Bisc 502: Mycology
University of Mississippi, Fall Semester 2018

Class schedule: Tues 1 - 3:45pm, Wed 1 – 2:50pm (Shoemaker 213)
Instructor: Dr. Jason Hoeksema (phone: 915-1275, e-mail: hoeksema@olemiss.edu)
Office hours: Monday 12-1 p.m. (Shoemaker Hall Rm. 318) and by appointment
Credits: 4 (includes lab)

Course Description
Mycology is the study of fungi. In this course, we will learn about all aspects of fungi, including their morphological and physiological characteristics, evolution and diversity, ecological functions and dynamics, identification, and importance to humans in a variety of contexts. This learning will take place through a combination of lectures, field trips to collect specimens, and laboratory time spent examining, identifying, and growing fungi.

Course Learning Outcomes
By the end of the semester, all students (undergraduate and graduate) should be able to:

- Recognize and explain the important differences between the major lineages of fungi
- Describe important events and divergences in the evolutionary history of fungi
- Identify most fleshy fungi commonly encountered in northern Mississippi to genus, using dichotomous keys and other information available in the literature
- Understand, and recognize, the variety of important ecological niches occupied by fungi
- Understand the importance of fungi for humans in a variety of contexts, including agriculture, forestry, medicine, and food

Additional graduate student requirements: Through the writing of a synthetic paper, graduate students in the course will become experts on a particular aspect of fungi important to their area of graduate research, including knowledge of relevant primary literature, development of specific research questions and hypotheses, and a plan to test those hypotheses in future research.

Required Book: Mushrooms of the Southeast, by Todd F. Elliott & Steven L. Stephenson (2018, Timber Press)
Also recommended (but not required): Mushrooms Demystified, by David Arora (1986, Ten Speed Press), and Chanterelle Dreams, Amanita Nightmares, by Greg Marley (2010, Chelsey Green)

Exams
There will be one Midterm Exam (100 points) and one Final Exam (100 points), both of which will cover lecture material and fungal taxonomy/identification skills. The Final Exam will also cover material from the student presentations.

Miscellaneous activities (100 points)
These activities can be combined in a variety of ways to earn the maximum possible points (extra activities may be performed for up to 20 points of Extra Credit):

- **Make a post** on the "Mushrooms of Mississippi" Facebook page, AND the Ole Miss Department of Biology Facebook page, about a mushroom foray. This can be a class trip

or an independent foray with a friend. You can work with a partner on writing the post. It should include at least three photos taken during the field trip (including at least one showing people, and at least two good close-ups of mushrooms), a brief description of where the trip took place, and a list of some of the highlight mushrooms you found during the trip (and any other interesting things observed). You *must* do this at least once during the semester, and can optionally do it up to three times. Each post is worth 10 points.

- **Make an independent mushroom foray** to a nearby habitat. The field time must last at least 45 minutes, and you must spend at least 2 hours afterwards, trying to identify your specimens. To document your foray, you can optionally make a Facebook post (for separate credit, described above), or write a short report detailing the date, location, and mushroom findings, and post it on Blackboard under the appropriate assignment link. You must make at least one of these independent forays, and can optionally make a 2nd one. Each foray is worth 25 points.
- **Attend a Department of Biology seminar.** Department of Biology seminars usually take place on Friday afternoons at 2pm in Shoemaker Hall Room 303, but they also happen at other times during the week. Check this website (http://biology.olemiss.edu/seminar-series-2/) for a schedule of the Friday afternoon seminars, but watch for flyers on the walls of Shoemaker Hall advertising other opportunities. You must attend at least one seminar, and may attend a second one for additional credit. Each seminar summary is worth 15 points.
- **Spore of the day.** Find a cool fungi-related news item (current or past), create a very short presentation (5 minutes, 2-3 Powerpoint slides), and present it at the beginning of class. You can find such news items in many locations, but check the New York Times Tuesday Science section, Science News, Science Daily, and Huffington Post Science section. You can present up to 2 spores of the day for credit. At least one is required. Each is worth 10 points.
- **Add extra fungal specimens to MycoPortal.** You will be required to add five specimens to MycoPortal as part of your fungal collection. But if you do the work to add (up to 5) *extra* ones, you can earn up to 5 points each (maximum of 25 points).
- **Additional options may be announced during the semester**

Presentations and papers

In the final week of the semester, all students will give an **oral presentation** (100 points) on the fungal genus of their choice. For graduate students, the topic of the presentation will correspond to a component of the **synthetic paper** (which is **due at 5 p.m. the Friday before Thanksgiving break, also worth 100 points**). See separate page for detailed requirements of presentations and papers.

