

I ILLINOIS

IB456 - Advanced Tropical Marine Bio

Spring 2027

Course Information

- Course Duration: Full Semester
- Contact Hours: Tuesday, Thursday, 11:00-12:20; 2 x 80-minute lecture periods each week, lab: Friday 10:00-13:00; 1 x 170 min
- Course Format: in-person
- Course Location: NHB 4074
- Weekly Hours of Expected Student Work: 6 hours instruction time (lecture hours, plus lab hours), additional: 8 hours outside of class per week, Contact time exceeds 4 hours due to the lab component. Weekly expected student work has been reduced to accommodate this increase.
- Credit Hours: 4

Instructor Information

Dr. Tanja Hofmann

School of Integrative Biology

- Contact information: thofmann@illinois.edu
- Office location: NHB 2010
- Drop-in hours for students: by appointment
- Teaching Assistant (TA): TBA

Teaching Assistant (TA): TBA

Ph.D. Student

School of Integrative Biology

- Contact information: TBA
- Office location: TBA
- Drop-in hours for students: by appointment

Course Description

- This course offers a comprehensive exploration of tropical marine ecosystems, focusing on the biogeography, evolution, and ecology of coral reefs, mangroves, and seagrass beds. Students will investigate the function, physiology, behavior, and ecological roles of tropical marine organisms, as well as the evolutionary dynamics of reef systems and their inhabitants.
- Key topics include organismal adaptations to physical and chemical environmental factors, natural processes shaping reef structure and function, and the life history traits, anatomy, and distributions of species within these ecosystems. The course will highlight the interactions between reef fishes and coral communities, as well as the ecological importance and challenges of coral reef fisheries.
- Modern threats—such as thermal bleaching, ocean acidification, nutrient pollution, and disease—will be critically examined, with attention to the ecological processes shaping the future of tropical systems. The course concludes with a critical analysis of natural and human impacts on reefs, seagrass beds, and mangrove ecosystems, emphasizing contemporary strategies for management and conservation.

Learning Outcomes

In this course, students will be able to:

- Apply principles of physical oceanography to predict the distribution and biogeography of tropical marine ecosystems
- Analyze ecological interactions among marine organisms in tropical habitats, including coral reefs, mangroves, and seagrass beds.
- Identify and compare physiological adaptations of tropical marine species, synthesizing these differences across ecosystems.
- Integrate ecological and physiological concepts to evaluate the impacts of anthropogenic stressors—such as rising temperatures, pollution, and ocean acidification—on ecosystem resilience.
- Critically review and synthesize scientific literature from peer-reviewed sources, interpreting its significance for marine conservation through written assignments and presentations.
- Gain hands-on experience in experimental research, including the care, maintenance, and husbandry of marine cnidarians.
- Design and conduct physiological experiments, analyze results, and communicate findings in the context of ecological and physiological theory.
- Effectively present scientific data related to tropical marine systems to both specialist and non-specialist audiences.
- Evaluate current conservation and management strategies by applying course concepts to real-world case studies.

Prerequisites

N/A

Course Materials

Learning Management System (LMS)

Canvas will contain all lecture and assessment material.

Course Readings

There is no textbook for the course. All required and recommended reading will consist of scientific publications and links will be provided on Canvas

Materials

Students will need access to a laptop for the course.

Software

Students are required to use Microsoft Office programs for completion of the assignments and lab work. These can be purchased/downloaded from the [Webstore](#) [Microsoft Office](#).

Course Requirements and Policies

Grading Breakdown

Instructional Activity	Occurrences	Point Value	Total Points
In-class/homework weekly paper discussion scores - best 20 count	20/24	100	10%
Exam – Coral reef biology	1	250	25%
Exam – Threats to and conservation of tropical marine systems	1	250	25%
Lab 1 – Virtual coral survey, data collection, analysis and results presentation	1	50	5%
Lab 2 – Virtual coral practical, results analysis, results presentation and discussion in context of literature	1	50	5%
Lab 3 - Final Project, Scientific lab investigation, impact of environmental	1	200	20%

Instructional Activity	Occurrences	Point Value	Total Points
factor on reef animals (scientific paper write-up)			
Lab 4 - Final Presentation, Research conservation case study (oral poster)	1	100	10%
Total	N/A	N/A	100%

Grading Criteria

Grading criteria will be provided for each lab report and rubrics will be available on Canvas. Feedback will be provided in the subsequent week after hand-in (see course components and course schedule below.

