MICRO 5129

Cellular and Molecular Biology of Pathogenic Eukaryotes

AKA **Molecular Parasitology**

The Ohio State University | Spring 2026 | 3 credits

BioSci Rm 668 | M-W-F | 9:10 – 10:05 AM

Course Overview

This course examines unicellular eukaryotic parasites, with an emphasis on the molecular, cellular, and metabolic features that govern their biology and capacity to cause disease.

Locations

All lecture sessions will be held in **Rm 668** of the Biological Sciences Building.
Mon-Wed-Fri | 9:10 AM -10:05 AM

Note: This is an in-person class. Contact time per week: 2.75 hours

Instructor

Krithika Rajaram, PhD
Office: Rm 440A Biological Sciences Building
Email address: **rajaram.24@osu.edu**

Office Hours

By appointment.

Course Technology

All material will be available on CARMENCanvas. You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you can connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Course Materials

For background information you may consult:

- Archibald, J. M., Simpson, A. G. B., & Slamovits, C. H. (Eds.). (2017). *Handbook of the protists* (2nd ed.). Springer.

- Becker, K (Ed.). (2011). *Apicomplexan parasites; molecular approaches toward targeted drug development*. Wiley.

Course Objectives

1. To acquire knowledge about the general characteristics of eukaryotic microbial pathogens with special emphasis on their molecular, cellular, and metabolic features.

2. To gain knowledge about biochemical and molecular genetic approaches that may lead to a better understanding of this group of pathogens.

3. To raise awareness of questions that, if answered, could lead to beneficial effects on human health by decreasing the frequency and severity of diseases caused by these pathogens.

Format of course

The course will include a mix of lectures, discussion of assigned literature, and student presentations. All students are required to read papers assigned for discussion and student presentations. In addition, students are advised to read assigned review papers on each topic covered in the class.

Student presentations

These presentations will involve papers assigned by the instructor. The entire class will be divided into teams of 3-4 students depending on class size. Teams will be responsible for preparing a PowerPoint presentation in which each student will cover some aspect of the paper assigned. Typically, papers will be divided into 3 major sessions:

-Introduction/Background
-Results (including methods and justification for experiments)
-Discussion (including your own assessment of the paper)

Each team should prepare to present for 35-40 minutes. This will be followed by an open discussion (including questions) with the rest of the class.

Evaluation of presentations

Three main criteria will be used in the scoring:

1. Quality of slides, e.g., providing requisite background, clear slide titles, etc.
2. Clarity of presentation and demonstration of independent analysis
3. Ability to answer questions

Scoring rubric:

A range: the presentation enlightens the audience by including materials that go beyond the assigned paper. The slides are of excellent graphic quality and clear to follow. The presenter is in complete control of the presentation and topic and finishes in good time.

B range: The presentation is clear and concise but does not provide any new insights into the topic. The presentation runs overtime or is too short.

C range: the presentation is disorganized, runs overtime or it is too short. The presenter is unable to answer questions relevant to the topic. The presenter makes serious scientific mistakes.

Class participation

Students will be graded on class participation. Active engagement is expected from all students, including

attentive listening and questioning. Meaningful participation involves coming to class prepared, having read the assigned material in advance, and contributing constructively to discussions. To maintain a focused learning environment, please put your cell phones away during class.

Attendance

Students are allowed two absences without needing to provide any excuses during lecture sessions. However, perfect attendance is required during manuscript discussion and student presentation sessions, unless an appropriate excuse is provided by the student (medical emergency, etc.).

Grades

Grades will be based on a mid-term exam (30%), an oral presentation (20%), a final exam (30%) and participation during in-class discussion (20%).

Sessions

1. 01-12 Course Orientation and Lecture: Introduction to Molecular Parasitology
2. 01-14 Lecture: Introduction to Molecular Parasitology
3. 01-16 Lecture: Apicomplexa - Malaria

4. 01-19 **MLK day – No classes**
5. 01-21 Lecture: Apicomplexa - Malaria
6. 01-23 Lecture: Apicomplexa - Malaria

7. 01-26 Journal article discussion - Malaria
8. 01-28 Lecture: Apicomplexa - Babesia
9. 01-30 Lecture: Apicomplexa - Theileria

10. 02-02 Lecture: Apicomplexa - Toxoplasma
11. 02-04 Lecture: Apicomplexa - Toxoplasma
12. 02-06 Journal article discussion - Toxoplasma