Discussion of readings (100 points)

Most Wednesdays, we will discuss assigned readings. You earn 5 points for actively participating in the discussion (this means chiming in at least twice), and 5 points for submitting 2 discussion questions on Blackboard. These discussion questions are due 1 hour before class starts. No credit for questions submitted late.

Fungal collection (100 points)
Over the course of the semester, students will make a collection of fungal specimens, identified to the level of genus or (ideally) species. To obtain maximum credit, the collection must contain:

1. At least 3 different members of Phylum Ascomycota (no more than 1 lichen)
2. At least 22 different members of Phylum Basidiomycota

The specimens should be dried and kept in clearly labeled envelopes in a box, with codes including your initials and a specimen number (e.g., JDH01), corresponding to matching information slips. You must acquire all specimens for your collection yourself, rather than by trading with others in the class. All data must be entered into an Excel spreadsheet that is uploaded on Blackboard when the collection is completed. The box must be labeled clearly on the outside with your name, your specimen codes (e.g., JDH01-25), and the semester (e.g., "Fall, 2018"). At least 5 of your specimens must be properly deposited onto the online MycoPortal website. **The collection is due by 5 p.m. on the Friday before Final Exams.**

Course Schedule

Date	Topics
August 21/22	• Intro to fungal ecology, evolution, & characteristics • Intro to collection and identification of fungi • Major fungal lineages I: Phylum Basidiomycota
August 28/29	• Major fungal lineages II: Phylum Ascomycota • Reading due Aug. 28: Arora pp. 1-23 (quiz) • Intro to using keys to ID unknown fungi • Reading for Aug. 29: To be announced
Sept 4/5	• Major fungal lineages III: Phyla Glomeromycota, Chytridiomycota, Microsporidia, and others • Macroscopic characters of mushrooms (handout) • Practice using keys • Reading for Sep. 5: To be announced
Sept 11/12	• Mycophagy, edible fungi, and fungal roles in food production • Macroscopic characters of mushrooms, continued • Intro to culturing fungi on media • Reading for Sep. 12: To be announced
Sept 18/19	• Fungal ecology I: Decomposers and plant parasites • Taxonomy review • Intro to molecular identification of fungi • Reading for Sep 19: To be announced
Sept 25/26	• Fungal ecology II: Fungal parasites and predators of animals, and medical mycology • Microscopic characters of fungi • Reading for Sep 26: To be announced
Oct 2/3	• Fungal ecology III: Mycorrhizae, lichens, and endophytic fungi • Reading for Oct. 3: To be announced • ****Final deadline for choice of topic for papers & presentations: Submit your top 3 choices by end of class today**
Oct 9/10	• Tuesday: Field trip and mushroom ID review, work on collections

	• **Wednesday: Midterm Exam**
Oct 16/17	• Poisonous and invasive fungi • Reading for Oct 17: To be announced
Oct 23/24	• Fungal dispersal and biogeography • Reading for Oct 24: To be announced
Oct 30/31	• Tuesday: Arbuscular mycorrhizal fungi • Wednesday: Discussion of reading and work on collections • Reading for Oct. 31: To be announced
Nov 6/7	• Tuesday: Natural product chemistry of fungi (Guest lecture: Dr. Jordan Zjawiony) • Reading for Nov 7: To be announced
Nov 13/14	• Fungal communities: Spatial and temporal variation in composition and diversity • Reading for Nov 14: To be announced
Nov 20/21	• No Class – Thanksgiving Break
Nov 27/28	• Presentations & work on collections
***Thursday, December 6	• **Final Exam: 12 noon**

