

SEMESTER AT SEA COURSE SYLLABUS

Colorado State University, Academic Partner

Voyage:	Fall 2022
Discipline:	Microbiology, Immunology, and Pathology
Course Number and Title:	MIP 260 The World of Parasites
Division:	Lower
Faculty Name:	Cindy Church
Semester Credit Hours:	3

Prerequisites: One (1) lower-division principles of animal biology course OR one (1) lower-division attributes of living systems OR permission of the instructor.

COURSE DESCRIPTION

Welcome to the World of Parasites: protozoa, worms, bugs, vectors, and human and animal diseases! This course will take you into the world of an amazing group of organisms that are endemic to many of the places you will visit during the voyage and greatly impact the people you will meet. We will not only cover the biological aspects of human parasites—their morphology, life cycles, epidemiology and evolution—but we will also bring the world's oceans into the conversation with a discussion of marine mammal parasites. We will explore how new infectious diseases emerge, their subsequent distribution across the globe and the strategies parasites use to achieve transmission from host-to-host. You will learn about the neglected tropical diseases (almost all parasitic), the unacceptable burden they impose on human and animal welfare, and why parasite control is particularly challenging. You will gain an understanding of why our shrinking world has fueled a renewed interest in the study of parasites and the diseases they cause. The Semester at Sea voyage will give students opportunities to witness the global impact of parasites on at-risk communities.

LEARNING OBJECTIVES

At the completion of this course, students will be able to:

- Identify the kinds, degrees, and effects of parasitism and the evolution of parasites from free-living progenitors
- Explain principles of immunology as they relate to the host-parasite relationship
- Identify, classify and describe the life cycles of significant parasites of humans
- Investigate which species of parasites are endemic to each country visited
- Examine how parasitic diseases are diagnosed, including current molecular methods
- Examine the roles of selected parasites in human history
- Compare and contrast human living conditions and parasite problems
- Identify politics, cultural habits and religious beliefs that encourage the spread of parasites and/or impede control programs
- Evaluate transmission, pathology, and control of parasitic diseases in the context of global public health

REQUIRED TEXTBOOKS AND SUPPLIES

AUTHOR: Robert S. Desowitz
TITLE: New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People
PUBLISHER: W. W. Norton
ISBN: 978-0-393-30426-8
DATE/EDITION: 1987

AUTHOR: Murray Dailey
TITLE: The Worm Chronicles
PUBLISHER: Xlibris Corporation
ISBN: 978-1-4363-6542-0
DATE/EDITION: 2008

Waterproof Notebook/Journal (Recommended: Rite in the Rain)

TOPICAL OUTLINE OF COURSE

Embarkation Day – September 9

1: Introduction; terminology; types of symbiotic relationships
Special topic: Surveillance of foodborne parasitic diseases in Europe in a One Health approach

2: Ecology & evolution of parasitism; Desowitz ch 1

3: Host-parasite interactions and global parasitism; Desowitz ch 2
Special Topic: How Animal Parasites find a Home in Humans

4: Introduction to protozoans

5: Hemoflagellates I: African sleeping sickness (*Trypanosoma*); Challenges to vaccine development against protozoan parasites; Desowitz ch 6
Special Topic: The Present Situation of *Echinococcus* in Europe

6: Hemoflagellates II: Kala-azar and Oriental sore (Leishmania)

7: Intestinal and reproductive tract flagellates (*Giardia* and trichomonads); Desowitz ch 13

8: Amoebas: amoebic dysentery (*Entamoeba*)
Special Topics: Amoebiasis Global Impact
Food and waterborne protozoan parasites: The African Perspective

9: Exam 1 (through #8)

10: Introduction to Apicomplexa; Desowitz ch 4
Special topic: Decline in Transmission of *Schistosoma mansoni* in Oman

11: Malaria and man: a history of the struggle; Desowitz ch 5
Sickle cell anemia, drug resistance

12: Apicomplexa (continued) and Ciliophora; Desowitz ch 11
Video: Milwaukee Cryptosporidium outbreak

