Biology 342: Parasitology

SYLLABUS – Spring, 2022

Instructor information

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Course description

In this course, we will examine parasites and parasitism, emphasizing the influence of parasites on the ecology and evolution of free-living species, and the role of parasites in global public health. Prerequisites: Cell Biology or Biochemistry. Offered every spring Credits: 4 (3-3)

Course Format

For the Spring of 2022, the lecture and lab are fully in person. Asynchronous forms of participation will be provided for those who cannot participate. Please note that missing labs frequently has a negative impact on success in this course. Contact me for more information if you are unable to come to class.

Texts, other readings and other course materials

Required text: *Despommier DD, Griffin DO, Gwadz RW, Hotez PJ, and Knirsch CA. Parasitic Diseases, 7th edition.). Parasites Without Borders, 2019. Available as a book from the publisher or from the Geneseo Bookstore. Also available on Amazon as a Kindle book (ISBN-10 : 1097115909), and available on the Parasites Without Borders website as a downloadable PDF file.*

Laboratory resource: *We will make extensive use of a free online resource from the Centers for Disease Control, DPDx Laboratory Identification of Parasites of Public Health Concern. Additional lab resources are available in Canvas and in the laboratory.*

Canvas: *Additional articles, case studies, links to videos and other resources, and lecture materials will be available on Canvas. A weekly announcement provides specific information about readings required each week, including what would be helpful to download before class.*

Learning outcomes

THEMATIC OVERVIEW:

1. *Protozoan parasites: basic knowledge and current challenges (learning outcomes 3, 4)*
2. *Helminth parasites: basic knowledge and current challenges (learning outcomes 3, 4)*
3. *Nature of symbiosis, parasitism and parasites (learning outcomes 1, 2)*
4. *Ecological and evolutionary roles of parasites (learning outcome 5)*

Students who are active participants and complete all course requirements will be able to:

1. *Demonstrate through tests and on writing assignments an understanding of parasitism, including the diversity of symbiotic associations and their populational, dynamic and contextual nature.*
2. *Demonstrate through tests and on writing assignments an understanding of views of parasites and parasitism, including social and cultural perceptions of parasitism, and varying views of parasitism among scientists from different disciplines.*
3. *Demonstrate through quizzes, class activities and tests an understanding of the taxonomic diversity of parasites, and the universality and variety of symbiotic associations.*
4. *Demonstrate familiarity with common protozoan and helminth parasites of humans as well as some related parasites of livestock and companion animals on quizzes, class activities and tests.*
5. *Analyze case studies and scenarios, interpret data and use evidence to address problems in parasitology, including clinical, public health and biological issues.*
6. *Analyze research challenges in diagnosis, treatment and control of parasitic infections in humans and in veterinary contexts through examination of evidence.*
7. *Demonstrate an understanding of the roles of parasites and of infectious diseases on the ecology and evolution of their hosts, and of the role of symbiosis in the evolution of life on earth.*

Students who are active participants and complete all course requirements will be able to:

1. *Critical Thinking and Problem Solving: Students will have the knowledge base and intellectual (conceptual) framework to use reasoning and problem-solving skills to:*

(1) read critically; (2) evaluate support for competing hypotheses; and (3) critique experimental design.

2. *Laboratory Inquiry and Technique: Students will have the laboratory and inquiry skills and technical ability to formulate hypotheses, design and run experiments using instruments to test*
3. *their hypotheses, and analyze and interpret the results. They will be able to build on earlier work to design further experiments.*
4. *Communication: Students will be able to communicate biological ideas from literature or their own laboratory investigations to audiences of biologists and non-biologists in a variety of formats including written reports, poster and oral presentations.*
5. *Attitudes and Personal and Professional Development: Students will recognize the importance of scientific integrity and ethical research and applications of biology to science policy. They will be able to work independently and in teams for life-long learning.*
6. *Students will be able to demonstrate a broad and diverse background in biology and related sciences and a strong foundation for graduate and professional programs of study or employment.*
7. *Students will recognize evolution as the central tenet of biology which explains the unity and diversity of life and interrelatedness of levels of biological organization.*

All of the Biology learning outcomes are addressed in this course to varying degrees, but those emphasized in this course are critical thinking and problem solving, attitudes and personal and professional development, and diverse biological content.

Evaluation – Summary

Day-to-day activities (Reading quizzes, participation, homework)	12.5%
Summative Quizzes (drop lowest)	20%
Tests (3, 2 higher count 15% each; lowest counts 7.5%)	37.5%
Laboratory (primarily quizzes)	15%
Project and presentation	15%

Additional Information About Evaluation

Overview:

Below is a brief description of the quizzes, homework, exams, lab and writing assignment that contribute to your grade.