Course Components

Assignments

In-class/homework **paper discussions**. There will be 1 per lecture, which will be either completed as part of the class activities or for homework. The paper questions will link directly to the content of the class. Grades and feedback for class-discussions will normally be provided in the subsequent lecture. Each discussion paper will be worth 5 points. A total of 24 paper discussions will be available (1 per lecture) and the best 20 will be included in the final grade (total score 100 points). These are paper based activities which can also be downloaded from Canvas (if class is missed for a valid reason).

Lab reports

Lab 1 (1 session) – Virtual Coral Survey. This lab is computer based. Virtual data collection will be completed in lab time. Students will start data analysis and presentation of results during lab time and will receive formative verbal feedback during this session from the TA as well as a grading grid detailing point allocation. Students will complete the lab report at home and hand it in at the subsequent lab session the following week. Grades and feedback will be provided in the subsequent lab one week later (total points 50). See course schedule of timings of submission.

Lab 2 – (2 sessions) Virtual Coral Lab.

This lab is computer based and will run for two sessions. Students will be provided with an experimental data set and will start data analysis and presentation of results in session 1. Students will receive formative verbal feedback during this session from the TA as well as a grading grid detailing point allocation for the results section.

In session 2, students will have the opportunity to improve on their data analysis and results section based on previous feedback and will start the discussion section. Students will receive formative verbal feedback during this session from the TA as well as a grading grid detailing point allocation for the discussion section. Students will complete the lab report at home and hand it in at the subsequent lab session the

following week. Grades and feedback will be provided in the subsequent lab one week later (total points 50). See course schedule of timings of submission.

Lab 3 – Final project (7 sessions). Students will conduct a **scientific investigation** into the impact of an environmental factor on behavior or physiology of a reef invertebrate. The project will run over 7 lab sessions. Students will design the experiment in pairs using replicate tropical marine biology tanks and a selection of marine invertebrates, collect and analyze data. A list of possible invertebrates and a short reading list will be provided to students as a starting point.

The lab report will consist of a full scientific paper, which students will complete in sections, i.e. Introduction, Methods, Results, Discussion and References over the seven sessions (see course schedule for details of handing in times). Students will hand in the section they have completed at the end of each lab and will receive formative written feedback on this section from the TA in the subsequent week. A grading grid detailing point allocation for all sections will be provided to the students. The final project will be handed in a week after the final lab session, giving students time to complete the report at home to integrate formative feedback comments. Final grades and feedback for the entire project will be provided the week (total 200 points). See course schedule for timings of submission.

Lab 4 – Scientific poster (3 sessions). Students will produce a scientific poster and give an oral presentation on the conservation of a tropical marine ecosystem or species. Grading grids for both the structure of the scientific poster (50 points) and the oral presentation (50 points) will be provided. In session 1, students will decide on the content of their poster and start to research the topic area. In session 2, students prepare the poster and will receive formative verbal feedback from the TA during this session. In session 3, students will present their posters. Grades and feedback will be provided in the subsequent lab (total 100 points). See course schedule for timings of submission.

Exams

Exams will take place in lecture time (see course schedule).

Exam 1 – This exam will consist of 5 short-answer questions, each worth 2 points and 1 essay question worth 15 points on topics focusing on coral reef biology. A review lecture before the exam will provide exemplar material of past essay questions. Students will also be provided with a mock essay title prior to the exam (see course schedule) and will receive formative written feedback on their essay plan from the instructor. In the exam a choice of 3 essay titles will be provided.

Exam 2 – This exam will consist of 5 short-answer questions, each worth 2 points and 1 essay questions worth 15 points on topics focusing on tropical marine ecosystem threats and conservation. A review lecture before the exam will provide exemplar material of past essay questions. Students will also be provided with a mock essay title prior to the exam (see course schedule) and will receive formative written feedback on their essay plan from the instructor. In the exam a choice of 3 essay titles will be provided.

There is no final exam.

Late Assignment Policy

If you are unable to meet a particular deadline, please communicate with the instructor as soon as possible to avoid incurring a penalty for late submission. As per Student Code you will have two weeks to request accommodation.

Class Attendance

The [Student Code](#) states "Regular class attendance is expected of all students at the university." In class discussions form part of grading (see above) and absences will impact on students' final outcome, unless students follow absence policy as outlined below.

Absence Policy

The [Student Code](#) outlines those circumstances in which a student may be eligible to obtain a letter from the Office of the Dean of Students for missed class. When eligible, students must submit an [absence letter request](#) within two weeks of returning to class following the absence. For known absences, students are expected to email the instructor at least 1 day in advance of the class.

