

**Instructors:** Carly Kenkel (she/her)  
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**Office hours:** by request

**Meeting times:** Wednesdays 12-2p, AHF 259

**Textbooks:**

*Mutualism*, Bronstein (ed.); recommended only, assigned excerpts will be provided via blackboard

**Websites:**

<https://blackboard.usc.edu>

**Course Description**

Cooperation between species has played a fundamental role in the evolution and diversification of life on this planet, from fleeting facultative interactions to fully integrated organelles, like mitochondria and chloroplasts within eukaryotic cells. This seminar course will introduce students to the concept of symbiosis, explore mechanisms underpinning the ecology and evolution of these relationships, and synthesize key concepts in contemporary symbiosis research.

**Prerequisites:** Admission to the MBBO or Ocean Sciences graduate programs or permission from the instructor.

<b>Learning Objective</b>
By the end of this course, students should be able to:
1. Differentiate mutualism and symbiosis
2. Understand factors contributing to the evolution of symbiotic relationships
3. Explain how symbiosis has shaped evolution across kingdoms of life
4. Present and summarize the primary literature

**Tentative schedule of lecture topics.** *Note that the schedule is subject to change. Any schedule changes will be discussed in class and posted on Blackboard.*

Week	Topic	Reading Assignment
01/10	Introduction to mutualism	Bronstein Ch 1: The study of mutualism
01/17	Mutualism vs symbiosis	Bronstein Ch 2: The special case of symbioses: mutualisms with persistent contact
01/24	Evolutionary drivers of symbiosis	Sachs et al. 2004; Wein et al. 2019
01/31	Host Sanctions and reciprocal rewards	Kiers et al. 2003; Kiers et al. 2011, Noë et al. 1995
02/07	Transmission modes	Bright and Bulgherisi 2010; Conwill et al. 2022
02/14	Evolutionary Transitions	Kiers & West 2015; West et al. 2015
02/21	Down the Rabbit Hole	McCutcheon & Moran 2011; Bennett & Moran 2012
02/28	End of the Line	Sachs & Wilcox 2006; Sachs & Simms 2008
03/07	Holobionts and Hologenomes	Rosenberg et al. 2007; Madhusoodanan 2019
03/14	Spring Break	
03/21	Specificity between partners	Fraune and Bosch 2007; Mandel et al. 2009

03/28	Student's choice	TBD
04/04	Student's choice	TBD
04/11	Student's choice	TBD
04/18	Student's choice	TBD
04/25	Symbiosis in a changing climate	Kiers et al. 2010
05/09	Final Reflection	

### Student-led discussions

Four of the discussions will be based on student selected papers. Depending on enrollment students may present individually or in groups. They will be charged with identifying the paper or papers in an area of interest and leading the group discussion for that class period.

### Course Policies

COMMUNICATION: Email is the preferred form of communication with the instructor outside of class. Responses can be expected within 24-48 hours, though there may be an additional delay over weekends/holidays. If an in-person meeting is desired, please email a request to set up a meeting time.

### ONLINE COURSE BEHAVIORAL NORMS AND NETIQUETTE (if needed):

#### Behavioral norms

- Treat everyone with respect and dignity.
- Criticize ideas, not individuals.
- Always be mindful of the following: would you say it to the individual in person?
- Be courteous and refrain from interrupting others.
- Don't dominate conversations- ensure everyone has a chance to contribute.
- Ask questions, especially when you don't understand something.
- Support your statements with evidence and explain your rationale.

#### Course netiquette (live sessions)

- Mute your microphone if you are not speaking
- Chat will only be used to make comments to the entire class (private chat will be disabled).
- Please use the "raise hand" function in Zoom to request clarification or ask questions. This will reduce interruptions.
- Your video doesn't have to be on but be present and participate if you are attending the live sessions.
- If you have technical issues, please email the instructor ([ckenkel@usc.edu](mailto:ckenkel@usc.edu))

GRADES: Any document associated with grading may be photocopied by the instructional staff. The final letter grade will be determined by the total number of points as follows.

	Points possible	Percent
Contribution to Weekly Discussions (20 points ea.)	280	74%
Lead presentation assignment	50	13%
Final reflection assignment	50	13%
<b>TOTAL</b>	<b>380</b>	<b>100%</b>

PLANNED ABSENCES: Requests for absences should be made by email to the Instructor at least 2 weeks in advance and preferably as early in the semester as possible. If the absence is approved a reasonable accommodation will be provided, which may include coordinating remote participation or a make-up assignment.

## **Statement on Academic Conduct and Support Systems**

### **Academic Conduct:**

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, [policy.usc.edu/scientific-misconduct](http://policy.usc.edu/scientific-misconduct).

### **Support Systems:**

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](http://studenthealth.usc.edu/counseling)

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*  
[suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call*

[studenthealth.usc.edu/sexual-assault](http://studenthealth.usc.edu/sexual-assault)

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298*  
[equity.usc.edu](http://equity.usc.edu), [titleix.usc.edu](http://titleix.usc.edu)

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

*Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298*  
[usc-advocate.symplicity.com/care\\_report](http://usc-advocate.symplicity.com/care_report)

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

*The Office of Disability Services and Programs - (213) 740-0776*  
[dsp.usc.edu](http://dsp.usc.edu)

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*USC Campus Support and Intervention - (213) 821-4710*  
[campussupport.usc.edu](http://campussupport.usc.edu)

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity at USC - (213) 740-2101*

[diversity.usc.edu](http://diversity.usc.edu)

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

*USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu), [emergency.usc.edu](http://emergency.usc.edu)

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

*USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu)

Non-emergency assistance or information.