

**BOT4650/6656 - Plant Symbiosis - 3 credits – Fall 2015**  
**Periods 3 – 4 (9:35 - 11:30 am), Carr Hall 221**

**Instructor:**

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Office hours: Thursday period 5, or by appointment

**Required texts:**

*The Symbiotic Habit*, Angela E. Douglas. 2010.  
Also, **book excerpts and journal articles** posted on the course Canvas site (see schedule).

**Course description:**

In this course, I hope to foster a deeper understanding of the crucial role symbioses play in shaping the diversity of life on the planet. The course will devote roughly equal time to discussing broad concepts – such as generalities among symbioses, origins and establishment of symbioses, coevolution and co-speciation – and learning the specifics of well-studied exemplars of plant symbioses.

Our study will consist of instructor and student-led discussions of texts and primary literature, short written assignments, and a final essay-style written exam.

**Learning outcomes: upon completion of this course, you will be able to:**

- Define symbiosis in several ways
- Describe the evolutionary and ecological significance of symbioses
- Explain our current understanding of how symbioses form and how they are maintained
- Discuss how symbiosis can lead to diversification
- Summarize the specifics of some plant symbioses

**You will also practice:**

- Evaluating and synthesizing journal articles
- Leading a discussion with classmates

**Course grading (undergraduate students):**

Participation in discussion	50%
Leading discussion	20%
Written discussion synopses	20%
Final written exam	10%

**Course grading (graduate students):**

Participation in discussion	45%
Leading discussion	25%
Written discussion synopses	10%
Final written exam	10%
Annotated bibliography	10%

**Grading scale:**

90 – 100% = A; 80 – 89.9% = B; 70 – 79.9% C; 60 – 69.9% D; below 60 = E

See <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx> for a description of UF grading policies for assigning grade points.

**Course attendance and make up policies:**

Requirements for class attendance and work in this class are consistent with university policies that can be found in the catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Attendance is required and essential for success in this course and is a component of your participation grade. I understand that absences happen, but if you make this a habit, you are guaranteed to perform poorly. If you have a valid documented excuse and notify me in advance, you may be able to make up missed discussion assignments. I will determine this on an as-needed basis.

**Grade curves and extra credit:**

There will be NO curve applied to grades. There MAY be opportunities for extra credit – if so, such opportunities will be announced in class and offered to all students.

**Policy on electronic devices:**

Use them if you want, but if they become distracting to your classmates, you will be asked to leave. Also, please note that the use of devices for socializing during class is very obvious to your classmates and your instructors. We'll make a mental note of it as disrespectful, and it leaves a negative impression.

**UF counseling services**

Resources are available on campus for students having personal problems or lacking clear career and academic goals. The resources include:

UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.

Career Resource Center, Reitz Union, 392-1601, career and job search services.

Many students experience test anxiety and other stress – related problems. “A Self Help Guide for Students” is available through the Counseling Center (301 Peabody Hall; 392-1575) and at their web site:

<http://www.counseling.ufl.edu/cwc/>

**Academic Honesty Policy**

All students registered at the University of Florida have agreed to comply with the following statement:

“I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.”

In addition, on all work submitted for credit the following pledge is either required or implied:

“On my honor I have neither given nor received unauthorized aid in doing this assignment.”

If you witness any instances of academic dishonesty in this class, please notify the instructor or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at:

<https://catalog.ufl.edu/ugrad/current/advising/info/student-honor-code.aspx#honesty>.

**Important – Plagiarism:**

Plagiarism is also a violation of the Academic Honesty Policy. It will not be tolerated. Please review how to define plagiarism and how to avoid it: <http://web.uflib.ufl.edu/msl/07b/studentplagiarism.html>

**Accommodations for students with disabilities:**

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: <http://www.dso.ufl.edu/drc/>. Note that the student should provide documentation of a requirement for accommodation by the second week of classes. No accommodations are available to students who lack this documentation. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

**Course evaluation:**

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

### **Paper discussions:**

Each student will work within a small group to lead class discussions of a research paper. Each leader group is required to prepare a discussion synopsis to facilitate the discussion. All students are responsible for reading the paper and contributing to discussion.

***When you lead the discussion, you are the “expert” on the readings. It is your job to help the class meet the following goals:***

- Clarify the main points of the readings.
- Clarify the basics of the methods used (if applicable).
- Reveal interesting topics and questions for further discussion or debate.
- Apply the readings to the course topics being considered.
- Involve contributions from all classmates.
- Avoid domination by any one speaker (including you, the discussion leaders).

### **Guidelines for writing the discussion synopsis**

***The discussion synopsis is a two-page document that will be handed out to all participants at the beginning of your discussion.***

- 1) The first page of the discussion synopsis is a list of defined terms and/or clarification of methods crucial for understanding the reading. This should be covered as part of the discussion, too.
- 2) The second page of the synopsis should contain a series of discussion questions you’ll pose.

Before you write the discussion synopsis, start by thinking about 3 or 4 key concepts everyone should come away with from the discussion. Design 3 or 4 key questions that will assess understanding of these concepts.