Participation

There are expectations and/or grading based on class participation/discussion – i.e. graded in class paper discussions. See above for how participation will be calculated for the grade.

Final Letter Grades

Grading Scale

[Final letter grades are determined based on [point ranges](#) (see below).

Percentage	Letter Grade
98.00% - 100.00%	A+
93.00% - 97.99%	A
90.00% - 92.99%	A-
87.00% - 89.99%	B+
83.00% - 86.99%	B
80.00% - 82.99%	B-
77.00% - 79.99%	C+
73.00% - 76.99%	C
70.00% - 72.99%	C-

67.00% - 69.99%	D+
63.00% - 66.99%	D
60.00% - 62.99%	D-
59.99% and below	F

Campus Academic Policies & Statements

Academic Integrity

The University of Illinois Urbana-Champaign [Student Code](https://studentcode.illinois.edu/) (https://studentcode.illinois.edu/) should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the [Academic Integrity Policy](https://studentcode.illinois.edu/article1/part4) (https://studentcode.illinois.edu/article1/part4). Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

AI policy

In this course, AI tools are permitted only in specific circumstances. This policy outlines how these tools may be used in ways that support and uphold academic integrity.

This course emphasizes the development of critical thinking, writing, problem-solving and data analysis skills. Because these skills are essential, some uses of AI are restricted.

Students may use AI for the following purposes only:

- Brainstorming ideas or topics (e.g. for essay plan)
- Research support (e.g. finding relevant experiments for the final project)
- Organizing structure (e.g. for essay plan)

Assignment-specific guidance:

- Lab 1 & Lab 2 – use of AI not permitted
- Lab 3 & 4 – AI can be used as research support (see above)
- Essay planning – AI can be used to brainstorm and organize structure

The following uses are not permitted on this course:

- Submitting fully AI generated work as your own
- Using AI without disclosure

- Generating answers for any assessed work

It is the students' responsibility to critically evaluate AI-generated content. AI outputs may be inaccurate, incomplete, biased, fabricated or insufficiently nuanced.

Students are required to disclose AI use by a) including a brief statement describing how AI was used, b) citing AI tools in a reference section.

Improper use of AI will be considered a violation of course expectation and may be treated as academic misconduct, consistent with University policies.

If you are unsure whether a specific use of AI is permitted, please ask before submitting the work.

Students with Disabilities

The University of Illinois Champaign-Urbana, is committed to ensuring that all students, including students with disabilities, do not experience barriers to learning and participating fully in class. Students who have a letter of accommodation from Disability Resources and Educational Services (DRES) are advised to share that with instructors as soon as possible to ensure accommodation needs can be discussed and met.

To obtain disability-related academic accommodations, disabled students are encouraged to contact DRES as soon as possible. To contact DRES, please visit 1207 S. Oak Street, Champaign, call (217) 333-1970, email disability@illinois.edu, or visit the [DRES website](https://dres.illinois.edu/) (<https://dres.illinois.edu/>).

Family Educational Rights and Privacy Act (FERPA)

See [FERPA – Office of the Registrar](https://registrar.illinois.edu/academic-records/ferpa/) (<https://registrar.illinois.edu/academic-records/ferpa/>) for more information on the Family Educational Rights and Privacy Act (FERPA).

Mental Health

Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Health Service Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline 988
- Rosecrance Crisis Line (815) 720-4953 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

This statement is approved by the University of Illinois Counseling Center.

Community of Care

As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether regarding their well-being or yours, we encourage you to refer this behavior to the Connie Frank CARE Center (formerly the Student Assistance Center) in the Office of the Dean of Students. You may do so by calling (217) 333-0050 or by submitting an CARE [online referral](https://odos.illinois.edu/community-of-care/referral) (<https://odos.illinois.edu/community-of-care/referral>). Based on your report, staff in the Connie Frank CARE Center will reach out to offer support and assistance.

Further, as a Community of Care, we want to support you in your overall wellness. We know that students sometimes face challenges that can impact academic performance (examples include mental health concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact the [Connie Frank CARE Center](https://odos.illinois.edu/community-of-care/CAREcenter) (<https://odos.illinois.edu/community-of-care/CAREcenter>) (formerly the Student Assistance Center) in the Office of the Dean of Students for support and referrals to campus and/or community resources.

