)

During the field portions of this course you will be surveying reef communities. Thus you must be able to identify, in the field, some of the more common species, genera, or families of fish invertebrates, and corals. Proficiency in identifying reef species will reduce errors in the survey data and it will enrich your experiences while snorkelling. Prior to your first snorkel trip you will be tested on the 50 most common fish, invertebrates and corals around Heron Island. This test will be done in a class room using photographs. To study for the test, use the reference photographs and species descriptions in your field manual. You will only be tested on the organisms presented in your manual. We recommend that you spend a minimum of 5 hours of study time on learning these organisms.

Lab/Field analyses (15 points)

In this class you will learn some of the common techniques marine biologists use to study corals, invertebrates, fish, and reef ecosystem processes. You will apply these techniques in the field in small groups to collect data, which you will then analyse back in the lab. Lab/field assignments

will assess your ability to apply data collection techniques, collect data, extract (video analyses) and input data into an excel sheet, apply basic graphing and statistics, and communicate your results in a lab report. Lab reports are done individually and should be a max of two pages. Lab reports must include: 1) a short description of the methods used to collect and analyse the data, 2) graphical representations of the data, 3) interpretations of trends/patterns in the data.

Labs/analyses

Benthic cover lab (3.75 points)

Invertebrate line-intercept transects (3.75 points)

Fish video analyses (3.75 points)

Herbivory lab (3.75 points)

Blogs (5 points)

Each night you will be given an hour to Blog about your experiences at Heron Island on the course website. Your blog can include photos and should be a reflection of your experiences that day, trials and tribulations you faced, amazing experiences, and anything else you want to say (Remember this is a University course so keep it clean!). Your blog will be graded at the end of the class as a whole instead of individual daily blogs. Grades will be assigned based on effort and presentation.

Participation (15 points)

Your enthusiasm, attitude, punctuality, and participation is crucial to ensuring that you and your classmates have an awesome, productive, and safe trip. If you keep a positive and enthusiastic attitude and are on time to scheduled events these should be easy points!

Research project

You will work in small groups on a short-term (2-3 days) original research project concerning some aspect of coral reef ecology. As a group you will select your own research question with guidance from Dr. Atwood and Dr. Hammill. Before commencing your research project, you must complete and turn-in a 1-page pre-proposal (see below). All research questions must be pre-approved by either Dr. Atwood or Dr. Hammill before you can start. You will be required to integrate at least one of the sampling techniques that you learned throughout the course into your project. The research project will be graded in three parts: pre-proposal, group presentation, and individual project reports. As a group you will present a 15-minute PowerPoint presentation on your research project to the class.

Group project pre-proposal (5 points)

Written outline on your idea. Must include hypotheses and methods. Your pre-proposal **MUST BE SIGNED OFF BEFORE YOU START YOUR PROJECT!!!**

Group project presentation (15 points)

Each group will give a 12 minute PowerPoint presentation on their group research project. Every group member must speak during this presentation. Your presentation should include (in this order) background information on your topic (what is known, what is not known), your hypotheses and how you generated them, methods used to collect your data and analyse them, results in graphical form, and conclusions. You will be graded on the aesthetics and use of PowerPoint, clarity of your science, and timing.

Individual project report (30 points)

Based on your group project you will write a manuscript style paper. This will include an abstract (100 words), methods, results (including graphs, tables, photos), discussion, and literature cited. Your report should be between 1500-2500 words (**Max 2500 words!**). For guidance on writing style and layouts see examples in field manual. Your report will be graded on the experimental design of your research question as well as your writing.

Video project (10 points)

For the final assessment you will produce a short (max 4 minute) video report on a human-caused threat the reef is facing (e.g. climate change, eutrophication). This assessment will be completed when you return home after the completion of the course, and will be due 6 weeks after you return. You are expected to edit the video using freely available video editing software (e.g. imovie on a mac, or windows movie maker). The video should be able to be understood by a non-scientific audience, avoid lots of scientific jargon. You will be graded based on the relevance of your topic, the integrity of the research, and your presentation style.

As an example, every year the Great Barrier Reef Marine Park has a completion where researchers submit videos describing threats to the reef. Here is a very very good one indeed...

<https://www.youtube.com/watch?v=TNISbtM41dQ>

Detailed descriptions and relevant grading rubrics for all other assignments are available on Canvas. Please email us or schedule an appointment if you have questions or concerns.

Grading scale				
A	100-93%	C	76-73	(Note: This grading scale is strict—for example: 89.4% is a B+ NOT an A-)
A-	92-90	C-	72-70	
B+	89-87	D+	69-67	
B	86-83	D	66-63	
B-	82-80	D-	62-60	
C+	79-77	F	59 and below	

Departmental and University Policies:

Statement Regarding Students with Disabilities

Students who have, or suspect they may have, a disability that will require accommodations in this course should contact the Disability Resource Center (DRC; University Inn # 101, 435-797-2444, drc@usu.edu) and one of the course instructors at least one month before departure to Heron Island. The DRC will work with you and your instructor to arrange for reasonable accommodations.

Academic Dishonesty

This course follows the University rules on civility and honesty. These can be found at <http://www.usu.edu/policies/PDF/Acad-Integrity.pdf>.

