

# **BIOL 531 / ENHS 661 / EPID 661**

Parasitology (4 Credits)  
Spring 2024

**Lecture Meeting Times:** Tuesday & Thursday, 10:05-11:20 COKER 202

**Lab Meeting Times:**

Wednesday, 8:30-11:15 COKER 201 (Section 001)

Wednesday, 12-2:45 COKER 201 (Section 001)

**Lecture Instructor:** Dr. Tad Dallas

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Office: Earth and Water Sciences Building, Office 601

Office Hours: TBA

**Lab Instructor:** Grant Foster (he/him)

Email: [fostergt@email.sc.edu](mailto:fostergt@email.sc.edu)

Office: Earth and Water Sciences Building, Office 601

Office Hours: TBA, or by appointment

## **Academic Bulletin Description**

Parasites of biological, economic, and public health importance. Three lecture and three laboratory hours per week.

**Prerequisites:** 300 level Biology course or equivalent.

## **Prerequisite or Corequisite**

300 level Biology course or equivalent.

## **Course Overview:**

Parasitism is the most common trophic strategy on Earth, with incredible variation in their life histories (e.g., intestinal helminth parasites, viruses, ectoparasites like ticks and fleas, etc. etc.). This diversity of life history types leads to differences in the number of host species they infect and the resulting consequences on the host itself. This course introduces major issues and advances in the ecology of infectious diseases. Specifically, we will cover parasite functional and taxonomic diversity, variation in transmission dynamics, parasite virulence and co-evolution of hosts and parasites, host-parasite networks, spatial and environmental gradients of host specificity, and the process of disease emergence in human and wildlife systems.

## **Course Materials**

All course materials, including lecture slides, lab handouts, and homework assignments are available on the course website (<https://dallaslab.github.io/diseaseEcology/>). There is no required text for this class, though students will be asked to read a number of primary articles through the course of the semester, all of which will be posted on the course website.

## Course Learning Outcomes

After successful completion of this course, the student will be able to...

- Explain the diverse set of taxonomic groups and life-history strategies encompassed by the term “parasite”
- Identify major classes of macroparasites through microscopy and diagnostic techniques
- Analyze and develop mathematical models of parasite transmission
- Evaluate the benefits of taking an ecological perspective in the management and control infectious disease
- Interpret primary literature presenting foundational parasite ecology concepts
- Explain the major pathways of infection for a variety of parasite groups, from encounter in the environment to infection, immune response, and recovery
- Work as a team to apply disease ecology principles to real world problems, developing research and intervention plans
- Identify characteristics of parasites that pose a higher risk of zoonotic infection, and explain how changes in climate, land use, community turnover, and other factors may influence zoonotic risk.
- And more!

At the beginning of each week, the specific learning outcomes and goals relevant to the chapter will be presented. **Taking a few moments to look these over before and after each topic will greatly help guide your studying for assignments and cement your learning!**

## Course Schedule

Week	Date	Lecture Topic	Lab Topic	Due This Week
<b>1</b>	1/08	Course design, goals, introduction, and setup	No Labs	
<b>2</b>	1/15	Life history strategies and host-parasite coevolution	Lab 1: Introduction; Parasite Specificity; Microscope Review	
<b>3</b>	1/22	Parasite richness, specificity, and host range	Lab 2: Parasite Diversity; Life History Strategies	Worksheet 1
<b>4</b>	1/29	Behavioral and immunological responses	Lab 3: Host Range	1/30: HW 1 Worksheet 2
<b>5</b>	2/05	Biology of microparasites	Lab 4: Immunological Responses: Melanization responses in <i>Passalid</i> beetles	Worksheet 3
<b>6</b>	2/12	Epidemics and interventions	Lab 5: Diagnostic Testing: Identifying Helminth parasites in wildlife	Worksheet 4
<b>7</b>	2/19	Parasite aggregation and burden	Lab 6: Disease Modeling I	Worksheet 5
<b>8</b>	2/26	Biology of macroparasites	Lab 7: Disease Modeling II	Midterm Exam (2/29) Worksheet 6
	3/04	Spring Break!		
<b>9</b>	3/11	Vector-borne disease	Lab 8: Disease Modeling Wrap Up: Presentations + Case Study	3/10: HW 2 Worksheet 7
<b>10</b>	3/18	Environmentally-transmitted disease and sexually-transmitted diseases	Lab 9: Parasite Aggregation: Trematodes burdens in marine snails	Worksheet 8
<b>11</b>	3/25	Infectious diseases in communities	Lab 10: Parasite Encounter Rates: Tick Collection	Worksheet 9
<b>12</b>	4/01	Coinfection	Lab 11: Tick Data Analysis	4/04: HW 3 Worksheet 10