Ombuds Assistance & Resources for Students (OARS)

OARS is housed in the Office of the Dean of Students and serves as a confidential, impartial, informal, and independent resource for students seeking guidance, clarity, and resolution when facing challenges or conflicts with university faculty, staff, policies, procedures, or practices. The office exists to provide a space where students can feel heard, discuss their concerns, explore potential options and pathways for resolving disputes and, when appropriate, be referred to other campus resources. The Student Ombudsperson listens without judgment, helps clarify issues, identifies possible pathways forward, and supports students in making their own decisions. For more information, please visit [the Ombuds Assistance & Resources for Students \(OARS\)](https://oars.illinois.edu/) (<https://oars.illinois.edu/>).

Disruptive Behavior

Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported using the [Public Incident Report Form](https://go.illinois.edu/ReportMisconduct) (<https://go.illinois.edu/ReportMisconduct>), email (conflictresolution@illinois.edu), or phone (217) 333-3680 to the [Office for Student Conflict Resolution](https://conflictresolution.illinois.edu/) (<https://conflictresolution.illinois.edu/>) for disciplinary action.

Emergency Response Recommendations

For emergency response recommendations and building floor plans, review [Public Safety's Run, Hide, Fight information](https://police.illinois.edu/em/run-hide-fight/) (https://police.illinois.edu/em/run-hide-fight/), [Emergency Action Plans](https://eoc.illinois.edu/plans/eap/) (https://eoc.illinois.edu/plans/eap/), and [Facility Access Maps](https://facilityaccessmaps.fs.illinois.edu/archibus/schema/ab-products/essential/workplace/index.html) (https://facilityaccessmaps.fs.illinois.edu/archibus/schema/ab-products/essential/workplace/index.html). I encourage you to review these resources within the first 10 days of class.

Religious Observances

It is the policy of the University of Illinois Urbana-Champaign to reasonably accommodate its students' religious beliefs, observances, and practices that conflict with a student's class attendance or participation in a scheduled examination or work requirement, consistent with state and federal law. Students must make requests for accommodation in advance of the conflict to allow time for both consideration of the request and alternate procedures to be prepared. Requests should be directed to the instructor. An optional resource to assist students in making such requests can be found on the [Religious Observances website](https://odos.illinois.edu/resources/students/religious-observances) (https://odos.illinois.edu/resources/students/religious-observances) of the Office of the Dean of Students.

Sexual Misconduct Reporting Obligation

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including supportive measures, resources, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found on [We Care Student Resources](https://wecare.illinois.edu/resources/students/#confidential) (https://wecare.illinois.edu/resources/students/#confidential) and on the [Illinois app](#). Other information about resources and reporting is available on [At Illinois We Care](https://wecare.illinois.edu/) (https://wecare.illinois.edu/) and on the [Illinois app](#).

Veterans and Military Students

As a military-friendly institution, and per federal regulations and Illinois statutes, the University of Illinois Urbana-Champaign has established policies and procedures to accommodate military-connected students. In addition to the support available at the [Chez Veterans Center](https://chezveteranscenter.ahs.illinois.edu/) (https://chezveteranscenter.ahs.illinois.edu/), members of the National Guard or Reserves and active-duty military personnel with military obligations (e.g., deployments, training, drills) are encouraged to communicate these, in advance whenever possible, to the instructor. For policy details, see the Student Code on [Excused Absences and Departure from the University for U.S. Military or other U.S. National Defense Services](https://studentcode.illinois.edu/article3/part3/3-313) (https://studentcode.illinois.edu/article3/part3/3-313).

Course Schedule/Outline

Week	Topics	Instructional Activities
Week 1 (01/18/27-01/24/27)	• Introduction to the course/evolution of coral • Biogeography of coral	Hand in 2 paper discussions in lectures No lab
Week 2 (01/25/27-01/31/27)	• Coral reef importance and global status • Coral reef assessment and monitoring	Hand in 2 paper discussions in lectures Lab 1 – Virtual coral reef survey. Data collection, analysis and presentation of results. Formative verbal feedback given during lab session
Week 3 (02/01/17-02//07/27)	• Coral reef biology – taxonomy, heterotrophy, photobiology, larval settlement • Coral reef biology – Calcification and reproduction	Hand in 2 paper discussions in lectures Hand in lab 1 in lab session Lab 2 – Session 1 Virtual coral reef experiment. Data analysis and presentation of results. Formative verbal feedback given during lab session
Week 4 (02/08/27-02/14/27)	• Coral reef biology – Larval dispersal and connectivity • Coral reef community ecology	Hand in 2 paper discussions in lectures Lab 2 – Session 2 Virtual coral reef experiment. Discussion section. Formative verbal feedback given during lab session
Week 5 (02/15/27-02/21/27)	• Well-being day - essay planning • Phyto and zooplankton	Hand in 1 paper discussion in lecture Hand in essay plan in lecture 2 to instructor for formative written feedback in week 6

