**Syllabus ABE498: Photosynthetic Strategies - A Molecular Survey of Photosynthetic Diversity**

**Instructor: Dr. Laurie Leonelli,** *lbl@illinois.edu*

**Class meets: W 10-11:50am, (8/27/25 - 10/15/25)**

**Office hours: By appointment**

**Course Website: https://canvas.illinois.edu/courses/60503**

Nature has evolved distinct and elaborate ways to capture energy from the sun and to convert that energy into chemical form. Photosynthetic organisms achieve this feat through molecular mechanisms designed to optimize light harvesting, photoprotection, and carbon fixation in their native environments. This course explores the common themes of these mechanisms, as well as features unique to diverse photosynthetic lineages represented in the tree of life. By expanding our understanding of how different organisms use the resources available in their environments, we can begin to design and adapt these solutions to new engineered scenarios, like artificial growth environments for plants and algae. This course will also explore some of the emerging technologies being used to engineer these species to solve challenges humanity is currently facing.

**Course/Learning objectives:**

1. Build understanding of the processes that convert light into chemical energy and connect variations in photosynthetic strategies to environmental adaptations
2. Create ideas to address limitations of photosynthesis and/or new algal applications
3. Learn potential applications of algae and the new molecular and/or computational techniques being used to engineer algal species
4. Develop effective data interpretation and dissemination skills in the context of paper presentations

**ABET objectives addressed/partially addressed:**

#3: An ability to communicate effectively with a range of audiences

#6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

**Tentative schedule:**

Week 1- Overview of course and general introduction to photosynthesis and photosynthetic organisms: Primary and Secondary endosymbioses

Light Harvesting:

Week 2- Prokaryotes (Cyanobacteria and Archaea)

Week 3- Eukaryotic algae

Week 4- Land plants

Carbon Fixation:

Week 5- Prokaryotes (Cyanobacteria and Archaea)

Week 6- Eukaryotic algae

Week 7- Land plants

Brainstorming:

Week 8- Current bio-engineering efforts and Applications

**Assessments:**

* 50% Participation
* 25% Attendance
* 25% Discussion/Peer evaluations [thoughtful reflection of peer presentations]
* 50% Paper Presentation

*! STUDENTS ARE EXPECTED TO READ ALL PAPERS, NOT JUST THOSE THEY ARE PRESENTING !*

**Paper sign up:** https://docs.google.com/spreadsheets/d/1X3KiHz6kwMYADordCGIWHAmRw8vNpe8JKdzk3\_NYAek/edit?gid=0#gid=0

**Presentation upload (due before class):**

https://uofi.box.com/s/o8xy8dv85c10y14diqo9es90by8g4ku7

Expectations (Student Conduct):

1. **Respect your peers and professor.** This means treating classmates with dignity and using language that is in no way derogatory, whether addressing an individual or a person’s ideas. Disagreement is acceptable and encouraged during healthy debates, but this can be done with tact and consideration.
2. **Be on time.** Coming to class late will disrupt others who are already engaged in the course, and it will also mean less time for you to complete assessments.
3. **Participate in discussion.** Your feedback is valuable to your peers. Since this class has a huge discussion-based component, please contribute and be an active listener.

Expectations (Professor Conduct):

1. **Respect the students.** I will cultivate and support a safe space for you to learn and engage in the scientific process and develop effective communication skills. I will not belittle your ideas or treat you differently than I would a fellow colleague.
2. **Professor will be reasonably accessible.** When possible, I will respond to emails within 24 hours.
3. **Be fair.** I will make sure all students have the same opportunities and access to course materials. If you need extra accommodation, please follow the proper channels through the university by requesting documentation through DRES: <https://www.disability.illinois.edu/applying-services>.

I will be transparent in my grading policies and provide rubrics for you to understand how you are being evaluated.

COVID-19/sick contingencies:

There is a chance that you will miss a class due to an illness or other emergency. **Please let me know as soon as possible so that we can arrange remote access. Also provide documentation** (<https://odos.illinois.edu/community-of-care/resources/students/absence-letters/>) if you must miss class so that your participation is reflected accurately, i.e. there will be NO PENALTY for missing class due to DOCUMENTED illness.

ACES syllabi recommended content:

* Academic Integrity Statement
  + The University of Illinois at Urbana-Champaign *Student Code* should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: <http://studentcode.illinois.edu/>.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <http://studentcode.illinois.edu/>. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

* Students with Disabilities Statement
  + To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to [disability@uiuc.edu](mailto:disability@uiuc.edu). <http://www.disability.illinois.edu/>.
* Emergency Response Recommendations
  + Emergency response recommendations can be found at the following website: <http://police.illinois.edu/emergency-preparedness/>.  I encourage you to review this website and the campus building floor plans website within the first 10 days of class.  <http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/>.
* Family Educational Rights and Privacy Act (FERPA) Statement
  + Any student who has suppressed their directory information pursuant to *Family Educational Rights and Privacy Act*(FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See <https://registrar.illinois.edu/academic-records/ferpa/> for more information on FERPA.
* Sexual Misconduct Policy and Reporting
  + The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University’s Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: [wecare.illinois.edu](http://wecare.illinois.edu/).