

HUMAN PARASITOLOGY

01:146:328

FALL 2026

I. COURSE OVERVIEW

The current *Cyclospora* outbreak has brought the word *parasite* to the forefront of conversations about health and food safety in the United States. Many Americans are reconsidering their eating habits as investigators work to identify the sources of these infections. Although this outbreak has been one of the largest in US history and has generated widespread national attention, there remains a general lack of understanding of - and attention to - the diverse and far-reaching impact of parasites on global human health. More than one billion people worldwide 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. In this course we will consider traditional aspects of parasitology including an 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 this in-person 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.

The importance of using life cycles as organizers to summarize the biology, pathology, control strategies, etc. associated with these organisms will be emphasized. Students will use quizzes and exams to gauge their understanding of the material. The importance of synthesizing course information and applying it to real-world problems will be highlighted.

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 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 individual, 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.

II. COURSE ADMINISTRATION

- **PREREQUISITES:** General Biology 01:119:115 & 116 (or 01:119:101 & 102)

- **INSTRUCTOR:** Dr. Anne Keating

Email

keating@biology.rutgers.edu

I will try to respond to all emails within 48 hours.

Do not send emails through Canvas as I do not check them and will not respond.

Office hours

On Zoom: Mondays, 8:30 – 9:30 am (or by arrangement).

Link will be posted on Canvas homepage.

Communication

Throughout the semester, I will keep in touch with you through Canvas Announcements or your Rutgers email account. If you need assistance accessing these communications, please let me know so I can ensure you receive all important updates.

- **LECTURES**

Mondays and Thursdays

10:20 – 11:40 am (2nd period)

BE-100 (Beck Hall Auditorium), Livingston Campus

Although attendance is not taken, it is expected that you will attend and arrive on time for every lecture throughout the semester. There is no substitute for hearing and seeing the material and actively taking notes. If you think that you will not be able to meet this expectation, then you should reconsider taking this course. I understand that things happen in life, and you might need to miss one or perhaps a small number of lectures, but in those cases, it will be your responsibility to get the notes from a classmate as I do not have materials to give you.

- **TEXTBOOK**

Despommier's Parasitic Diseases, 8th edition

Griffin, DO, Gwadz, RW, Hotez, PJ, and Knirsch, CA.

Parasites Without Borders, 2025.

https://parasiteswithoutborders.com/wp-content/uploads/2025/07/PD8-Full-Book-7-14-25-HR_compressed.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 and assigned material will be included on quizzes and exams.

- **CANVAS WEBSITE**

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

Announcements, grades, assignments, quizzes, and other materials will be posted here throughout the semester.

- **ACADEMIC ACCOMMODATIONS**

Rutgers University is committed to the creation of an inclusive and safe learning environment for all students and welcomes students with disabilities into all the University's educational programs. The [Office of Disability Services \(ODS, https://ods.rutgers.edu/\)](https://ods.rutgers.edu/) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. Once a student has completed the ODS process (registration, initial appointment, and submitted documentation) and reasonable accommodations are determined to be necessary and appropriate, a **Letter of Accommodation (LOA)** can be requested and will be sent to the student and instructor. This should be done as early in the semester as possible as accommodation is not retroactive. Students should then have a discussion with their instructor and/or ODS when appropriate regarding implementation of the accommodation. Students with disabilities requesting accommodation must follow the procedures outlined by ODS.

- **ACADEMIC INTEGRITY POLICY**

Dishonesty in any form will not be tolerated in this course. Students must adhere to the University Policy on Academic Integrity which can be found at <http://nbacademicintegrity.rutgers.edu/home-2/academic-integrity-policy/>

- **SUCCESSFUL COURSE COMPLETION**

To support your success in this course, please focus on the following:

- Attending every lecture. If you do miss a lecture, it is your responsibility to get notes from a classmate and then to see the instructor if you have any questions.
- Completing the weekly Canvas quizzes before each deadline.
- Developing a long-term plan for exam preparation. This includes identifying the outcomes for each lecture, preparing and practicing appropriate organizers for all outcomes, and attending office hours to discuss any difficulties.
- Allocating a minimum of 2 hours of studying per hour spent in class.

- **COURSEWORK DIFFICULTIES**

If you're facing a significant issue that prevents you from keeping up with the coursework during the semester, please contact me as soon as possible so we can discuss your options and find a solution together.

- **DROPPING THE COURSE**

Should you need to drop this course, the last day to drop without a "W" grade is Thursday, September 10, 2026.