Day-to-Day:

Each type of assignment in this course is designed to contribute to your learning. Keeping up with the reading provides an essential foundation for success on both the test and major writing assignment. You will typically have a formative quiz, an online homework, and participation assignments each week. These are not listed in the syllabus, but weekly Canvas announcements provide updates and reminders. The day-to-day activities are intended to deepen your understanding of topics from the reading and class discussion.

Summative Quizzes

Summative quizzes are larger quizzes, and include short answer and short essay questions, and provide practice of the skills needed for the tests. Many questions will test your ability to apply the information in the context of a scenario. Some questions will require you to analyze or evaluate information. Some or all of these may have a required group quiz component.

Tests:

There are three larger tests, spread roughly equally through the semester. Some questions may be available ahead of time or drawn from the summative quizzes. The tests will take place during the laboratory time to reduce time pressure. The format will be similar to the other quizzes but longer. There may also be a laboratory component.

Project & Presentation:

This is a larger written assignment requiring that you collaborate with a partner to read and analyze primary literature addressing a question or challenge in parasitology, write a collaborative paper and make a presentation to the group. Two topic options are available. Instructions are provided separately.

Laboratory

In the laboratory, you will have quizzes and participation assignments each week. Quizzes may vary in size and may be practical or based on photographs. Some may be completed in groups. If it is necessary to go fully online during the semester, the laboratory will consist of reviewing images and taking quizzes.

Explanation of final grades:

Grades are determined using the scale presented below almost always without any adjustment or curve. There are no limits on numbers of high grades, and helping others can only help you and cannot hurt your grade in any way. Scores will be rounded up or down to the nearest whole number. The point distribution is the standard Geneseo distribution; Canvas is set to display this. The distribution is as follows: A: (>93%), A- (90-92%), B+ (87-89%), B (83-86%), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D (60-69), E (<60%)

Tentative Schedule of Topics with Readings

Note: The topics and readings are listed by week. Consult weekly overviews and reading guides in Canvas for information specific to each day.

Week 1: (1/27)

- Introduction: Syllabus and introductions. Course themes. Who studies parasites? Read: A Vein is a River.

Week 2: 1/31, 2/1, 3

- Introduction to the lab; amebas and flagellates
- *Entamoeba* (Parasitic diseases, PD, pp 147-160), *Giardia* (PD 11-20)
- Non-pathogenic amebas (Intestinal Non-Pathogenic Amebae) and free-living amebas (PD 174-176)
- Life cycles, risk factors; signs & symptoms, diagnostic techniques
- Definitions of parasite, parasitism; classification of parasitic protists
- Also read: Worm Hunt, A Pig from Jersey

***Week 3:** 2/7, 8, 10*

- Quiz; Lab: amebas & flagellates, continued
- *Trypanosoma brucei gambiense*, *Trypanosoma brucei rhodiense* (PD 57-70); *Trypanosoma cruzi*, American trypanosomes (PD 71-84),
- Diagnostic techniques, treatments
- Variety and dynamic nature of symbiotic associations; virulence
- Additional reading: Janovy & Roberts definitions

***Week 4**: 2/14, 15, 17*

- Quiz; Lab: Leishmanias & trypanosomes
- Visceral leishmaniasis (PD 21-28 and 47-56); Cutaneous and mucocutaneous leishmaniases (D 29-46)
- Immune response (supportive reading from Bogistsh et al.)
- Variety and dynamic nature of symbiotic associations

***Week 5** 2/21, 22, 24*

- Quiz; Lab: leishmanias & trypanosomes, malarias
- Malarias & *Babesia* (PD 93-122)
- Parasite control – vectors and vaccines (supportive Reading from Loker & Hofkin)

***Week 6**: 2/28, 1/1, 3*

- Quiz; lab identification of malarias
- *Cryptosporidium* & *Toxoplasma* (PD 123-132, 133-146)
- Parasite control – sanitation (supportive Reading from Loker & Hofkin)
- Review and catch up

Week 7: 3/7, 8, 10

- **Lab: TEST 1 (including lab quiz)**
- *Enterobius, Trichuris, Ascaris* (PD 189-214)
- Introduction to nematodes; Soil-transmitted helminths, parasite control through mass drug administration.
- Parasites & sexual selection; sexually transmitted parasites

3/12-3/20 SPRING BREAK – NO CLASSES

***Week 8**: 3/21, 22, 24*

- Quiz; Lab: nematodes
- Hookworms: *Necator, Ancylostoma* (PD 215-228), *Strongyloides* (PD 229-240)
- Hygiene hypothesis

***Week 9**: 3/28, 29 31*

- Quiz; Lab: nematodes
- *Trichinella* (PD 241-252), cutaneous *larva migrans*, visceral *larva migrans* (PD 299-314)
- Zoonotic and emerging infections; parasite modifications of host physiology