Grading/Points Breakdown

Undergraduate		Graduate	
Source	**Points**	**Source**	**Points**
Misc activities	100	Misc activities	100
Reading discussions	100	Reading discussions	100
Midterm Exam	100	Midterm Exam	100
Final Exam	100	Final Exam	100
Presentations	100	Presentations	100
Collection	100	Collection	100
		Synthetic paper	100
Total	**600**	**Total**	**700**

Grading: 90%+ = A or A-, 80-89% = B(+/-), 70-79% = C(+/-), 60-69% = D, <60% = F

Field Trips

Field trips will occur almost every week, usually on Tuesday, regardless of weather, and will usually involve walking around off-trail in a variety of habitats, especially forests. So, you should be prepared for rain, sun, heat, cold, mud on your clothes and shoes and under your

fingernails, ticks, chiggers, and mosquitoes! It is suggested that you come to Mycology class each Tuesday dressed in clothes and shoes or boots that you don't mind getting dirty, and bring along a rain jacket (or poncho) and rain pants, bug spray, sunscreen, snacks, and water. Additional suggested field equipment will be discussed on the first day of class.

Absences
Exams, discussions, and other activities can only be made up under special circumstances when they have been missed due to a medical or family emergency or official University activity (documentation required). If you have an emergency or official University activity that will cause you to miss class, it is essential that you contact me prior to the absence (as soon as you are aware of the conflict), either by e-mail or phone.

Necessary and suggested supplies and equipment
For field trips and fungal collection, it is essential that you bring to class each day a field notebook, pen or pencil, a supply of brown paper lunch bags or (ideally) small wax paper bags or a roll of wax paper for containing your fungal specimens, and a sturdy bag or basket to carry them in. Optional equipment that you would find useful includes: A sturdy knife, a hand lens or magnifying glass, and a digital camera. Additional suggestions for optional equipment will be discussed on the first day of class.

Suggestions for success
1. Take advantage of the full class time. This is a time when you have great access to class materials, the instructor, and your fellow students. Don't waste it!
2. Don't wait until the end of the semester to build up your collection. Especially the Ascomycetes can be hard to find, so keep an eye out for them during every field trip.
3. Study fungal taxonomy and identification carefully and frequently. During class, take full advantage of your time by carefully working through the keys for each specimen. When you encounter new vocabulary (which will happen frequently at first), look it up immediately. Outside of class, you should frequently study your fungal identification notes, photographs and drawings created by yourself or others, and study your mushroom field guide. A useful study tool is to alter the screensaver on your computer so that it cycles through a slideshow of photos of fungi, with or without the names visible.
4. Assigned reading and vocabulary. Read any assigned pages well in advance of class, and then read your lecture notes after class. Read slowly and carefully, and look up unknown vocabulary words as soon as they are encountered. This will happen frequently, and is a necessary part of learning mycology.
5. Take notes during field trips, and review them frequently throughout the semester.
6. Ask or write down questions that arise during lecture and while reading and organizing your notes. Make sure you talk to the instructor about your questions, either during class, after class, during office hours, during an appointment, or with a study group.
7. Accommodations for disabilities. The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact Student Disability Services at **662-915-7128** so the office can: 1. determine your eligibility for accommodations, 2. disseminate to your instructors a Faculty Notification Letter, 3. facilitate the removal of

barriers, and 4. ensure you have equal access to the same opportunities for success that are available to all students. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are approved through SDS, you must log in to your Rebel Access portal at **https://sds.olemiss.edu** to request approved accommodations.