III. LECTURE & EXAM SCHEDULE*

Lecture	Date	Lecture Topic	Book (selected sections)
1	Thurs 9/3	Introduction to Parasitology Symbioses; Parasitism; Neglected tropical diseases; Why study parasitology?	III
2	Tues 9/8 (Mon classes)	Introduction to trematodes Taxonomy; Life cycle; Adults, eggs, & larval stages	VII
3	Thurs 9/10	Food-borne trematode infections Foodborne diseases; <i>Clonorchis sinensis</i> , <i>Opisthorchis viverrini</i> , <i>Fasciola hepatica</i> , <i>Paragonimus westermani</i>	VII
4	Mon 9/14	Schistosoma Life cycle; Exit of eggs; Pathology, diagnosis, treatment, & control	VII
5	Thurs 9/17	Introduction to cestodes Taxonomy; Generalized life cycle; Adult morphology; Eggs: Introduction to order Cyclophyllidea (Life cycle)	VI
6	Mon 9/21	Order Cyclophyllidea <i>Taenia solium</i> ; <i>Taenia saginata</i> ; <i>Echinococcus spp</i>	VI
7	Thurs 9/24	Order Pseudophyllidea <i>Diphyllobothrium latum</i> ; Larval pseudophyllideans	VI
8	Mon 9/28	Parasite transmission Transmission strategies; Parasite control	III
9	Thurs 10/1	Introduction to nematodes Overview; Adults; Treatments; Generalized life cycle	V
	Mon, 10/5	Exam 1: Lectures 1 (Sept 3) – 8 (Sept 28)	

Lecture	Date	Lecture Topic	Book (selected sections)
10	Thurs, 10/8	Soil transmitted helminths I <i>Trichuris trichiura</i> , <i>Ascaris lumbricoides</i> , Hookworms	V
11	Mon, 10/12	Soil transmitted helminths II Hookworms, <i>Strongyloides stercoralis</i>	V
12	Thurs, 10/15	Tissue nematodes <i>Trichinella spiralis</i> , <i>Anisakis simplex</i> , <i>Dracunculus medinensis</i>	V
13	Mon, 10/19	Filarial nematodes General characteristics; <i>Wuchereria bancrofti</i> , <i>Onchocerca volvulus</i> , <i>Dirofilaria immitis</i>	V
14	Thurs, 10/22	Epidemiology Introduction; <i>Ascaris</i> model; Parasite control; <i>Enterobius vermicularis</i>	V
15	Mon, 10/26	Introduction to protozoa and amoebae Introduction; Order Amoebida; <i>Entamoeba histolytica</i>	IV
16	Thurs, 10/29	Non-pathogenic and pathogenic amoebae. Flagellates <i>Entamoeba coli</i> , <i>Entamoeba hartmani</i> , <i>Entamoeba polecki</i> ; <i>Endolimax nana</i> , <i>Iodamoeba butschlii</i> , <i>Entamoeba gingivalis</i> ; <i>Naegleria fowleri</i> , <i>Acanthamoeba</i> , <i>Giardia lamblia</i> , <i>Trichomonas vaginalis</i>	IV
17	Mon, 11/2	Pathology & Diagnostic techniques Pathology and virulence; Effects on host; Fecals; Immunologic testing	Appendix B
18	Thurs, 11/5	<i>Trypanosoma brucei</i> Order Kinetoplastida; Section Salivaria; Antigenic variation	IV
	Mon, 11/9	Exam 2: Lectures 9 (Oct 1) – 17 (Nov 2)	

Lecture	Date	Lecture Topic	Book (selected sections)
19	Thurs, 11/12	<i>Trypanosoma cruzi</i> Life cycle; Pathology; Diagnosis, treatment, & control	IV
20	Mon, 11/16	<i>Leishmania</i> & Ciliates <i>Leishmania</i> morphology, life cycle, treatment & control; Cutaneous, mucocutaneous, & visceral leishmaniasis; Ciliates	IV
21	Thurs, 11/19	Introduction to apicomplexans and <i>Plasmodium</i> Evolution of apicoplast; <i>Plasmodium</i> life cycle	IV
22	Mon, 11/23	<i>Plasmodium</i> 1 <i>Plasmodium vivax</i> , <i>P. malariae</i> , <i>P. ovale</i> , & <i>P. falciparum</i>	IV
		Thanksgiving - No class on Thurs, 11/26	
23	Mon, 11/30	<i>Plasmodium</i> 2 Diagnosis, treatment, vaccines, & mosquito control	IV
24	Thurs, 12/3	Other apicomplexans <i>Toxoplasma gondii</i> , <i>Cyclospora</i> , <i>Babesia microti</i> , <i>Cryptosporidium</i> Life cycle, morphology, pathology, diagnosis, treatment, control	IV
25	Mon, 12/7	Ectoparasites Parasites that live on host surface; vector biology	VIII
26	Thurs, 12/10	The future of parasitology & course conclusion Careers; Predictions	
	Tues, 12/22 8:30 – 10:00 AM	Final Exam: Lectures 18 (Nov 5) – 26 (Dec 10)	

*Please note – Schedule and topics are subject to change

IV. ASSESSMENTS

• QUIZZES

Almost every week there will be a quiz on Canvas related to material covered in two lectures. Each quiz will have 5 questions that cover lecture material and any other content (videos, readings, papers, etc.) that may have been assigned. These quizzes will help you stay up-to-date with the information and allow you to gauge your mastery of the content. Quizzes will be posted on Canvas on Mondays at 2:00 pm and must be submitted by 11:59 pm on the following Saturday. Students are responsible for ensuring that they have a stable internet connection. Once a quiz has been started it must be completed within 10 minutes. Once a quiz has closed (Saturday, 11:59 pm), it cannot be reopened (there will be no exceptions, and any requests will be ignored). Students are advised to take the quiz earlier in the week than later to avoid any last-minute issues that might arise and prevent timely completion of the quiz. The total points earned on the quizzes will comprise 10% of the final course grade.