13: Introduction to Platyhelminthes

Video: Flatworm penis fencing

<https://www.bing.com/videos/search?q=leslie+newman+video+of+penis+fencing+flatworm+s&&view=detail&mid=5B16080B647942C5BB325B16080B647942C5BB32&&FORM=VRD GAR>

14: Blood Flukes: Bilharzia (*Schistosoma*); the Aswan Dam story; Desowitz ch 8

15: Liver and lung flukes: *Fasciola*, *Clonorchis* and *Paragonimus*

Special Topic: Prevalence and seasonal variation of human intestinal parasites in patients attending hospital with abdominal symptoms in northern Jordan

16: Exam 2 (through #15)

17: Tapeworms I: *Diphyllobothrium*: Is that a worm in your sushi?

Special Topic: Many Vietnam Vets have Cancer-Causing Parasites: What are Liver Flukes?

18: Tapeworms II: *Taenia* and *Echinococcus*; Desowitz ch 3

19: Introduction to Nematodes; Desowitz ch 14

Special Topic: Malaria in Kenya

20: Whipworm and *Trichinella*

Video: The Fish Sucking Lice that aren't Lice

<https://www.youtube.com/watch?v=QqAY2RuySuA>

21: *Strongyloides*, Hookworm, and *Ascaris*

22: Pinworm and *Anasakis*; Desowitz ch 12

Special Topic: Sushi Delights and Parasites: the Risk of Fishborne and Foodborne Parasitic Zoonoses in Asia

23. Filarial worms and Guinea worm; Desowitz ch 7

<https://www.youtube.com/watch?v=HCGOYxO5sJw>

24. Final Exam (comprehensive)

Special Topic: A Child Dies in a Small Village in India

25—FINAL CLASS: Parasitism in the developing world

Special Topic: The global war against intestinal parasites—should we use a holistic approach?

Disembarkation Day — December 22

FIELD WORK

Semester at Sea® field experiences allow for an unparalleled opportunity to compare, contrast, and synthesize the different cultures and countries encountered over the course of the voyage. In addition to the one field class, students will complete a Comparative Experiential Project that span multiple countries.

Field Class & Assignment

STUDENTS: Field Class proposals listed below are not finalized. Confirmed ports, dates, and times will be posted to the [Fall 22 Courses and Field Class page](#) when available.

Field Class attendance is mandatory for all students enrolled in this course. Do not book individual travel plans or a Semester at Sea sponsored trip on the day of your field class.

Field Classes constitute 20% of the contact hours for each course.

Outcomes: Parasites are emerging as some of the most important health issues in developing countries. Underprivileged people living in rural and suburban areas bear the greatest burden of disease because they have limited access to the public healthcare system and proper sanitation. The goal for the field class is to give the students a first-hand look at the impacts of parasites and efforts to control them by visiting a research facility, veterinary clinic or tertiary care hospital. Visiting one of these facilities will contribute to their understanding of the organisms that we discuss in class with a special emphasis on malaria and soil-transmitted helminths (worms). The experience may include exposure to one or more of the following specialties in the field of parasitology: medical, agricultural, ecological, veterinary and/or wildlife.

Activity: Visit the parasitology department of a teaching hospital, medical school, or veterinary clinic. A resident parasitologist may be open to taking the students on a tour of their facilities and giving the students some insight into the scope of parasitic infections encountered in that country. If possible, arrange for the students to accompany a “medic” on a visit to a rural community hospital.

Assessment: Students will keep a log of their activities during the field class and throughout the voyage. The log will be due at the end of the voyage. The instructor will be the only reader of your journal. Be as personal and candid as you wish. Your journal will be returned. During the course of the voyage, feel free to ask if your journal is “on-track”.

Comparative Experiential Project

The CEP is the required comparative assignment that span multiple countries. The Comparative Experiential Project constitutes at least 5% of the grade for each course.

