

IB 193**Course title: Practical Pedagogy: Becoming an Effective Instructor in Biology**

1 unit P/NP

Enrollment: 20-25 students

This course is a pre-requisite to IB 192 (Applied Pedagogy in Integrative Biology) but may be taken concurrently with that course.

The goal of this course is to provide undergraduate students with conceptual and practical expertise in teaching lab-based classes in biology. Many students in Integrative Biology seek opportunities to continue to participate in courses that they have already completed by serving as undergraduate lab instructors. This interest is driven by a passion for the subject matter, a desire to remain engaged with often seminal lab experiences, and a commitment to sharing knowledge with other students. This course will combine the practical knowledge gained by in-class instruction with exploration of key pedagogical components of university-level instruction in evolutionary biology.

Each week, the class will meet for one hour to discuss fundamental aspects of pedagogy (see syllabus). Students will typically be enrolled simultaneously in IB 192; the latter course will provide 2-3 hours per week of practical experience with instruction in an upper division IB lab course. To integrate these experiences, students in IB 193 will complete a series of assignments that (1) design activities to be implemented in the associated lab course or (2) evaluate practices currently used in the lab course. Evaluation of course participants will be based on these assignments as well as short reflection pieces submitted by students regarding their experiences while contributing to lab instruction.

Tentative syllabus:

Week	Unit	Topic
1		Introduction: why learn how to teach? Activity: reflection on “good” teaching

The first portion of the course will focus on practical aspects of teaching. Because enrolled students will be participating simultaneously in instruction of upper division lab courses, it is critical that they be introduced to strategies for effective methods of in-class instruction early in the semester.

2	Teaching skills	Developing your teaching objectives Activity: list of personal teaching objectives
3	Teaching skills	Interacting with students: promoting understanding Activity: practicing heuristic answers
4	Teaching skills	Clarity matters: honing your presentation skills Activity: design short lab introduction
5	Teaching skills	DEI: creating inclusive classrooms Activity: identifying implicit bias

The second part of the course will explore the theory of learning, including some of the key styles of learning and how they can be facilitated by instructors. This section will also consider how teaching practices can be modified to accommodate students with special needs.

6	Types of learning	Memorization: maximizing effectiveness Activity: creating lab mnemonics
7	Types of learning	Critical thinking: evaluating information Activity: incorporating figures and graphs
8	Types of learning	Problem solving: working without a script Activity: practicing spontaneity
9	Types of learning	Accommodating special needs Activity: reflection on role of DSP

The final portion of the course will examine different methods that can be employed in the classroom to improve instructional effectiveness. This includes elements of lab design as well as evaluative exercises used to assess student learning.

10	Implementation	Learning objectives: why are we doing this? Activity: outlining objectives for a specific lab
11	Implementation	Lab design: blending concepts and activities Activity: creating your ideal lab period
12	Implementation	Evaluation: creating appropriate tasks Activity: writing good quizzes
13	Implementation	Effective grading: it's not just right or wrong Activity: developing good rubrics
14		Wrap up: how did we do? Activity: reflection on material learned

Suggested readings:

No single text covers the content of this course. Instead, supplementary readings will be drawn from a variety of sources, including the following:

Cooper, K. M., B. Haney, A. Krieg and S. E. Brownell. 2017. What's in a name? The importance of students perceiving that an instructor knows their names in a high-enrollment biology classroom. *CBE-Life Sciences Education* 16.ar8, 1-13.

Goodman, B. E., M. K. Barker, and J. E. Cooke. 2018. Best practices in active and student-centered learning in physiology classes. *Adv. Physiol. Educ.* 42:417-423.

Grunspan, D. Z., S. L. Eddy, S. E. Brownell, B. L. Wiggins, A. J. Crowe, and S. M. Goodreau. 2015. Males underestimate academic performance of their female peers in undergraduate biology classrooms. *PLOS One*. DOI:10.1371/journal.pone.0148405.

Lyons, A. Bio 1B: Pedagogy prompts. Unpublished resource developed within Integrative Biology to facilitate instruction in Bio 1B course.

Tanner, K. D. 2013. Structure matters: twenty-one teaching strategies to promote student engagement and cultivate classroom equity. *CBE-Life Sciences Education* 12:322-331.

Additional resources:

The lower division Bio 1B course that is overseen by the Department of Integrative Biology has developed resources to improve pedagogical practices in a laboratory setting. The faculty instructor for IB 193 (Lacey) is actively working with the instructional staff from Bio 1B, notably Dr. Jules Winters, to modify those resources for use in the former course.

Tentative grading scheme:

Evaluation will be based primarily upon active participation in the course and completion of weekly activities. Because the course emphasizes learning appropriate practices (rather than mastery of a set of factual material), evaluation will focus on effort and self-evaluation of knowledge gained rather than objective, quantitative assessment of material learned.

In-class participation ¹ (10 points/week x 14 weeks)	140 points
Completion of weekly activities ² (10 points/activity x 14 activities)	140 points
Final reflection (self-evaluation of improvement)	20 points
	<hr/>
Total	300 points

¹ Each class session will include multiple activities and/or break out discussion opportunities during which students will be asked to complete specific tasks or address specific themes. Participation will be evaluated based on the resulting worksheets or short statements submitted as well as verbal reports provided by members of breakout discussions.

² Weekly activities focus on pedagogical practices that are employed in the lab course in which students are concurrently enrolled through IB 192. Students will be asked to outline these practices in advance and then provide a post-activity written reflection regarding the success of each practice.