Quiz schedule

Quiz	Lectures	Quiz opens at 2 pm on Monday	Quiz closes at 11:59 pm on Saturday
1	1 & 2	Tues, 9/8	9/12
2	3 & 4	9/14	9/19
3	5 & 6	9/21	9/26
4	7 & 8	9/28	10/3
5	10 & 11	10/12	10/17
6	12 & 13	10/19	10/24
7	14 & 15	10/26	10/31
8	16 & 17	11/2	11/7
9	19 & 20	11/16	11/21
10	22 & 23	11/30	12/5

• EXAMS

There will be three, in-person, non-cumulative exams. 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. The exams will cover the lectures and any additional assigned materials (textbook, papers, videos, etc.).

Students who require special accommodation must make arrangements at least one week in advance with Dr. Keating. This accommodation will be provided only if approved by the Office of Disability Services.

Exams cannot be rescheduled or retaken. Individual exceptions for rescheduling will possibly be made only in cases of documented serious, long-term illness or family emergency or for Rutgers approved activities. Only one makeup exam may be taken during the semester.

If a makeup has been approved, then the following will apply.

Exam 1 must be made up no later than Wednesday, Oct 7.

Exam 2 must be made up no later than Wednesday, Nov 11.

Final exam makeup will be on Tuesday, Dec 22 at noon. Location is TBD.

Exam schedule

Exam	Date	Lectures	
1	Monday, Oct 5	1 - 8	30% of final course grade
2	Monday, Nov 9	9 - 17	30% of final course grade
Final	Tuesday, Dec 22	18 - 26	30% of final course grade

- OTHER ASSESSMENT INFORMATION**

Extra Credit: None. No exceptions. Any requests for extra credit will be ignored.

Grades

Final course grades will be determined by the quizzes and exams. Neither the individual quizzes, exams, nor final averages will be curved. Any requests for grades to be curved, “bumped up”, or altered in any other way will be ignored.

Your grade will be based on the following distribution.

Assessment	% of Final grade
Quizzes	10
Exam 1	30
Exam 2	30
Final Exam	30

Final grade	Final average
A	90.00 – 100.00%
B+	85.00 – 89.99%
B	80.00 – 84.99%
C+	75.00 – 79.99%
C	70.00 – 74.99%
D	60.00 – 69.99%
F	0 – 59.99%

V. STUDENT SUPPORT SERVICES

- **Academic Services:**

For academic support visit Rutgers Academics Student Support (<https://www.rutgers.edu/academics/student-support>).

Any student can obtain tutoring and other help at the Learning Centers on each campus. (<https://rlc.rutgers.edu/>)

Many library resources are available online. Assistance is available through phone, email, and chat. (<https://www.libraries.rutgers.edu/>).

- **Resources for Student Success** (<https://success.rutgers.edu/>)

The faculty and staff at Rutgers are committed to your success. Students who are successful tend to seek out resources that enable them to excel academically, maintain their health and wellness, navigate college life and finances, connect with the RU community, and prepare for future careers. Resources that can help you succeed and connect with the Rutgers community can be found at success.rutgers.edu, and nearly all services and resources that are typically provided in-person are now available remotely.

- **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.

- **Veteran Services**

Rutgers is proud to support veterans. If you are a veteran of the armed forces, please visit the Office of Veteran and Military Programs and Services website (<https://www.rutgers.edu/veterans>).

- **Counseling, ADAP & Psychiatric Services (CAPS)**

(848) 932-7884

<https://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

<https://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.

- **Rutgers Career Exploration and Success**

CES supports all Rutgers-New Brunswick students and recent alumni, regardless of career interest, academic discipline, or degree level. <https://careers.rutgers.edu/>

- **Chosen Name Initiative**

Every student has the right to be called by their chosen/preferred name and to have their name pronounced correctly. If your chosen name is different from your legal name, visit the Chosen Name Initiative website (<https://uhr.rutgers.edu/worklife-balance/submitting-chosen-name>) to register your chosen name. You may also use the Shout-out tool (<https://canvas.rutgers.edu/external-apps/rutgers-shout-out/>) in our Canvas course site to record the correct pronunciation of your name.

- **Basic Needs Assistance (food, housing, and other essentials)**

<https://ruoffcampus.rutgers.edu/basic-needs>