- List and number your key questions in bold.
- Under the key question, indent and list questions that will “lead up” to your key question (3 – 4).
- Leave adequate space under each question for note-taking.

### **Guidelines for leading and facilitating discussion**

- Start the discussion by discussing crucial terms, then, ask one of your “key questions.” (see Guidelines for writing the discussion synopsis.)
- Try not to answer your own questions.
- Minimize or eliminate rhetorical questions or “yes/no” and “agree/disagree” questions.
- It’s okay to wait a while in silence after you ask a question. Sometimes it takes a little while for people to think before answering – be patient.
- It’s okay to stray from the planned list of questions in your synopsis. Just steer the discussion back when you can.
- After the initial discussion about terms, minimize “recitation” type questions; that is, questions that ask your classmates to recall facts or knowledge about the subject matter.
- When possible, summarize portions of the discussion (for example, summarize what the class has learned about the methods used in a study, or the key components of the experiment in the paper).
- When appropriate, paraphrase your classmates’ comments, responses, and questions in order to clarify their meanings to the class. (This is called active listening.)
- Use eye contact, clear confident speaking, and positive body language. Avoid actions such as crossing your arms, looking at the clock, or deep sighs.

### **Annotated bibliography (graduate students only):**

No system is free of symbiotic associations! You will write an annotated bibliography of ten reference papers that pertain to your study system and symbiosis and have not already been read in the course. The bibliography will be evaluated based on completeness, relevance, and depth. See here for a description and samples of annotated bibliographies: <https://owl.english.purdue.edu/owl/resource/614/01/>

Rubric for discussion leading:

Grading Criteria	Descriptors	Points
Preparation	Demonstrates: Good preparation and familiarity with readings Cooperation and collaboration among leaders	___/4
Discussion Techniques	Discussion techniques: Engage students—motivating Encourage all students to contribute Guide but do not dominate discussion Promote discussion of different viewpoints	___/4
Content & Discussion Questions	Questions asked: Lead the class toward discussion goals Are clear Refer to readings	___/4
Facilitation Skills	Leaders demonstrate good facilitation skills: Active listening Summarizing	___/4
Communication skills	Facilitators engage class through their: Eye contact Clear and confident voice Gestures	___/4
	Total points	___/20

Rubric for discussion synopsis:

Descriptors	Points
Key questions match with major points of readings	___/4
Other questions adequately “lead up” to key questions	___/4
Crucial terms and methods described correctly and clearly	___/4
Format of synopsis follows guidelines	___/4
Writing free of spelling and grammatical errors	___/4
Total points	___/20

Rubric for participation points:

**0 points** = Absent  
**1 point** = Present but does not contribute  
**2 points** = Participates in discussion by adding an opinion or asking a question  
**3 points** = Participates in discussion by adding an opinion, posing a thoughtful question, and answering questions  
**4 points** = Makes exemplary contributions to discussion by integrating concepts, introducing novel perspectives, and drawing out additional contributions from classmates

Course schedule (subject to adjustment)

Date	Topic	Reading	Discussion
27-Aug	Introduction	Syllabus	Intro - Sign up for discussion leading
3-Sep	<b>How do we define "symbiosis" and how is symbiosis significant?</b>	Margulis p. 5 - 12; Douglas p. 12 - 23; Palmer et al. 2008	The significance of symbiosis; example symbiosis - <u>Ant plants</u> (Dr. Davis leads discussion)
10-Sep		Paracer and Amadjian 117 - 122; Kiers et al; 2001	Example symbiosis - <u>Mycorrhizae</u>
17-Sep		Douglas p. 1 - 11; Paszkowski 2006	Defining symbiosis
24-Sep		Schardl et al. 2004; Tanentzap et al. 2014	Example symbiosis - <u>Grass endophytes</u>
1-Oct	<b>How do mutualistic symbioses evolve and how are they maintained?</b>	Douglas p. 24 - 38; Heil et al. 2013	Symbiotic spectra from antagonist to mutualist
8-Oct		Douglas p. 39 - 55; Brundrett 2002	Evolution and partner capture
15-Oct		Paracer and Amadjian 65 - 69; Olivares et. al 2013	Example symbiosis - <u>Legumes and rhizobia</u>
22-Oct	<b>Cheaters and conflict resolution in mutualistic symbioses</b>	Paracer and Amadjian 192 - 195, Jandér and Herre, 2010	Example symbioses - Pollination symbioses - <u>Ficus and Yucca</u>
29-Oct		Douglas p. 56 - 66; Althoff et al. 2006	Costs of symbiosis and cheating
5-Nov		Douglas p. 66 - 90; Gilson 2001	Vertical transmission and assimilation
12-Nov		Martin et al., 2002	Example endosymbiosis - chloroplasts
19-Nov	<b>No Class - Thanksgiving</b>		
26-Nov	<b>Coevolution and mutualistic symbioses</b>	Douglas 91 -105; Bonfante and Genre 2010	Establishment of symbioses
3-Dec		Douglas 125 - 150; Currie et al. 2003	Diversification and coevolution
Finals week	<b>FINAL WRITTEN EXAM (time, date, location TBA)</b>		