The log will include parasite-related observations from different countries throughout the voyage. Look for examples of how we are sometimes our own—and the developing world's—worst enemy such as:

- Ecological alterations—e.g., cutting down rain forests, overexploiting savannah grasslands, and damming great rivers—provide breeding habitats for flies, mosquitoes, and snails, all vectors for disease-producing organisms. Fruits and vegetables: wash, cook, peel.
- Swimming or wading in fresh water in areas where schistosomes are endemic (larvae penetrate human skin).
- The cities of the tropics have seen uncontrolled growth resulting in sprawling slums with poor infrastructure. These living conditions may include inadequate sanitary facilities and open sewers.
- Global growth in fish farming (aquaculture) has been associated with the proliferation of parasites.
- Parasitic worm infections are linked to untreated night soil use in agriculture (night soil is human waste used as fertilizer).
- Transmission of animal diseases to humans (zoonotic diseases or zoonoses) is common when people are directly involved in animal rearing and when animals are reared within homes.
- Certain religious practices encourage the spread of parasitic diseases (e.g., Varanasi, India is on the banks of the heavily polluted Ganges River, yet Hindus believe that ritualistic bathing in the waters of Varanasi purifies the soul.)
- Climate change can alter the geographic distribution and intensity of the transmission of vector-borne diseases (these parasites usually benefit from increased temperatures as both their reproduction and development are accelerated).

Observing and photographing these events in different countries (when culturally appropriate) will allow the students to make a connection to the effects of urbanization, deforestation, and parasites.

Observations of control strategies should be recorded in the logbook. This can include both your own behavior and that of others (anonymously). Examples:

- One obvious way to disrupt trophic (food-borne) transmission of parasitic infections is by avoiding the consumption of potentially infective food items such as sushi, undercooked beef or pork, and unpasteurized dairy foods. Fruits and vegetables: wash, cook, peel.
- Oral-fecal transmitted parasitic diseases, such as amoebic dysentery, can be controlled by proper sanitation (notice if people are/are not washing their hands correctly).
- Use of footwear and otherwise avoiding contact with soil (at the beach, wear sandals and sit on a towel). Notice what type of shoes people are wearing (e.g., flip flops vs closed-toe shoes). **AVOID WALKING BAREFOOT OUTSIDE!**
- Dirty surface water can be avoided by drilling a borehole and installing a hand pump, which provides clean drinking water.

- Bed nets may be found in hotels in tropical areas, which help reduce malaria and other vector-transmitted parasitic diseases (and can be photographed without permission).
- Taking antimalarial drugs is crucial when visiting malaria-endemic countries. Are you using insect repellent and wearing protective clothing to avoid insect bites?
- Bedbugs hang out in upholstered surfaces like couches and mattresses, so store suitcases in the bathroom of a hotel. Take a photograph.
- Solicit the opinions of the medical personnel on the ship regarding the prevention/control/treatment of parasites (include the main points of your conversation in your logbook).

Where possible, compare control strategies across cultures and offer your thoughts on the reasons they have different levels of success.

Examples:

- Kenya's Ministry of Health is urging its citizens to undergo regular deworming. See [Business Daily Africa focuses on Kenya's deworming efforts ...](#) Do other countries on the itinerary have similar programs? If so, how do they compare to Kenya's?
- India ranks second in global aquaculture production. Compare country-specific recognition, impacts, and management of aquatic parasite outbreaks.

Morbidity and Mortality Weekly Report (CDC)

<https://www.cdc.gov/mmwr/index.html>

Grades will be based on journal content, organization, and effort.

METHODS OF EVALUATION

Class participation 10%

Field class 20%

Comparative Experiential Project 20%

Midterms (10% each) 20%

Final exam 30%

GRADING SCALE

The following Grading Scale is utilized for student evaluation. Pass/Fail is not an option for Semester at Sea® coursework. Note that C-, D+ and D- grades are also not assigned on Semester at Sea® in accordance with the grading system at Colorado State University (the academic partner institution).

