

SIO 131 Parasitology (working draft)
Spring 2022

Course Instructor:

Professor Ryan Hechinger, Scripps Institution of Oceanography
Zoom office hour: Fri 12:30-1:30 pm; rhechinger@ucsd.edu

Teaching Assistant:

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Course structure: Two in-person lecture sessions/week on M & W, 12:30pm – 1:30 or 2 pm, followed by a 4-4.5 h laboratory. In-person attendance is required.

Course Description: An ecological approach to parasitology. Students will gain the intellectual and practical foundation required to undertake parasitological research. **Lectures** will cover biological/ecological/evolutionary concepts, and the biology (e.g., morphology, life cycles, and physiology) of various parasitic taxa. Lectures will be recorded to permit asynchronous attendance. Lectures will also introduce students to the **laboratory material**. The goal for the laboratory exercises is that students will learn how to (1) survey hosts for parasites, (2) collect, study, & identify parasites, (3) learn basic parasite anatomy & functional morphology, and (4) collect and analyze parasitological data. Additional **homework** questions and/or assignments will complement the lab exercises and will be **due every Monday ON CANVAS morning BY 8:00 am** (note, homework less than a week late gains ½ points, over a week, 0 points).

In the labs, students will dissect fresh hosts and examine live and fixed parasites. We will emphasize marine hosts and parasites, but include some terrestrial parasites. We emphasize metazoan and eukaryotic single-celled parasites of animal hosts. However, the concepts and skills will apply broadly to other types of parasite-host systems.

Laptop: Students are required to bring a laptop to the lab. We will use them in almost every lab. You will need JMP statistical software. We have arranged for you to access this software, free-of-charge.

Textbook (required—bring ideally to 1st lab, 2nd at latest!): Goater, Goater, & Esch (2014) Parasitism: the diversity and ecology of animal parasites (2nd ed.). Cambridge University Press (print or digital edition). *This book includes many of the concepts covered in lecture, but will also serve as a reference for the laboratory.*

Textbook (recommended): Roberts, Janovy, & Nadler (2013) Foundations of Parasitology (9th edition). McGraw Hill. *This book provides more extensive detail on the biology of classical parasite groups. It can serve to fill in a lot of detail missing in Goater et al. (2014).*

Textbook (recommended): Loker & Hofkin (2015) Parasitology: a conceptual approach. Garland Science. *This book does the most thorough job of covering concepts in parasitology, but does not provide much information on basic biology (which we need in the laboratory).*

Lab notebook: Get and bring a bound “composition” book or a ring-bound folder with unlined pages. Unlined pages are best for creating unhindered and interpretable drawings. All drawings must be done with a soft-leaded pencil (HB or softer). Only one reason to use pencil is to permit erasing. Most of us should be doing a decent amount of erasing while you draw your organisms to get them drawn correctly. You can label and write notes in pen. Your lab book will be collected and graded two times during the quarter.

Dissecting kit: We are providing each student with a “parasitology processing/dissecting” kit (checked out for quarter)!

Lab policy: You must wear **closed-toe shoes** (even we will, darn it). You will be asked to leave if you don't have them on. **No food or drink is to be consumed in the lab**. I advise eating lunch beforehand. You can take a 10-minute break between lecture and lab when you can eat some food.

Waitlistees: Because it's a lab course, waitlisting is tough. But it's doable. You must contact me in the first class AND fully take part in the initial lectures and labs. You'll have to share lab station space to the extent possible, and seek to be helpful to the enrolled students who are sharing.

Getting to Hubbs Hall: From the main campus catch the SIO Shuttle, which leaves every 15 minutes (<https://transportation.ucsd.edu/campus/shuttles/sio.html>). The shuttle has limited capacity, so if you all try and get the last shuttle (say, the 12:15 Gilman shuttle), some of you will miss out! I strongly advise you to take the 11:45 or 12:00 shuttle; go for 12:15 as last option. Come early and eat lunch around Hubbs Hall—there are nice places on the ground or south-side balconies! Get off the shuttle at the IGPP or Eckart/Hubbs stops and walk to Hubbs Hall; go in the 3rd floor East door; make your way to the northeast corner of the 3rd floor, where you will find the laboratory 3300.

Canvas web site: We will post lecture slides, lab guides, and other things on the course page.

Grading:	Component	Percent	~Points	(all points will be normalized to the percentage for the component)
	Homework	15%	90	(5 pts/lab, perhaps 18 labs)
	Lab book	15%	90	(5 pts/lab, perhaps 18 labs)
	Midterm	20%	80	
	Practical	25%	100	
	Final Exam	25%	100	
	Total points	100%	480	

Grading scale: We usually do not use a curve. So, it's possible for everyone to get at A! We also have a very liberal grading scale:

- A 87-100% total (95-100% = A+)
- B 74-87% total (82-87%=B+)
- C 61-74% total (69-74% = C+)
- D 48-61% total

Schedule:

Week	Session	Date	Lecture: Major concept	Lecture: Taxa	Lab exercises (homework)
1	1	Mon-28-Mar	Course logistics; definitions of parasite; trophic strategies (Ch 1)	Trematoda 1 (Ch 6.1-6.5.4)	(1) Intro to lab; (2) Horn snails & trematode parthenitae/cercariae; (3) Use of a dichotomous key.
	2	Wed-30-Mar	Parasitic castrators, body snatching, trematode soldiers	Trematoda 2 (Ch 6.1-6.5.4)	(1) Horn snail cercaria shedding; (2) Continue with trematode parthenitae/cercariae & use of a dichotomous key.
2	3	Mon-04-Apr	Parasite increased trophic transmission (Ch 15.2.4; Boxes 7.1, 15.1)	Trematoda 3- Metacercariae (Ch 6.1-6.5.4)	(1) 2 nd intermediate host horn snails & trematode metacercaria counts; (2) Metacercaria collection & anatomy; (3) Data Management 1
	4	Wed-06-Apr	Parasite population biology 1 (Ch 12)	Trematoda 4- Adult trematodes;	(1) Analyze metacercaria abundance; (2) Adult trematodes

				Human schistosomes (Ch 6.1-6.5)	from arrow gobies.
3	5	Mon-11-Apr	Parasite population biology 2-epidemiology (Ch 12)	Turbellaria; Monogenea (Ch 6.1-6.3; 6.6; 6.10)	(1) <i>Gyrodactylus</i> abundance analysis; (2) Monogenea from killifish
	6	Wed-13-Apr	Transmission modes; life cycles (Ch 12 case studies as background)	Cestoda 1 (Ch 6.1; 6.8; 6.9; 6.10)	(1) Analyze larval tapeworm growth; (2) Plerocercoids from decapods. LAB NOTEBOOKS DUE
4	7	Mon-18-Apr	Impacts on individuals; ecological currencies (Ch 15.1-15.2)	Cestoda 2; Acanthocephala (Ch 6.1; 6.9; 6.10; Ch 7)	(1) Analysis: plerocercoid abundance in ghost shrimp and spiny sand crabs; (2) Live cystacanths of <i>Proflicollis altmani</i> ex sand crabs. (3) oncospheres in Tenebrio.
	8	Wed-20-Apr	Host defense	Nematoda 1 (Ch 8.1-8.5.0)	(1) Analysis of fish parasite species richness data; (2) <i>Spirocamallanus pereirai</i> ex top smelt.
5		Mon-25-Apr	Midterm		Break
	9	Wed-27-Apr	Coevolution (16.0-16.4.1)	Nematoda 2; Nematomorpha (Ch 9)	(1) Analysis of <i>Spirocamallanus pereirai</i> loads; (2) Cockroach pinworms (3) oncospheres in <i>Tenebrio</i> .
6	10	Mon-02-May	Parasites & sexual reproduction (16.4.1)	Crustacea 1: Isopoda; Barnacles (Ch 11.1-11.2.5.0; 11.2.5.3-11.2.5.5)	(1) pseudocastrator <i>Hemioniscus</i> isopods ex <i>Chthamalus</i> barnacles; (2) <i>Portunio conformis</i> ex <i>Hemigrapsus oregonensis</i> crab.
	11	Wed-04-May	Vector transmission	Ticks; Insects (11.3.1-11.3.4; 11.4.1-11.4.4) (read other sections for context)	(1) Analyze <i>Hemioniscus</i> prevalence (2) gall insects and gall mites
7	12	Mon-09-May	Host/site specificity (no reading in particular); Co-speciation/phylogenetic tracking (16.4.2)	Crustacea 2: Copepoda; Branchiura; Amphipoda; (11.2.5.1, -.2, -.4)	(1) Copepod parasites of scorpionfish
	13	Wed-11-May	Parasites & invasions	Myxozoa; Microsporidea (Ch 4 & 5)	(1) <i>Ichthyosporidium</i> microsporan ex arrow goby gonads; (2) analyze <i>Ichthyosporidium</i> prevalence among goby populations. LAB NOTEBOOKS DUE

8	14	Mon-16-May	Parasite competition (13.3)	Trypanosomatida; Dinoflagellata (3.1-3.3.1; 3.3.2)	(1) Analyze arrow goby infracommunities; (2) Examine kelp flies for trypanosomes; (3) Geimsa staining
	15	Wed-18-May	Parasites & climate change Dan Metz Guest Lecture	Ciliata (3.3.5); Apicomplexa 1 (3.3.4.1-3.3.4.4; Aconoidasida). Dan Metz Guest Lecture	(1) Count and measure size of stained trypanosomes? (2) trypanosome morphology? (3) Survey & examine <i>Trichodina</i> ciliates from <i>Nutallina fluxa</i> (4) ImageJ to get morphometrics
9	16	Mon-23-May	Parasites & migration	Apicomplexa 2: Conoidasida (3.3.4.1-3.3.4.4)	(1) analyze <i>Trichodina</i> morphometrics. (2) Identify and process polychaetes for archigregarines and barnacles for eugregarines
	17	Wed-25-May	Parasite origins /adaptations to parasitism	Other parasites 1 (more cnidarians)	Discovery session. Dissect fish from Sea Camp etc.
10		Mon-30-May	Memorial Day		
	18	Wed-01-Jun	Parasite global diversity; Parasites in ecosystems	Other parasites 2 (annelids, eulimids)	Turn in lab notebooks Lab practical
11		Wed-08-Jun	Final (11:30a - 2:30p)		