Week	Date	Lecture Topic	Lab Topic	Due This Week
<b>13</b>	4/08	Macroecology of infectious disease and networked populations	Lab 12: Risk Mapping of Environmentally-Transmitted Disease; Case Study + Analysis	Worksheet 11
<b>14</b>	4/15	Zoonoses, spillover, emergence, and One Health	Lab 13: Disease Transmission in networked populations: Data Analysis of Respiratory Disease in Primates	Worksheet 12
<b>15</b>	4/22	Final Exam Review	No Lab	4/22: HW 4 Worksheet 13 (Due 04/22)

**Final Exam Date: Thursday, April 27 - 9:00 a.m**

## Course Assignments and Grading

The course will be graded out of 650 points, broken down as such:

Assignments	Points	Percentage (approximate)
HW Assignments (4)	160	25%
Exams (2)	140	21%
Weekly Lecture Quizzes	170	25%
Participation	50	7%
Lab Quizzes	25	4%
Lab Worksheets (11, lowest dropped)	100	15%
Disease Modeling Presentation	30	4%
<b>TOTAL</b>	<b>650</b>	<b>100%</b>

585 – 650 points (90%) = A  
 559 – 584 points (86%) = B+  
 520 – 558 points (80%) = B  
 494 – 519 points (76%) = C+  
 455 – 493 points (70%) = C  
 390 – 454 points (60%) = D  
 0 – 389 points (<60%) = F

## Technology Requirements

The lecture presentations and all assignments will be available to students in pdf and doc formats through the course website. To successfully participate in this course, students will need:

- Access to a working computer that has a current operating system with updates installed
- Reliable Internet access and a USC email account;
- A current Internet browser that is compatible with Blackboard (Google Chrome is the recommended browser for Blackboard);
- Reliable data storage for your work, such as a USB drive or Office365 OneDrive cloud storage.

Some lab assignments will require students to use the program R to analyze data and create disease models. Students will likely find it helpful to download the program R as well as development

environment RStudio to work on these assignments outside of class. Instructions and walkthroughs for how to do this will be gone over on the first day of the lab.

## Technical Support

If you have problems with your computer, technology, IT-related questions, support, including Blackboard, please contact the Division of Information Technology (DoIT) Service Desk at (803) 777-1800 or submit an online request through the [Self-Service Portal](https://scprod.service-now.com/sp) (<https://scprod.service-now.com/sp>) or visit the [Carolina Tech Zone](https://www.sc.edu/about/offices_and_divisions/university_technology_services/support/ctz.php) ([https://www.sc.edu/about/offices\\_and\\_divisions/university\\_technology\\_services/support/ctz.php](https://www.sc.edu/about/offices_and_divisions/university_technology_services/support/ctz.php)). The Service Desk is open Monday – Friday from 8:00 AM – 6:00 PM (Eastern Time Zone). If you are located in the Columbia, SC area, the Thomas Cooper Library at USC has computers for you to use in case you encounter computer issues/problems. If you are not located in the Columbia, SC area, most regional campuses and public libraries have computers for public use.

## Assignment Policies and Descriptions

All assignments are due immediately before the start of class on the day indicated. Assignments should be submitted as instructed. Assignments are not collaborative, and I expect that each student will complete the assignment independently.

