BIOLOGY OF PROTISTS
CBIO (PBIO) 4600/6600, Spring 2016

Course Description: This course explores the organismal biology of a tremendously diverse, interesting, often beautiful but sometimes dangerous assemblage of organisms called protists, most of which are better known as protozoa and algae. Using case studies (stories / discussions with an educational message) and online videos, we will examine the roles of nutrition, endosymbiosis and parasitism in shaping the protists and their descendants, the more complex eukaryotes in Earth's biosphere. We will consider the origins of eukaryotes and their organelles, the origins of multicellularity, how modern phylogenetic methods can be used to develop testable hypotheses about the evolutionary history of protistan diversity and interesting solutions protists have evolved to adapt to environmental challenges. This course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

Instructors:

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Required Course Materials:

eLC: This course will be using eLC. Get help at http://www.ctl.uga.edu/student

A laptop (or some sort of personal device for accessing the internet) will be useful for some of the in-class activities that involve online research.

A three-ring binder is provided.

Not everything is electronic. We are providing each student with a three-ring binder to keep the syllabus, class handouts, notes and documents related to the course that you print out. We will 3-hole punch handouts.

Graduate Students:

Students enrolled in CBIO/PBIO 6600 will develop (with instructor mentoring) and lead a case in one of the class periods.

This Course Is Different!

In a typical course, you generally sit passively listening to a lecture and taking notes. In that typical course, most learning takes place after class and often just before an exam. Homework assignments are also done after class. In that typical course, you might write to enhance learning, but you don't usually get a chance to revise your writing, to think more critically about your writing and how you might improve it.

This course is different. Learning will take place 1) before class as you do the assigned homework, 2) in class as you, your classmates and the instructor work together to investigate in detail a topic introduced in the homework, and 3) after class as you synthesize what you have learned and prepare for an exam. The essays in this course will be writing as a process, not an event. We will not be giving classroom lectures because research shows they are one of the least effective ways to learn (see *Impatient Futurist* by David H. Freedman, in the binder).

Homework you will be doing before class:

The assigned homework is listed in the Course Outline (attached) which will be updated during the semester. The video homework consists of online PowerPoint presentations narrated by the instructor. They typically contain the basic content (the facts and concepts) of the course that you would normally receive in a lecture. Each is typically no longer than 15-20 minutes; the PPT is available to print out and take notes on as you listen to the video. The reading homework will typically introduce and/or provide background information on the topic to be discussed in the next class period. The reading assignment will be available online or be given as a handout in class.

There will be a quiz for each video and reading homework assignment on eLC. Each quiz contains one standard question asking you to reflect on the video or reading assignment; the deadline for completing each quiz is 5:00 pm on the day before the relevant class. Details are provided below under assessments

> Suggestions for learning as you view the videos and read the assignments. Before viewing a video, eliminate distractions (e.g. iPods, phones, TV) from your learning environment. The BioScience Learning Center on the fourth floor of Biological Sciences Bldg. is a good study environment with computers and headsets available for no charge. Make the most efficient use of your time by employing *active learning techniques*. (Just listening to the video as you typically listen to a lecture is *passive learning* and is the least effective way to learn.) Print out the PPT available on eLC and use it to take notes that promote your personal understanding of the material. Own it! Write down questions to ask in class. Periodically summarize, in your own written words, what you just have learned. A major advantage of the videos is the flexibility that allows you to learn on your own time and at your own pace – make frequent use of the pause and rewind features (and even fast forward when you have mastered that section). You control the remote! Use the same active learning techniques as you complete the reading homework assignments.

What we will be doing in class:

When we meet on Wednesdays and Fridays from 11:15 to 12:05 in room 216 Biological Sciences, we will be exploring and extending knowledge you have gained in the homework assignments. The format will be case studies which are stories with an educational message. Everyone loves stories. Humans have used stories to as a teaching technique as long as humans have used language. You will be actively engaged in telling the stories because you will be

prepared with background knowledge learned in the homework assignments. You will be analyzing, evaluating and incorporating new data into the unfolding story. Story telling might involve manipulating objects and/or learning dances. Your instructor's role in class will be that of tutors, guides and resource people to help you in your learning as you interact with your classmates and the subject matter. In this class the instructors are here to assist you but you are responsible for your own learning.

