

Human Parasitology

01:146:328

Fall 2020

COURSE INSTRUCTOR Anne Keating, PhD
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PREREQUISITES General Biology 01:119:101 & 102 (or 01:119:115 & 116)

COURSE OVERVIEW

The current SARS-CoV-2 pandemic is having a catastrophic human health and economic impact. The enormity of the response and pace of research and vaccine development are unprecedented and highlight the interconnected nature of today's world and the importance of disease control. This health threat and the global reaction, however, are in stark contrast to the lack of attention to the over 1 billion people worldwide who are infected with parasitic diseases caused by a range of helminths and protozoa. Many of these diseases are described as neglected and the suffering of their victims, who are often economically disadvantaged, does not always generate world-wide concern. During this course, we will consider traditional aspects of parasitology including understanding of the morphology, life cycle, pathology, treatment, and control of many of the major parasites of humans. We will also explore molecular mechanisms in the host-parasite relationship, the modes of action of chemotherapeutic agents, and strategies for the possible elimination and eradication of these diseases. The objectives of the course are summarized in the following enduring understandings, learning outcomes, and CBN learning goals

Enduring understanding 1: Parasites cause enormous human suffering and an understanding of their basic biology is critical to our ability to control these infections

Learning outcomes:

- a. Explain the relevance of studying parasitology
- b. Describe the living conditions of the world's "bottom billion" and why they are at greatest risk for infection with parasites
- c. Use basic morphological characteristics to identify the major species of human parasites
- d. Draw generalized life cycles for the major groups of parasitic organisms (trematodes, cestodes, nematodes, and protozoa)
- e. Sequence detailed life cycles for specific parasite pathogens of humans

Enduring understanding 2: The host-parasite relationship must be considered at the ecological and molecular levels.

Learning outcomes:

- a. Evaluate a simple epidemiological model of a parasite life cycle
- b. Design appropriate transmission control and prevention programs based on life cycle information
- c. Discuss host immune responses to parasitic infections
- d. Determine and describe appropriate diagnostic techniques to identify infections
- e. Analyze patient history information and lab results to make diagnoses
- f. Explain the modes of action of commonly used anthelmintic drugs
- g. Describe the major control programs which target the eradication of parasitic diseases

CBN learning goals

1. Master factual and conceptual knowledge in cell biology and neuroscience that will provide a solid foundation for success in advanced training and professional careers.

We will cover the species which cause the major human parasitic diseases and gain an understanding of their basic morphology, life cycle, and host relationships and also explore the molecular mechanisms of pathology, drug action, and host defenses. These competencies will lay the foundation for students to continue advanced research and to apply this knowledge in health-related fields.

2. Develop an ability to summarize, integrate and organize information.

Students will use practice quizzes and learning sessions to synthesize the course information and apply it to real-world problems. The importance of using life cycles as organizers to summarize the biology, pathology, control strategies, etc. associated with these organisms will be emphasized.

3. Use scientific reasoning to evaluate the potential for current research and new discoveries to improve our understanding of cell biology and neuroscience and its relevance to human health and to our society.

It is estimated that over 1 billion people are affected by one or more of the neglected tropical diseases, but because, in part, these are typically conditions associated with poverty and generally not easily transmissible from person-to-person (thereby making their global spread less likely) they are not given much attention. These diseases, however, inflict terrible social and economic costs in many developing parts of the world. Our understanding of these diseases and development of methods to control and treat them are critical to humanitarian efforts. In this course we will explore experiments, techniques, and control strategies that are used in the field of parasitology.

COURSE RESOURCES

Text: *Parasitic Diseases*, 7th edition
Despommier, DD, Griffin, DO, Gwadz, RW, Hotez, PJ, and Knirsch, CA.
Parasites Without Borders, 2017.
<https://parasiteswithoutborders.com/wp-content/uploads/2020/02/PD7thEditionHighResVersion5-11-2019.pdf>

This online textbook has been selected for our course because it covers traditional and modern aspects of parasitology and because it is free of charge, thereby supporting the mission of a more affordable Rutgers education. The text and associated videos will be used throughout the course.

Website: <https://canvas.rutgers.edu/>
Study questions, announcements, grades, assignments, quizzes, and other material will be posted throughout the semester. Exams will be administered through this website.

Synchronous learning sessions:

We will hold one learning session each week during the scheduled lecture time (exact time will be announced at the start of the semester). This will be an opportunity for us to meet, review material, and talk about questions you may have. While these sessions are optional, you are strongly encouraged to attend. The sessions will be recorded and posted on Canvas so they can be reviewed by students who were unable to attend. Material that is covered in the learning sessions may be included on exams even if it was not covered in the lecture videos.