## Late Assignments:

All assignments are expected to be electronically submitted by the due date through blackboard. I will not accept any assignment that is submitted after the deadline and the assignment will receive the grade of 0. This course is an upper-level class and you are expected to work at the appropriate level and be responsible for your work. All deadlines are posted with the syllabus or any changes will be announced ahead of time.

## Attendance:

Much of the material presented will not be available if you aren't in class to hear it. You should come to class. If you do not, you may struggle. Part of the class will be discussing relevant papers. If you do not participate in paper discussions, clearly demonstrating that you have read and understand the nuances of the work, this will affect your grade. Attendance and participation will be worth 50 points.

## Weekly Lecture quizzes

There will be weekly quizzes that will cover material in the required reading for the week. These will consist of 1-3 questions, and are designed as a useful check-in to gauge what folks took away from the reading that week. These will likely happen on Tuesday, meaning that before the first class of the week, students will have had to do the reading for that week.

## Exams

There will be two exams, roughly distributed as a mid-term (covering modules 1 and 2) and a final exam (covering modules 3 and 4). Exams will be worth 100 points, will be completed in class, and will be closed book/notes.

## **Lab Quizzes**

Students will be quizzed on pre-lab materials at the beginning of each laboratory period. Students arriving to class after the quiz has been handed out will be allowed the remaining time to finish their quiz for a 20% grade reduction on that assignment. Students arriving after their peers have already finished the quiz will not be allowed to take that class period's quiz. Each students' lowest grade in this assignment category will be dropped at the end of the semester.

## **Lab Worksheets**

All labs will have an associated worksheet. Unless specified otherwise, lab worksheets are due before class the following week they are assigned. For example, the lab worksheet assigned on the first lab period (1/18) will be due before class on 1/25. Each students' lowest grade in this assignment category will be dropped at the end of the semester.

## **Disease Modeling Presentation**

In lab week X, students will be assigned to groups and tasked with using real case data to model an outbreak of a given infectious disease. Groups will work together to learn about the biology of their disease, model outbreak progression, and design a set of potential intervention strategies that could be used in a similar future outbreak. This project will culminate with a presentation to the class on the groups' findings.

## **Other Class Policies:**

### **Academic Integrity**

Cooperation has a limit. You should not copy your code or answers directly with other students. Feel free to discuss the problems with others, but write your own solutions. Penalties for cheating are severe – they range from a zero grade for the assignment or exam up to dismissal from the University, for a second offense. Rather than copying someone else's work, ask for help. You are not alone in this course! If you invest the time to learn the material and complete the projects, you won't need to copy any answers.

You are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will result in a minimum academic penalty of your failing the assignment, and will result in additional disciplinary measures. This includes improper citation of sources, using another student's work, and any other form of academic misrepresentation.

The first tenet of the Carolinian Creed is, "I will practice personal and academic integrity."

Below are some websites for you to visit to learn more about University policies:

[Carolinian Creed \(http://www.sa.sc.edu/creed\)](http://www.sa.sc.edu/creed)

[Academic Responsibility \(http://www.sc.edu/policies/staf625.pdf\)](http://www.sc.edu/policies/staf625.pdf)

[Office of Student Conduct and Academic Integrity \(https://www.sa.sc.edu/academicintegrity/\)](https://www.sa.sc.edu/academicintegrity/)

## Information Security Policy and Standards

([https://sc.edu/about/offices\\_and\\_divisions/division\\_of\\_information\\_technology/security/policy/universitypolicy/](https://sc.edu/about/offices_and_divisions/division_of_information_technology/security/policy/universitypolicy/))

### **Class Conduct**

Professionalism will be expected at all times. Because the university classroom is a place designed for the free exchange of ideas, we must show respect for one another in all circumstances. We will show respect for one another by exhibiting patience and courtesy in our exchanges. Appropriate language and restraint from verbal attacks upon those whose perspectives differ from your own is a minimum requirement. Courtesy and kindness is the norm for those who participate in my class.