***Week 10**: 4/4, 5, 7*

- Quiz; Lab: filarial worms
- *Dracunculus medinensis* (PD 253-264); Lymphatic filariasis (PD 285-290); Onchocerciasis & Loaiasis (PD: 265-284)
- Parasites and behavior change; coevolution

***Week 11**: 4/11, 12, 14*

- **TEST 2 (lecture and lab)**; Lab: Cestodes
- Major Cestodes: *Diphyllobothrium, Taenia* (PD 317-348); Minor cestodes (PD 349-358)
- Cospeciation and colonization

***Week 12**: 4/18, 19, 21*

- Quiz;Lab: Cestodes
- Larval cestodes: sparganosis, cysticercosis, hydatid disease. (PD: 359-376)
- 4/21 GREAT DAY – no class

***Week 13**: 4/25, 26, 28*

- Quiz; Lab: Trematodes
- *Clonorchis, Opisthorchis* (PD: 405-412, 421-428) *Fasciola, Paragonimus* (PD: 413-420, 429-438)
- Evolution of sex

***Week 14**: 5/2, 3, 5*

- Quiz; lab: trematodes
- Schistosomes (PD: 394-404); *Fasciolopsis* and other miscellaneous trematodes (PD 429-438)
- Review and catch-up

***Week 15**: 5/9, 10, 12*

- **Lab: TEST 3, lecture and lab**
- Presentation preparations and peer editing

Week 16: 5/19, 12:00-3:20

- presentations (Final Exam period)

Important notes regarding the schedule

This schedule is tentative and subject to change, particularly given the ongoing pandemic. Check the announcements on Canvas each week to see what is required. Generally, test dates will not change but content covered on a test may change. The direction of change is likely to be dropping topics, not adding. Should we go to fully remote instruction, a modified schedule will be published.

Accommodations

Disabilities and pregnancy or parenting:

SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities. Accommodations will also be made for medical conditions related to pregnancy or parenting. Students should consult with the Office of Disability Services and see me regarding any needed accommodations as early as possible in the semester.

Accommodations for English language learners:

Individuals who have been using English as a primary language of instruction for 6 years or fewer and are actively working to improve English fluency may receive extra time on in-class tests and online quizzes. Please see me for assistance early in the semester if this applies.

Diversity and inclusion

Parasitology is about people as well as about diseases, and the use of inclusive language contributes to creating an environment conducive to learning for everyone. This will include use of individuals' preferred names and pronouns, use of group descriptors preferred by members of that group, and using language that is people-centered and non-discriminatory. Especially critical in the public health context is the use of non-judgmental descriptions of human behavior. Inclusive language is dynamic and socially constructed, and requires communication and living with tension as individuals learn from each other.

IMPORTANT POLICIES

Communication:

Set up Canvas to provide daily updates via email or text message to ensure that you receive updates or changes to the schedule. Check Canvas announcements regularly. Besides office hours, the fastest way to get in touch with me is via e-mail. To preserve my work-life balance, I reserve the option to delay answering emails sent after 5 pm or on the weekends until the start of the next business day.

Attendance and expectations for class:

The lecture and laboratory sessions are in person unless I am sick or quarantined or the College closes. Active participation is strongly linked to student success, and your active participation in class benefits not only your success but other students' learning. Because a significant fraction of class is spent in small group discussion, classes will not be recorded. Nonetheless, if you are unable to participate in person, all participation assignments can be completed by working with the course materials on your own. Please contact the Dean of Students, Dr. Leonard Sancilio, if you cannot participate for an extended period.

COVID and the unexpected

Due to the dynamic nature of the COVID19 pandemic, changes to the schedule, assignments and content delivery mode may be necessary after the semester has started. If this is the case, I will prioritize student success, course continuity and open lines of communication.

Missing Summative quizzes and Tests:

For the summative quizzes and tests, making these up within a few days is usually not a problem. However, if you are unable to make up a test quickly, you will need to take a different test so that I can return tests to other students. Please contact me as soon as you know there is a problem so we can work out a solution together.

Missing Day-to-Day assignments:

The benefits to learning of completing the online assignments are greatest if you use these to stay caught up on the reading and class activities. When you miss classes, the participation assignments can be completed outside of class. Please contact me as soon as possible when you are having trouble completing day-to-day assignments, and be prepared to propose and discuss solutions. If you will be unable to complete course work for a week or more, please contact me along with the Dean of Students, Dr. Sancilio (sancilio@geneseo.edu). Similarly, if you are working with Accessibility Services and have accommodations related to due dates, please meet with me early in the semester to discuss the supports that you need.