13. 02-09 Lecture: Apicomplexa - Cryptosporidium
14. 02-11 Lecture: Apicomplexa - Cryptosporidium
15. 02-13 Journal article discussion - Cryptosporidium

17. 02-16 Lecture: Organelles - Apicoplast
18. 02-18 Lecture: Organelles - Apicoplast
19. 02-20 Journal article discussion - Apicoplast

20. 02-23 Lecture: Kinetoplastids - Trypanosoma
21. 02-25 Lecture: Kinetoplastids - Trypanosoma
22. 02-27 Journal article discussion - Trypanosoma

22. 03-02 Lecture: Kinetoplastids - Leishmania
23. 03-04 Lecture: Organelles - Glycosomes
24. 03-06 Midterm exam

25. 03-09 Lecture: Metamonads - Giardia
26. 03-11 Lecture: Metamonads - Giardia
27. 03-13 Journal article discussion - Giardia

28. 03-16 Spring Break
29. 03-18 Spring Break
30. 03-20 Spring Break

31. 03-23 Lecture: Metamonads - Trichomonas
32. 03-25 Lecture: Metamonads – Trichomonas
33. 03-27 Journal article discussion - Trichomonas

34. 03-30 Lecture: Organelles - Mitochondria
35. 04-01 Lecture: Organelles - Mitochondria
36. 04-03 Journal article discussion - Mitochondria

37. 04-06 Lecture: Amoebomastigotes - Naegleria
38. 04-08 Lecture: Amoebomastigotes – Naegleria/How to give a good presentation
39. 04-10 Student presentation #1

40. 04-13 Student presentation #2
41. 04-15 Student presentation #3
42. 04-17 Student presentation #4

43. 04-20 Student presentation #5
44. 04-22 Student presentation #6
45. 04-24 Student presentation #7

46. 04-27 Review of topics covered in student presentations

47. 04-29 Final Exam

Final exam

The final exam will consist of material covered in lectures and from assigned journal articles that have been presented/discussed.

Academic Misconduct

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute Academic Misconduct.

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: Any activity that tends to compromise the academic integrity of the University or subvert the educational process. Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an excuse for academic misconduct, so please review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If an instructor suspects that a student has committed academic misconduct in this course, the instructor is obligated by University Rules to report those suspicions to the Committee on Academic Misconduct. If COAM determines that a student violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University.

If students have questions about the above policy or what constitutes academic misconduct in this course, they should contact the instructor.

Artificial Intelligence and Academic Integrity

There has been a significant increase in the popularity and availability of a variety of generative artificial intelligence (AI) tools, including ChatGPT, Sudowrite, and others. These tools will help shape the future of work, research and technology, but when used in the wrong way, they can stand in conflict with academic integrity at Ohio State.

All students have important obligations under the Code of Student Conduct to complete all academic and scholarly activities with fairness and honesty. Our professional students also have the responsibility to uphold the professional and ethical standards found in their respective academic honor codes. Specifically, students are not to use unauthorized assistance in the laboratory, on field work, in scholarship, or on a course assignment unless such assistance has been authorized specifically by the course instructor. In addition, students are not to submit their work without acknowledging any word-for-word use and/or paraphrasing of writing, ideas or other work that is not your own. These requirements apply to all students undergraduate, graduate, and professional.

To maintain a culture of integrity and respect, these generative AI tools should not be used in the completion of course assignments unless an instructor for a given course specifically authorizes their use. Some instructors may approve of using generative AI tools in the academic setting for specific goals. However, these tools should be used only with the explicit and clear permission of each individual instructor, and then only in the ways allowed by the instructor.

Religious Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement **and** the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Civil Rights Compliance Office.

Policy: Religious Holidays, Holy Days and Observances

Disability Statement (with Accommodations for Illness)

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If students anticipate or experience academic barriers based on a disability (including mental health and medical conditions, whether chronic or temporary), they should let their instructor know

immediately so that they can privately discuss options. Students do not need to disclose specific information about a disability to faculty. To establish reasonable accommodations, students may be asked to register with Student Life Disability Services (see below for campus-specific contact information). After registration, students should make arrangements with their instructors as soon as possible to discuss your accommodations so that accommodations may be implemented in a timely fashion.

If students are ill and need to miss class, including if they are staying home and away from others while experiencing symptoms of viral infection or fever, they should let their instructor know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations.

Counseling and Consultation Services / Mental Health Statement

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.