### **Laptop/Smartphone Policy**

The use of laptops and smartphones is allowed when it is required for course assignments. Please place your laptop under your seat during class. Cellphones should be placed on silent and should be put away in your pocket or bag. If there is a serious need (such as a family emergency), please leave your phone on vibrate.

### **Incomplete Grades**

You may be assigned an 'I' (Incomplete) grade if you are unable to complete some portion of the assigned course work because of an unanticipated illness, accident, work-related responsibility, family hardship, or verified learning disability. An Incomplete grade is not intended to give you additional time to complete course assignments or extra credit unless there is indication that the specified circumstances prevented you from completing course assignments on time. Students seeking an incomplete should reach out to the office of student advocacy.

### **Diversity and Inclusion**

The university is committed to a campus environment that is inclusive, safe, and respectful for all persons, and one that fully embraces the Carolinian Creed. To that end, all course activities will be conducted in an atmosphere of friendly participation and interaction among colleagues, recognizing and appreciating the unique experiences, background, and point of view each student brings. You are expected at all times to apply the highest academic standards to this course and to treat others with dignity and respect.

### **Accessibility, Disability, and Triggers**

I am committed to ensuring course **accessibility** for all students. If you have a documented **disability** and expect reasonable accommodation to complete course requirements, please provide [SDRC](https://sc.edu/about/offices_and_divisions/student_disability_resource_center/) ([https://sc.edu/about/offices\\_and\\_divisions/student\\_disability\\_resource\\_center/](https://sc.edu/about/offices_and_divisions/student_disability_resource_center/)) documentation to me before requesting accommodation. *Additionally, please notify me at least one week before accommodation is needed.* Likewise, if you are aware of cognitive or emotional **triggers** that could

disrupt your intellectual or mental health, please let me know privately so that I can be aware in terms of course content.

### ***Diversity, Ethics, and the Carolinian Creed***

This course works to foster a climate free of harassment and discrimination, and it values the contributions of all forms of **diversity**. The decision to enter university and pursue advanced study is a choice that entails commitment to personal **ethics** expressed in the [Carolinian Creed \(www.sa.sc.edu/creed\)](http://www.sa.sc.edu/creed): “I will discourage bigotry, while striving to learn from differences in people, ideas and opinions.” Likewise, the Student Code of Conduct ([STAF 6.26 \(http://www.sc.edu/policies/ppm/staf626.pdf\)](http://www.sc.edu/policies/ppm/staf626.pdf)) stresses, “The University of South Carolina strives to maintain an educational community that fosters the development of students who are ethical, civil and responsible persons.”

### ***Title IX and Gendered Pronouns***

This course affirms equality and respect for all gendered identities and expressions. Please don’t hesitate to correct me regarding your preferred gender pronoun and/or name if different from what is indicated on the official class roster. Likewise, I am committed to nurturing an environment free from discrimination and harassment. Consistent with Title IX policy, please be aware that I, as a responsible employee, am obligated to report information that you provide to me about a situation involving sexual harassment or assault.

## **Academic Success**

### **Disability Services**

[Student Disability Resource Center \(http://www.sa.sc.edu/sds/\)](http://www.sa.sc.edu/sds/): The Student Disability Resource Center (SDRC) empowers students to manage challenges and limitations imposed by disabilities.

Students with disabilities are encouraged to contact me to discuss the logistics of any accommodations needed to fulfill course requirements (within the first week of the semester). In order to receive reasonable accommodations from me, you must be registered with the Student Disability Resource Center (1705 College Street, Close-Hipp Suite 102, Columbia, SC 29208, 803-777-6142). Any student with a documented disability should contact the SDRC to make arrangements for appropriate accommodations.

### **Student Success Center**

In partnership with USC faculty, the Student Success Center (SSC) offers a number of programs to assist you in better understanding your course material and to aid you on your path to success. SSC programs are facilitated by professional staff, graduate students, and trained undergraduate peer leaders who have previously excelled in their courses. Resources available to you in this course may include:

- **Peer Tutoring:** You can make a one-on-one appointment with a [Peer Tutor \(www.sc.edu/success\)](http://www.sc.edu/success). Drop-in Tutoring and Online Tutoring may also be available for this course. Visit their website for a full schedule of times, locations, and courses.