Missing laboratory quizzes and tests

Setting up laboratory quizzes can be very time-consuming. Missing these will usually mean substituting identifying photographs rather than microscope slides for quizzes; some students may find this task more difficult. Without jeopardizing your health or the health of anyone else in our class, make every effort to attend lab in person, especially on quiz days. For lab quizzes, accommodations for disabilities are more limited. Please consult with me early and we can work with the Office of Accessibility Services to determine how best to meet your needs within the constraints of the course content and materials.

Extensions on the Project:

Because the final project is due at the end of the semester, extensions on the project will be limited and may require accepting an incomplete grade initially. It also may require dividing your collaborative project into two parts. Please contact me as soon as you know there is a problem so we can work out a solution together.

Responding to complex emergencies

Unfortunately, it is always possible that you may experience a crisis that impacts your ability to complete work for a portion of the semester. Examples of these crises include an illness that affects your class attendance for more than a week, an injury that affects your ability to keep up with your studies, a sexual assault, a financial issue that affects your ability to pay for your living

and educational expenses, serious illness or death of a family member. The best way to handle these emergencies is to work with the Dean of Students, Dr. Leonard Sancilio (sancilio@geneseo.edu). He can notify all of your professors of the emergency so you only have to tell your story once. He can also link you with appropriate people and services for support.

Appealing grades:

Any graded work may be submitted for re-evaluation along with a written appeal. Appeals must be submitted promptly, within one week of when the work is returned to you. The appeal should contain a brief written explanation of your concerns, including your understanding of the test question or assignment directions and why you believe your work meets the requirements. At the time that you turn in the work for appeal, we will schedule a conference to discuss my response.

Academic integrity:

Breaches of academic integrity devalue the work of other people. Cheating on exams is a serious breach of trust and will be treated accordingly. Examples of cheating on tests include (but are not limited to) collaboration or communication with others in any form. Plagiarism is the misrepresentation of the originality of your work. Either of these will result in a failing grade for the test or assignment, and may result in a failing grade for the course. Ignorance of the policy or of the definitions of cheating or plagiarism will not serve to excuse the behavior.

Copyrighted materials:

Many of the materials that are provided to students in this course have been created by your instructor, by the textbook publisher, or by authors of published sources excerpted under educational fair use. You should assume that all course materials are protected by legal copyright. Copyright protection means that reproduction of this material is prohibited without the author's consent. Thus, you are prohibited from sharing or posting copyrighted material to any websites outside our course Canvas site. Students are also prohibited from reproducing material to be shared with other more limited groups (e.g., sorority/fraternity test bank). Be aware that UUP (Union of University Professionals, the union representing faculty on this campus) is seeking to take legal action against sites that provide instructor materials, and that posting or selling copies of materials to such sites may put you in legal jeopardy.

FOR YOUR CONSIDERATION

Important disclaimer:

Even though we will discuss diagnosis throughout the course, you will not be qualified to diagnose parasitic diseases on completion of this course. It is especially important not to use the class as an opportunity to self-diagnose.

Class format:

The lecture portion of this class will be in person this semester. Transfer of information through lecture will make up only a portion of class time, and small group discussion or discussion with the full class will make up the rest. Obtaining your first exposure to new information outside of class through independent reading and video segments and through other assignments will make meaningful class discussion possible. Every assignment and activity is designed with a goal of assisting you to learn. If you are not seeing the purpose or benefit of what we are doing, Because lecture time is spent mostly in small group discussion, these sessions cannot be recorded for asynchronous participation.

Topics included:

Parasitism is the predominant trophic mode on earth, and the range of organisms we could examine is enormous. In this course, we will focus primarily on protozoa, helminths and arthropods that parasitize animal hosts including humans. Viruses, prokaryotes, fungi and plants are largely excluded.

Difficult discussion topics:

In this class, you will see some graphic and disturbing images that are needed to fully comprehend the impact of these neglected diseases. Understanding disease transmission requires discussing bodily functions and behaviors that you may not normally discuss in public. Treating others with respect, both those present in the room, and those portrayed in images, videos and case studies, is essential for learning.

Evolution:

The Theory of Evolution provides the central explanatory framework in biology, and will be an important theme running throughout the Parasitology course. I welcome the opportunity to discuss any questions or concerns you may have about evolution, including those related to religious belief.

COVID:

The changes brought on by COVID-19 have impacted us all in a number of ways and will continue to do so at various times and to varying degrees during the upcoming semester. Your health and wellbeing are foundational to your ability to learn, and if you find that you are feeling unwell (physically or mentally) and it is impacting your ability to complete your coursework, please reach out.

In a similar way, I will occasionally ask for some patience and flexibility on your part. The pandemic is affecting faculty as well as students and creating demands that would not be present in an ordinary semester. If I am slow responding to an email, if I take a long time to grade an assignment, if I forget to post materials that you need, please be patient. Feel free to send me an e-mail inquiry or reminder; I will not be offended. You will never suffer any disadvantage in the course because of delays on my part.