USU defines **cheating** as “intentionally: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity; (2) depending upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; (4) acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission; and (5) engaging in any form of research fraud.” **Falsification**, “includes the intentional and unauthorized altering or inventing of any information or citation in an academic exercise or activity.” **Plagiarism**, “includes knowingly representing, by paraphrase or direct quotation, the published or unpublished work of another person as one’s own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.” (This includes internet sources.) The penalty for cheating in this class will be a zero grade for the exam or assignment in question. In addition, the offense will be reported to the Office of Student Conduct for inclusion in the student’s permanent record.

THIS SYLLABUS IS NOT A CONTRACT

Aspects of the course, schedule and work to be handed in may be changed at any time depending on progressions.

**Coral Reef
Timetable**

Tuesday 24th May

(Sunset 17:14 pm)

12:30	Students check-in at Gladstone Marina	
14:00	Leave on Catamaran for Heron Island	
16:00 – 16:30	Arrive Heron Island HIRS Induction	HIRS staff
16:30	Station induction and settle in to rooms	
17:30	Gathering of snorkelling gear	Dive shed
18:00-19:00	Dinner	
19:00-19:45	Lecture	Snorkel safety and trip plans

Wed 25th May

High tide: 7:48 Low tide: 14:00 pm (Sunrise 6:23am; Sunset 17:14 pm)

6:30	Snorkel induction	harbour
8:30	Breakfast	
9:30-11	Lecture	Reef morphology and distribution
11:15-12:00	Lecture (field prep)	
12:00	lunch	
13:00-16:00	Field: benthic % cover; canopy height	Heron lagoon reef walk
16:00-18:00	Lab: analysis of benthic cover data	
18:15-19:15	Dinner	
19:15-20:00	Blog updates	

Thurs 26th May

High tide 8:34 am Low tide 14:43

7:00-8:00	Breakfast	
8:00-12:00	Field: invertebrate point-intercept transects	Heron lagoon-reef walk
12:00-13:00	Lunch time	
13:00-15:00	Lab: invertebrate community	
15:00-16:00	Free time	
16:00-18:00	Lecture	Invertebrates
18:00-19:00	Dinner	
19:00-20:00	Blog updates	

Fri 27th May

High tide 9:09 Low 15:36

7:30-8:30	Breakfast	
8:00	Edd and Trish set cameras	
8:30-10:30	Lecture	Fish
10:30-11:15	Fish video analysis techniques	
11:15-12:00	Free time	
12:00-13:00	Lunch	
13:00-15:00	Lab: Video analysis of High tide	
14:36	Low tide camera set	
16:36	Pick up low tide cameras	
15:00-17:00	Free time/Blog updates	
17:00-19:00	Lab: Video analysis of high tide	
19:00-20:00	Dinner	

Sat 28th May

High tide 10:10 Low 16:14

7:00	Breakfast	
8:00-12:00	Boat to the outer reef	
12:00-13:00	Lunch	
13:00 -14:00	Discussion, differences in lagoon/outer reef	
14:00-16:00	Lecture	Megafauna
16:00-17:00	Free time	
17:00-19:00	Lecture	Competition and Symbiosis
19:00-20:00	Dinner	
20:00-21:00	Blog updates	

Sun 29th May

High tide 11:05 Low tide 17:04

7:00-8:00	Breakfast	
8:00-12:00	Field: Herbivore assays	
12:00-13:00	Lunch	
13:00-16:00	Lab, analysis of herbivore assays	
16:00-17:00	Free time	
17:00-19:00	Lecture	Predation and Herbivory
19:00-20:00	Dinner	
20:00-21:00	Blog updates	

Mon 30th May

High tide 12:09 Low tide 6:30; 18:00

6:00-7:30	Megafauna snorkel	Heron jetty
7:30-8:30	Breakfast	
8:30-10:30	Lecture	Threats to coral reefs
10:30-12:00	Pre-proposals discussions	
12:00-13:00	lunch	
13:00-14:00	Free time	
14:00-17:00	Pre-proposals/Project design	
17:00-18:00	Blogs	
18:00-19:00	Dinner	
19:00-21:00	Movie night (Blue Planet)	

Tues 31th May

High tide 13:27 Low tide 7:28; 19:04

7:00-8:00	Breakfast	
8:00-12:00	Laboratory groups	
12:00-13:00	lunch	
13:00-18:00	Laboratory groups	
18:00-19:00	dinner	
19:00-20:00	Blog updates	

Wed 1 June

High tide 14:51 Low tide 8:36; 20:19

7:00-8:00	Breakfast	
8:00-12:00	Laboratory groups	
12:00-13:00	lunch	
13:00-18:00	Laboratory groups	
18:00-19:00	dinner	
19:00-20:00	Blog updates	

Thurs 2 June

High tide 16:03 Low tide 9:43

7:00-8:00	Breakfast	
8:00-12:00	Lab groups	
12:00 -13:00	lunch	
13:00-18:00	Lab groups	
18:00-19:00	dinner	
19:00-20:00	Blog	

Fri 3 June

High tide 17:01 Low tide 10:39

7:00-8:00	Breakfast	
8:00-12:00	Boat reef snorkel	
12:00-13:00	lunch	
13:00-18:00	Presentations	
18:00-19:00	dinner	
19:00	Debrief/Party	

Sat 4 June

7:00	Breakfast	
8:00	Pack up and clean	
8:45	Place luggage for pickup	
9:30	Meet at Catamaran	
10:00	Catamaran to Gladstone	
12:00	Arrive in Gladstone	