You will be working in groups during most class periods. Research shows that students learn more when they work in small groups of peers to discuss issues and solve problems. Collaborating with others is an important skill in most jobs, but there are rules (BIOL 1108 Lab Manual, p. 15). 1) Recognize and respect the diversity of ideas and contributions of others. 2) Be a careful listener as well as a thoughtful contributor (i.e. do not dominate discussions). 3) Do your share of the work (i.e. thinking and contributing) as you expect others to do their share, but understand that individual strengths and weaknesses preclude everyone from contributing in exactly the same way. 4) Instead of finding fault with an idea proposed by another group member, it is often useful to start with the word "or" when suggesting an alternative. 5) Realize that "brain storming" is just that – a wild collection of spontaneous ideas designed to foster creativity in the collective mind of the group. A crazy idea can often lead to a more useful idea.

Mondays: Class will only meet on the first and last Mondays of the semester and on those **four Mondays when exams are given**. Class will not meet on the remaining nine Mondays, giving you time for thinking, writing and learning.

Homework you will be doing after class:

Your job after class is to ask yourself these questions.

Have I mastered the basic content and concepts I was expected to learn?
How do I know I have learned them?
Have I improved my critical thinking ability in applying, analyzing, evaluating, and creating with respect to the biology of protists?
What are specific examples of critical thinking and problem solving I was able to accomplish before, during, and after class?

Have I learned it? How will you know – before the exam – if you have learned the material? Start by answering the above questions. With respect to content knowledge, ask yourself: "Can I explain this concept on paper and/or out loud to someone else, in my own words, from memory?" If the answer is "yes", DO IT and then check your answer. Just thinking about the correct answer is not enough! It has to come out of your head – out loud or on paper! Your correct answer is evidence that you have learned the concept. Try again several days later to see if you still know the answer (you'll be strengthening those synapses in the process). With respect to higher order learning (i.e. critical thinking skills) practiced before, during, and after class, create your own study questions following UGA's Dr. Stanger-Hall's template "How to create your own study questions" (in the binder). Studying with a partner or two is often a useful approach; the small rooms in the SLC are there for just that purpose.

Assessments:

Exams: There will be four, 50 minute exams, one given every third Monday starting February 1. The lowest score will be dropped. These exams will contain lower level thinking questions on content and concepts (i.e. short answer questions that involve remembering and understanding, including definitions). The exam will also include higher level thinking questions (applying, analyzing, evaluating, and creating – see Bloom's Taxonomy of Educational Objectives – Revised, in the binder). A typical question might be to evaluate the results of a new or different study related to a case discussed in class, including its significance to that story. You will usually be given a choice of questions. For example: Answer 5 of the following 6 items, or Answer one of the following two essay questions. Because the lowest score will be dropped, there will be no late exams given and there will be no make-up exams.

Final exam: The final exam will be comprehensive over the whole semester with an emphasis on the last three weeks of class which are not covered in a 50 minute exam.

Essays: We are asking you to write two essays in this course because "writing, thinking and learning are inter-related cognitive abilities" (Writing Intensive Program). Stop and think about that last quote for a few minutes and you will see the truth in it. Each of those three activities benefits from the other two. Please read carefully the attached document "Writing in Science"; just substitute "instructor" for "GLA".

For each essay, you will be assuming the role of a science writer (yes, science writing is a career – look up Carl Zimmer, a very successful science writer). Identify a topic related to protistology that you find interesting, search the primary literature for a research article on that topic and write an 800-1000 word essay in which you tell your audience how that article has added significantly to our understanding of that topic. See the Essay Guidelines and Examples module on eLC for more information, including a list of potential essay topics.

Quizzes: After completing each video and reading homework assignment, you will go to eLC and answer a short quiz (actually a reflection question) on that assignment. Our goals for these quizzes are 1) to encourage you to complete the assignment and to reward you for your effort, 2) to give us feedback on what you find most important or interesting in the assigned video or reading. Do your responses reflect our objective(s) in the assignment? The feedback will also help us identify and correct any misconceptions that appear in your answers.

To find the quizzes on eLC, click "Tools" in the menu at the top of the course home page and then click "Quizzes". Click on the title of the quiz to be answered. On the next screen, click "Start Quiz" and then "OK" on the following screen. In the box provided, answer the question using the format described below and then click "Save" and then click "Save All Responses" and then on that same screen click "Go to Submit Quiz". Then click: "Submit Quiz" --- "Yes, submit quiz" ---- "Done". Only one attempt is allowed.