Synthetic Paper (Graduate students only): due at 5 p.m. the Friday before Thanksgiving
The goal of this assignment is for you to develop significant depth of knowledge, using the primary literature, on a fungal topic that is central to your own research interests. The paper should be organized into the following sections (use the italicized headings below to delineate each section):
Background (2-4 paragraphs)
The first paragraph (or two) of this section should provide a general introduction to your own research interests, including specific questions you are potentially addressing in your graduate work. The last paragraph (or two) of this section should provide an overview of the role or relationship (or potential role) of specific fungi in your research questions, and should briefly introduce the aspect of the biology (secondary chemistry, ecology, evolution, phylogenetics, physiology, etc.) of those fungi that you will develop in depth in the remainder of the paper.
Fungal taxonomic information (~3-5 paragraphs)
Utilizing information gleaned from the primary literature (and citing that literature), provide an in-depth profile of the aspect of the biology of the fungi on which you have chosen to focus. In doing so, you should provide the key background information to support one or more research hypotheses.
Questions, hypotheses, and proposed research
Clearly state one or more research questions, and for each question, state one or more alternative hypotheses. These questions and hypotheses should flow logically from the material presented in the previous sections. A hypothesis is a general answer to a research question—a possibility about how the world might work. Then, briefly describe how you propose to test predictions of the hypotheses in future research (1-2 paragraphs).
Literature cited
Using a standard journal format, give full citations for all literature cited in the paper.

Oral Presentation (all students): Final Tuesday of class
Choose one fungal genus, and create an 8-10 minute presentation (in Powerpoint) in which you review its taxonomic placement in Kingdom Fungi and the meaning of the genus name (1 slide), key characteristics for identification (1 slide), and then tell us a detailed story on some aspect of its biology that you find interesting (secondary chemistry, ecology, evolution, phylogenetics, physiology, etc.). ****The latter "story" must be based on one or more scientific papers from the primary literature, not on information gleaned from websites (such as Wikipedia). The full citation of this paper(s) should be highlighted near the beginning of your presentation, when you begin to present material from it. If you choose a genus that was discussed in lecture, you must present primarily NEW information that was not covered in lecture.** For graduate students, presentation topic should correspond to (at least part of) the Synthetic Paper described above. Taxonomic information for Slide 1 should be gleaned from these two websites, with the second one given priority if their information differs:

Taxonomicon (http://taxonomicon.taxonomy.nl/)
Index Fungorum (http://www.indexfungorum.org/Names/Names.asp)
Do not plagiarize by copying text directly from another source or by paraphrasing without citing. If you use a graphic from another source, include a citation of the publication or website from which you obtained it.

Here are a few additional suggestions for preparing your presentation: First, be sure to follow the written guidelines above regarding content of the presentation very carefully. In addition, you should have a title slide with your talk title and your name on it at the beginning. On each slide, avoid using too many words, make sure that any text is short and easy to read (i.e. the font is large enough), and make sure that your graphics are very clear. Try to avoid putting much (if any) content on the bottom 1/5 of each slide, as it can be hard to see the bottom of the slides from the back of the room. Make sure that your presentation is NO LONGER than 10 minutes. This time limit will be strictly enforced. You should practice your presentation several times, ideally for a friend who can provide you with some constructive feedback that you can use to modify your presentation, although practicing in front of stuffed animals is better than nothing. Edit your presentation after practicing it, if necessary to meet the time limit. Try to speak slowly, loudly, and clearly, and avoid using filler words such as "um." Know your presentation well enough so that you do not have to just read your slides—instead, make frequent eye contact with the audience.

One final note: If you create your Powerpoint presentation on a Macintosh computer, then it will probably have some glitches when you use my computer (a PC) to present to the class. So, to avoid that problem, it is essential that you transfer your Powerpoint file to a PC, check it for errors by going through it in presentation mode, and make any necessary changes to correct the errors before sending it to me. **Please e-mail me the file by noon on the day of class, and also bring it to class on a USB drive.

Presentation Grading Rubric **Student Name: _____**

_____ Title slide (max 5 pts)
_____ Taxonomy slide (max 15 pts)
_____ ID slide (max 15 pts)
_____ Story content: Quality and depth (max 50 pts)
_____ Overall clarity of graphics (max 5 pts)
_____ Overall clarity of speaking style (max 5 pts)
_____ Length (target: 8-10 minutes) (max 5 pts)
_____ **Total Points (max 100)**