Pluses and minuses are awarded as follows on a 100% scale:

<u>Excellent</u>	<u>Good</u>	<u>Satisfactory/Poor</u>	<u>Failing</u>
97-100%: A+	87-89%: B+	77-79%: C+	Less than 60%: F
93-96%: A	83-86%: B	70-76%: C	
90-92%: A-	80-82%: B-	60-69%: D	

ATTENDANCE/ENGAGEMENT IN THE ACADEMIC PROGRAM

Attendance in all Semester at Sea® classes, including the Field Class, is mandatory. Students must inform their instructors prior to any unanticipated absence and take the initiative to make up missed work in a timely fashion. Instructors must make reasonable efforts to enable students to make up work which must be accomplished under the instructor's supervision (e.g., examinations, laboratories). In the event of a conflict in regard to this policy, individuals may appeal using established CSU procedures.

CLASSROOM CLIMATE

Semester at Sea® is committed to the Voyage Community Values. Consequently, the classroom environment is founded on mutual respect, community, and an aim toward equity. The Voyage Community Values support the creation of a collaborative and vibrant community. Our community is the foundation of our learning, critical inquiry, and discovery. Each member of this course has a responsibility to uphold these values when engaging with one another.

With that, please review the following Voyage Community Values:

- **Well-Being:** We commit to the health, safety and well-being of ourselves, all members of our voyage community, *and* members of the communities we will visit.
- **Interconnectedness:** We understand our actions and attitudes have an impact locally and globally. We always seek to positively affect the planet and the people around us near and far.
- **Respect:** We honor the inherent dignity of *all people* with an abiding commitment to freedom of expression, scholarly discourse and the advancement of knowledge. We have the right to be treated, and the responsibility to treat others, with fairness and equity.
- **Inclusion:** We ensure inclusive environments that welcome, value, affirm and embrace *all people* within the shipboard community and in each country we visit.
- **Integrity:** We are honest and ethical in all of our interactions, including our academic work. We hold ourselves accountable for our actions.
- **Excellence:** We model the highest academic standards of preparation, inquiry and knowledge and consistently seek to understand complex issues and express informed opinions with courage and conviction.

LEARNING ACCOMMODATIONS

Semester at Sea® provides academic accommodations for students with diagnosed learning disabilities, in accordance with ADA guidelines. Students who will need accommodations in a class, should contact ISE to discuss their individual needs. Any accommodation must be discussed in a timely manner prior to implementation.

A letter from students' home institutions verifying the accommodations received on their home campuses (dated within the last three years) is required before any accommodation is provided on the ship. Students must submit verification of accommodations to their Student Services advisor as soon as possible, but no later than two months prior to the voyage. More details can be found within the **Course Registration Packet**, posted to the student portal prior to registration.

STUDENT CONDUCT CODE

The foundation of a university is truth and knowledge, each of which relies in a fundamental manner upon academic integrity and is diminished significantly by academic misconduct. Academic integrity is conceptualized as doing and taking credit for one's own work. A pervasive attitude promoting academic integrity enhances the sense of community and adds value to the educational process. All within the University are affected by the cooperative commitment to academic integrity. All Semester at Sea® courses adhere to this Academic Integrity Policy and Student Conduct Code.

Depending on the nature of the assignment or exam, the faculty member may require a written declaration of the following honor pledge: "I have not given, received, or used any unauthorized assistance on this exam/assignment."

RESERVE BOOKS FOR THE LIBRARY

AUTHOR: Roberts LS, Janovy J, Nadler S.

TITLE: Gerald D. Schmidt and Larry S. Roberts' Foundations of Parasitology

PUBLISHER: McGraw-Hill

ISBN: 9780073524191

DATE/EDITION: 2013/Ninth Edition

FILMS

TITLE OF FILM: "Deadly Parasites"

DISTRIBUTOR: A-Z Documentaries

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

ELECTRONIC COURSE MATERIALS

AUTHOR: Van der Giessen, J. et al.
ARTICLE/CHAPTER TITLE: **Surveillance of foodborne parasitic diseases in Europe in a One Health approach**
JOURNAL/BOOK TITLE: **Parasite Epidemiology and Control**
VOLUME: 13
DATE: May 2021

AUTHOR: Katie Clow
ARTICLE: **How Animal Parasites find a Home in Humans**
JOURNAL: *The Conversation*
<https://theconversation.com/how-animal-parasites-find-a-home-in-humans-92653>