COURSE SCHEDULE

Date	Lecture topic	Book section*
8 Sept	Introduction to Parasitology; Parasites and Human Health Trematodes – Introduction to trematodes	III VII
14 Sept	Trematodes – Food-borne trematode infections Parasite Transmission	VII. 34 - 37
21 Sept	Trematodes – Schistosomiasis Parasite diversity	VII. 33
28 Sept	Exam 1 (Material covered 8 Sept – 21 Sept) Cestodes – Introduction	VI
5 Oct	Cestodes – Cyclophyllidea & Pseudophyllidea Nematodes - Introduction	VI. 28 – 32 V
12 Oct	Nematodes – Soil transmitted helminths Epidemiology; Diagnostic techniques	V. 16 – 20, 27 Appendices A & B
19 Oct	Nematodes – Tissue Nematodes – Filarial	V. 21 - 25
26 Oct	Exam 2 (Material covered 28 Sept – 19 Oct) Protozoa – Amoebae	IV. 12
2 Nov	Pathogenic and Non-pathogenic Species, Flagellates Vector biology	IV. 8, 12, 14, 15 VIII. 38
9 Nov	Protozoa – <i>Trypanosoma</i> Antigenic Variation	IV. 6 - 7
16 Nov	Protozoa – <i>Leishmania</i> & Ciliates Evolution of virulence	IV. 2 – 5 IV. 13
23 Nov	Exam 3 (Material covered 26 Oct – 16 Nov) Protozoa - <i>Plasmodium</i> – Introduction	IV. 9
30 Nov	Protozoa – <i>Plasmodium</i> <i>Toxoplasma gondii</i>	IV. 9 IV. 11
7 Dec	The future of parasitology - Vaccines, control, jobs	
TBD	Exam 4 (Material covered 23 Nov – 7 Dec)	

*We will be covering **SELECTED** sections of these chapters in the book. Other material (in lectures and assigned) will supplement the book. Specific reading and figure assignments will be made throughout the semester and posted on Canvas. This schedule is subject to change

ASSESSMENTS

Study Quizzes

Each week there will be a study quiz on Canvas with questions related to that week's material. These questions will cover lecture material and any other content (videos, readings, papers, etc) that were assigned for that week. These quizzes will help students stay up-to-date with the material and allow them to gauge their mastery of the content. Generally, quizzes will be posted on Canvas on Friday and must be submitted by 11:59 PM the following Wednesday. Once a quiz has closed, it cannot be made up.

Exams

There will be four, non-cumulative exams given on Canvas. The exams will consist of multiple choice questions that require an understanding of the basic biology of parasitic organisms in addition to the ability to apply critical thinking to problems in parasitology.

Exam guidelines

1. Exams will be given during the normally scheduled lecture time and final exam time (to be determined) thereby eliminating conflicts with other courses
2. Exams will be open book/resource, however, since they will be timed, students should not rely on using these resources as they will not have time to finish the exams. Students should be prepared to take all exams without the aid of external resources.
3. Exams will be in one-at-a time question format (once a student answers a question they cannot go back to it) and randomized question and answer order.
4. Remote proctoring or lockdown browsers will not be used.
5. Students who require special accommodations must make arrangements at least a week in advance with the course instructor. These accommodations will be given only if approved by the Office of Disability Services.
6. Exams cannot be rescheduled or retaken. Individual exceptions will possibly be made only in cases of documented serious, long-term illness or family emergency. Only one makeup exam may be taken during the semester.

Extra Credit: None. No exceptions

Grades:

Final course grades will be determined by points accumulated on the study quizzes and exams. Neither the individual quizzes, exams, nor final averages will be curved. Your grade will be based on the following distribution.

Assessment	Value
Study quizzes	20%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Exam 4	20%

Final grade	Final average
A	90.00 – 100.00
B+	87.00 – 89.99
B	80.00 – 86.99
C+	77.00 – 79.99
C	70.00 – 75.99
D	60.00 – 69.99
F	0 – 59.99

Special needs: Students who require special accommodations and support services should contact the Office of Disability Services and the instructor during the first week of class.

Academic Integrity Policy

Dishonesty will not be tolerated in this course. Please see the Rutgers policy at <http://nbacademicintegrity.rutgers.edu/home-2/academic-integrity-policy/>

STUDENT-WELLNESS SERVICES

If you need help, there many services available at the university to provide assistance.

Just In Case Web App

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884

rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181

vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800

<https://ods.rutgers.edu/>

The Office of Disability Services works with students with a documented disability to determine the eligibility of reasonable accommodations, facilitates and coordinates those accommodations when applicable, and lastly engages with the Rutgers community at large to provide and connect students to appropriate resources.

Scarlet Listeners

(732) 247-5555

<http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.