- **Peer Writing:** Improve your college-level writing skills by bringing writing assignments from any of your classes to a Peer Writing Tutor. Similar to Tutoring, you can visit the website to make an appointment, and to view the full schedule of available drop-in hours and locations.
- **Success Consultations:** In Success Consultations, SSC staff assist you in developing study skills, setting goals, and connecting to a variety of campus resources. Throughout the semester, I may communicate with the Student Success Center regarding your progress throughout the semester, which indicates your instructor is concerned about your progress in this course. If contacted by the Student Success Center, please schedule a Success Consultation right away. Referrals are not punitive, and any information shared by your professor is confidential and subject to FERPA. Student Success Center services are offered to all UofSC undergraduates at no additional cost. Please call 803-777-1000, visit [www.sc.edu/success](http://www.sc.edu/success), or come to the Student Success Center in the Thomas Cooper Library (Mezzanine Level) to check schedules and make appointments.

SSC services are offered to all USC undergraduates at no additional cost. You are invited to call the Student Success Hotline at (803) 777-1000, visit the [SSC website \(www.sc.edu/success\)](http://www.sc.edu/success), or stop by the SSC in the Thomas Cooper Library on the Mezzanine Level to check schedules and make appointments.

## Writing Center

[Writing Center \(http://artsandsciences.sc.edu/write/university-writing-center\)](http://artsandsciences.sc.edu/write/university-writing-center)

This course has many of writing assignments. The University Writing Center is an important resource you should use! It's open to help any USC student needing assistance with a writing project at any stage of development. The main Writing Center is in Byrnes 703.

## University Library Resources

[University Libraries Resources \(sc.edu/libraries\)](http://sc.edu/libraries)

- University Libraries has access to books, articles, subject specific resources, citation help, and more. If you are not sure where to start, please [Ask a Librarian!](#) [Assistance is available at sc.edu/libraries/ask](http://sc.edu/libraries/ask).
- Remember that if you use anything that is not your own writing or media (quotes from books, articles, interviews, websites, movies – everything) you must cite the source in MLA (or other appropriate and approved) format.

## Blackboard and Technology

[Blackboard and Technology](https://sc.edu/about/offices_and_divisions/division_of_information_technology/end_user_services/available_technology_resources/)

[\(https://sc.edu/about/offices\\_and\\_divisions/division\\_of\\_information\\_technology/end\\_user\\_services/available\\_technology\\_resources/\)](https://sc.edu/about/offices_and_divisions/division_of_information_technology/end_user_services/available_technology_resources/)

As a student in this course, you have access to support from the Division of Information Technology (DoIT) for Blackboard and computer issues. The service desk can be reached at 803-777-1800.

## Counseling Services



### Counseling Services

([https://sc.edu/about/offices\\_and\\_divisions/student\\_health\\_services/medical-services/counseling-and-psychiatry/index.php](https://sc.edu/about/offices_and_divisions/student_health_services/medical-services/counseling-and-psychiatry/index.php)): The University offers counseling and crisis services as well as outreach services, self-help, and frequently asked questions.

### **Mental Health**

If stress is impacting you or getting in the way of your ability to do your schoolwork, maintain relationships, eat, sleep, or enjoy yourself, please reach out to any of our mental health resources. Counseling & Psychiatry offers individual and group counseling and psychiatric services. You can schedule an appointment at (803) 777-5223 or on MyHealthSpace. You can also call after-hours for crisis counseling. Wellness Coaching can help you improve in areas related to emotional and physical wellbeing, such as sleep, resiliency, balanced eating and more. Wellness Coaching appointments can be made by calling 803-777-6518. or on MyHealthSpace. Most of these services are offered at no cost as they are covered by the Student Health Services tuition fee. For all available mental health resources, check out [sc.edu/mentalhealth](https://sc.edu/mentalhealth).