AUTHOR:
ARTICLE/CHAPTER TITLE: **Amoebiasis Global Impact**
JOURNAL/BOOK TITLE: **CDIPD**
VOLUME:
DATE:
<http://www.cdipd.org/index.php/amebiasis-global-impact>

AUTHOR: Joyce Silwila
ARTICLE/CHAPTER TITLE: **Food and waterborne protozoan parasites: The African perspective**
JOURNAL/BOOK TITLE: *Food and Waterborne Parasitology*
DATE: Sept 2020
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7502820/>

AUTHOR: **Jaran, AS**
ARTICLE/CHAPTER TITLE: **Prevalence and seasonal variation of human intestinal parasites in patients attending hospital with abdominal symptoms in northern Jordan**
JOURNAL/BOOK TITLE: *Eastern Mediterranean Health Journal*
VOLUME: 22
DATE: 2016
[http://www.emro.who.int/emhj-volume-22-2016/volume-22-issue-10/prevalence-and-seasonal-variation-of-human-intestinal-parasites-in-patients-attending-hospital-with-abdominal-symptoms-in-northern-jordan.html#:~:text=In%20Jordan%2C%20parasitic%20infection%20has,histolytica%20\(31%25\).](http://www.emro.who.int/emhj-volume-22-2016/volume-22-issue-10/prevalence-and-seasonal-variation-of-human-intestinal-parasites-in-patients-attending-hospital-with-abdominal-symptoms-in-northern-jordan.html#:~:text=In%20Jordan%2C%20parasitic%20infection%20has,histolytica%20(31%25).)

AUTHOR: **Robert S. Desowitz**
ARTICLE/CHAPTER TITLE: **Ch 2 A Child Dies in a Small Village, Ch 3 How the Government Disease Came to India, and Ch 4 In Search of Kala Azar—Bedbugs and Other Red Herrings**
JOURNAL/BOOK TITLE: *The Malaria Capers* WW Norton
DATE: 1993
PAGES: 21-59

AUTHOR: Rettner, Rachael
ARTICLE: **Many Vietnam Vets have Cancer-Causing Parasites: What are Liver Flukes?**
JOURNAL: *LiveScience*
DATE: November 2017
<https://www.livescience.com/61057-liver-flukes-vietnam-veterans.html>

ARTICLE: **Malaria in Kenya**
JOURNAL: CDC website
https://www.cdc.gov/malaria/malaria_worldwide/cdc_activities/kenya.html

AUTHOR: Yukifumi Nawa et al.
ARTICLE: **Sushi Delights and Parasites: The Risk of Fishborne and Foodborne Parasitic Zoonoses in Asia**
JOURNAL/BOOK TITLE: *Clinical Infectious Diseases*
VOLUME: 41 (no. 9)
PAGES: 1297-1303
DATE: November 2005

AUTHOR: Absar Alum et al.
ARTICLE: **The global war against intestinal parasites—should we use a holistic approach?**
JOURNAL: *International Journal of Infectious Diseases*
VOLUME: 14(issue 9)
DATE: Sept 2010
PAGES: e732–e738
<https://www.sciencedirect.com/science/article/pii/S1201971210023088#>

AUTHOR: Choe Sang-Hun
ARTICLE: **Surgery Reveals North Korean Defector Is Riddled with Parasitic Worms**
JOURNAL/BOOK TITLE: *New York Times*
DATE: November 2017
<https://www.nytimes.com/2017/11/17/world/asia/north-korean-defector-parasitic-worms.html>

AUTHOR: Robert S. Desowitz
ARTICLE/CHAPTER TITLE: **Ch 3 “The DDT Jitters” and Ch 4 “The Malaria Millions”**
JOURNAL/BOOK TITLE: *Federal Bodysnatchers and the New Guinea Virus*. WW Norton
VOLUME:
DATE: 2004
PAGES: 57-101

ADDITIONAL RESOURCES

International Association for Medical Assistance to Travelers website:
<https://www.iamat.org/>

Morbidity and Mortality Weekly Report (CDC) website:
<https://www.cdc.gov/mmwr/index.html>