The following standard format will be used for every quiz. The due date and time will be included in the title.

Question:

I have personally viewed (or read) title of video (or reading assignment). To me, the most important and/or interesting fact, concept or discovery in the video (or reading assignment) is (1)____. I think that it is most important and/or interesting because (2) _____(15-30 words).

You will answer each quiz using the following standard format that you type in the box provided on eLC.

Answer:

I have personally viewed this video (or read this assignment).

1) ___

2) _____

As an example, here is the quiz question and an answer for a reading assignment:

Question:

I have personally read the essay titled The Essence of Plantness, Darley, due Tue, Jan 19 at 5 pm. To me, the most important and/or interesting fact, concept or discovery in the reading assignment is (1)____. I think that it is most important and/or interesting because (2) _____(15-30 words).

Answer:

I have personally read this assignment.

1) The importance of mode of nutrition in plant evolution
2) Being a terrestrial photoautotroph requires a high surface area to volume ratio which in turn leads to a sedentary life style, localized growth, large vacuoles, and developmental flexibility.

By writing the first sentence of the answer ("I have personally viewed /read this assignment."), you are abiding by UGA's A Culture of Honesty policy. To write that sentence without viewing or reading that assignment constitutes academic dishonesty.

Each answer is graded according to the following criteria. By "expectations" we mean that the answer reflects a careful and thoughtful viewing or reading of the assignment.

4 points – answered on time; answer meets or exceeds expectations
3 points – answered on time; answer does not meet expectations
2 points – answered on time; answer is unacceptable
1 point – answered after the due date and time but before the exam on that topic
0 points – not answered before the exam on that topic

We are not sure how many quizzes will be given, but we are clear that quizzes will account for 25% (250 points) of the course grade. Although we will assign a score to each answer (as above), the actual point value for each quiz will depend on the total number of quizzes given. For example, if only 5 quizzes are given, each would be worth 5% (50 points). If 50 quizzes are given (which is much more likely), each would be worth 0.5% (5 points).

To view the graded quiz and our comment, if any, on your answer, click "Tools" in the menu at the top of the course home page and then click "Quizzes". Then click on the triangle next to the question you are interested in and select "Submissions". Click on "Attempt 1"

Participation points. This format is only successful if everyone participates, so (naturally) there will be points awarded for participation. The main thing we are looking for is engagement but we recognize that students can participate in different ways, all equally valid. For example, some students may be active in small group discussions but are reluctant to contribute in whole class discussions. Other students may not contribute often in whole class discussion, but when they do, their contribution significantly advances the discussion.

Academic Honesty: All academic work must meet the standards contained in "A Culture of Honesty." All students are responsible to inform themselves about those standards before performing any academic work.

Disability: If you have a disability and require classroom, laboratory, and/or testing accommodations, please see one of us after class or make an appointment to discuss your situation.

Current point total?
To see your current points in the course, click "Grades" in the menu at the top of the home page.

Summary of points:

Final exam	200
3, 50 min exams (100 pts each)	300
2 essays (100 pts each)	200
Reflection questions (quizzes)	250
Participation points	50
	Total 1000

Assignment of grades

A = 95-100%
A- = 90-94%
B+ = 86-89%
B = 83-85%
B- = 80-82%
C+ = 76-79%
C = 70-75%
D = 60-69%

COURSE OUTLINE – Biology of Protists, Spring 2016

Week of January 11: Phylogenetic treess

Week of January 18: In the beginning . . .

Week of January 25: Living together (intimately)

Week of February 1: Becoming photoautotrophic; Becoming multicellular

Week of February 8: Excavates – anaerobes, parasites and photoautotrophs

Week of February 15: Green algae #1

Week of February 22: Green Algae #2

Week of February 29: Green Algae #3

Week of March 7 – SPRING BREAK

Week of March 14: Amoebozoa, Rhizaria, Opisthokonts

Week of March 21: Alveolates

Week of March 28: Alveolates

Week of April 4: Stramenopiles #1

Week of April 11: Stramenopiles #2

Week of April 18: Stramenopiles #3

Week of April 25: Hacrobians and protistan ecology

May 2, Monday, last day of classes: Major paradigms in protistology.

Final Exam: Monday, May 9, 12:00 pm – 3:00 pm