Week	Topics	Instructional Activities
		Hand in lab 2 in lab session Lab 3 – Session 1 Literature review and planning of experiments Hand in Experimental Plan to TA for formative written feedback in next session
Week 6 (02/22/27-02/28/27)	• Reef algae and invertebrates • Teleost (reef fish)	Hand in 2 paper discussions in lectures Lab 3 – Session 2 Set up experiments, continue literature review, write introduction Hand in Introduction section to TA for formative written feedback in next session
Week 7 (03/01/27-03/07/27)	• Elasmobranchs (sharks and rays) • Marine mammals	Hand in 2 paper discussions in lectures Lab 3 – Session 3 Baseline data collection, write up methods Hand in Methods section to TA for formative written feedback in next session
Week 8 (03/08/27-03/14/27)	• Review lecture • Exam 1	Lab 3 – Session 4 Data collection 1, plan data analysis Hand in data analysis plan to TA for formative written feedback
Week 9 (03/15/27-03/21/27)	• Spring break	

Week	Topics	Instructional Activities
Week 10 (03/22/27-03/28/27)	- Marine reptiles - turtles - Marine reptiles – iguanas, crocs and snakes	Hand in 2 paper discussions in lectures Lab 3 – Session 5 Data collection 2, data analysis
Week 11 (03/29/27-04/04/27)	- Mangroves - Seagrasses	Hand in 2 paper discussions in lectures Lab 3 – Session 6 Data collection 3, data analysis, complete results write-up Hand in Results section to TA for formative written feedback
Week 12 (04/05/27-04/11/27)	- The impact of fisheries - Coral mining and tourism	Hand in 2 paper discussions in lectures Lab 3 – Session 7 Write-up discussion Hand in Discussion section to TA for formative written feedback
Week 13 (04/12/27-04/18/27)	- Well-being day – essay planning - Coral diseases and corallivores	Hand in 1 paper discussion in lecture Hand in Lab 3 final report in lab session Lab 4 – Session 1 Start research for scientific poster
Week 14 (04/19/27-04/25/27)	- Ocean acidification - Climate change and bleaching	Hand in 2 paper discussions in lectures Lab 4 – Session 2 Complete posters Formative verbal feedback given during lab session

Week	Topics	Instructional Activities
Week 15 (04/26/27-05/2/27)	• Conservation and restoration • Cold water coral	Hand in 2 paper discussions in lectures Lab 4 – Session 3 Hand in lab 4 posters and complete oral presentations
Week 16 (05/03/27-05/09/27)	• Review lecture • Exam 2	

Rules of the laboratory

For the safety of all students and instructors please review the lab rules outlined below.

1. Food and drink are not allowed in the laboratories. Keep drinks in your backpacks. You are allowed to drink in the backpack area.
2. Bare feet, flip-flops and sandals are not allowed in the labs that require the use of chemicals (PTC lab); closed-toe shoes are required. Full-length pants or equivalent are required. Students won't be allowed in the lab if this rule is not followed.
3. The use of cell phones is not allowed unless the lab activities require it.
4. Coats (or extra apparel), backpacks, and bags must be stored in the cabinets, on the metal racks, or under the lab benches or chairs.
5. The walking areas must be completely clear.
6. Assume that all chemicals of unknown toxicity are highly toxic.
7. Do not perform any unauthorized experiments. Do not use equipment without instruction.
8. Microscopes and slides must be cleaned and returned to the bench for later sections.

9. The labs must be cleaned by the students after each lab. This includes the lab tables, the sink, and, if necessary, the floor. Use the sponges and paper towels provided. Wipe the lab bench down at the end of every lab. Put away all supplies.
10. Wash your hands with soap before leaving the laboratory.
11. Labs start on time and students are allowed to leave only when the TA dismisses the class.
12. The TAs and the classroom assistant oversee the orderly conduct of labs and may exclude a student who does not comply with a reasonable request in this regard.
13. The TAs and prep staff are not responsible for any student belongings during labs; only the necessary items to labs.