UNDERGRADUATE BIOLOGY EDUCATION RESEARCH
BSC 4932
3 credits, Spring 2020

Course instructor
Katelyn Cooper, Ph.D.
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Email: Katelyn.cooper@ucf.edu
Course times: T, TH 10:30am – 11:45am
Course location: ENG1 286
Office hours: T 12:00pm – 2:00pm or by appointment
Office hours will be held in BIO 310

Course description
In this course students will engage in an authentic undergraduate biology education research project as a class with the intent to publish their work. Students will engage in the full process of science including: research question development, data collection, data analysis, and communicating their findings. We will learn both qualitative and quantitative biology education research methodologies. We will use R for all statistical analyses, but no prior experience is needed. The overarching goal of this course is to strengthen students' abilities to think like scientists and to enhance their knowledge of research methodologies.

Learning goals
The major goals of this course are adapted from the Vision and Change report, which has outlined core competencies that all life sciences students should develop.

- To enhance students' abilities to think like a scientist in the context of a research project
- To improve students' information literacy.
    - Find and evaluate the credibility of a variety of sources of scientific information
    - Interpret, summarize, and evaluate evidence in primary literature
    - Evaluate claims in scientific papers, popular science articles, and other sources using evidence based reasoning
- To develop students' abilities to formulate research questions
    - Recognize gaps in our current understanding of a topic and identify what specific information is missing
    - Develop research questions based on your own or others' observations
    - Formulate testable hypotheses and state predictions
- To develop students' abilities to design a scientific study
    - Compare strengths and limitations of various study designs
    - Design controlled experiments
    - Execute protocols and accurately record measurements and observations
    - Identify methodological problems and suggest how to troubleshoot them
- To enhance students' abilities to interpret, evaluate, and draw conclusions from data
    - Analyze data, summarize resulting patterns and draw appropriate conclusions
    - Describe sources of error and uncertainty in data
    - Make evidence-based arguments using your own and others' findings

- Relate conclusions to original hypothesis, consider alternative hypothesis, and suggest future research directions based on findings

Inclusion and accessibility
As someone who studies how to create a more inclusive scientific community, it is extremely important to me that all students are able to learn and feel welcome in this class regardless of their identities, characteristics, or abilities. If anyone believes the design of this course poses barriers to effectively participating and/or demonstrating learning, please meet with me to discuss reasonable options or adjustments. You may also contact SAS (Ferrell Commons 185; 407-823-2371; sas@ucf.edu) to talk about academic accommodations.

Prerequisites
Junior standing
Majoring within the Department of Biology, Chemistry, or Physics.

Class meetings
Class meets twice per week (Tu/Th).

Webcourses site
There is a course website available through Webcourses (https://webcourses.ucf.edu) that will be used to post materials for the course, including the syllabus, lecture slides, and grades.

Course text
This course has no required text. All materials will be provided by the instructor.

This is a Research-Intensive (RI) course
BSC 4932 is designated as a Research-Intensive (RI) course. This designation will be noted on your transcript. Your active engagement in the research and/or creative scholarship process will be the core of your learning experience in this course. A significant portion of your grade for BSC 4932 will be derived from both your active participation in the research process and the tangible course-related project(s) that comes out of said project. If you have any questions about this designation, please let me know.

Methods of evaluation
Grades will be assigned on the following scale without rounding or the use of plus/minus grades:

A: 90-100% B: 80-89% C: 70-79% D: 60-69% F<60%

The grade for this course will be based on the following components:

(1) In-class participation (24%). The two lowest grades in this category will be dropped.
- This is a research-based course and is completely dependent on student daily engagement in the research project. If you score a 0 for participation in six classes or more, you will receive an F in the course. Participation points for approved university absences can be made up.

(2) Out-of-class assignments (44%)
- All assignments will be due by 2am on the day the class meets. This allows me to use the results of the assignment or give immediate feedback during that day's class. The only exception is the very first homework assignment, which serves as your academic engagement activity that will be due at the end of the first week of courses (Jan. 10, 2020 at 11:59pm).
- This is a research-based course and is completely dependent on student daily contributions to the research project. If you score less than five points on six out-of-class assignments, you will receive an F in the course. Out-of-class assignments missed for approved university absences can be made up.

(3) Individual manuscript (27%)

(4) Exit survey and interview (5%)

Breakdown of course points

Class day	Class participation	Homework due that day	Individual manuscript due	Exit survey and interview participation
1.07 T	6			
1.09 Th	6	10*		
1.14 T	6	10		
1.16 Th	6	10		
1.21 T	6	10		
1.23 Th	6	10		
1.28 T	6	10		
1.30 Th	6	10		
2.04 T	6	10		
2.06 Th	6	10		
2.11 T	6	10		
2.13 Th	6	10		
2.18 T	6	10		
2.20 Th	6	10		
2.25 T	6	10		
2.27 Th	6	10		

3.03 T	6	10			
3.05 Th	6	10			
3.10 T	Spring break	Spring break			
3.12 Th	Spring break	Spring break			
3.17 T	6	10			
3.19 Th	6	10			
3.24 T	6	10			
3.26 Th	6	10			
3.31 T	6	10			
4.02 Th	6	10			
4.07 T	6	10			
4.09 Th	6	10			
4.14 T	6	10			
4.16 Th	6	10			
4.21 T 10am – 12:50pm		10	170	34	
Total points	156 (lowest 2 dropped)	280	170	34	640

***** All instructors/faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete "1.09 Homework" on Webcourses, which is your academic activity by the end of the first week of classes (Jan. 10, 2020 at 11:59pm) or as soon as possible after adding the course. Failure to do so may result in a delay in the disbursement of your financial aid. Please email me (katelyn.cooper@ucf.edu) immediately if you have trouble accessing the assignment.

Course schedule

The course schedule is an approximation and subject to change at any time by the instructor. This course is research-based and as such, it is difficult to approximate how long any step of the research process will take. The workload for the course will be heavier toward the end of the semester. This schedule is based on the timeline of previous courses; yet, it will likely change due to the progression of the project.

Week	Day	Description
1	T (1.07) Th (1.9)	Overview of biology education research
2	T (1.14) Th (1.16)	Research ethics, internal review board Literature review
3	T (1.21) Th (1.23)	Literature review Research question development
4	T (1.28) Th (1.30)	Research question development Experimental design
5	T (2.04) Th (2.06)	Experimental design Tests and measurement development
6	T (2.11) Th (2.13)	Tests and measurement development
7	T (2.18) Th (2.20)	Tests and measurement development Data collection
8	T (2.25) Th (2.27)	Data collection Quantitative and qualitative analysis practice
9	T (3.03) Th (3.05)	Data cleaning Quantitative and qualitative analysis practice

10	Spring break (3.10, 3.12)	
11	T (3.17) Th (3.19)	Quantitative and qualitative data analysis
12	T (3.24) Th (3.26)	Quantitative and qualitative data analysis
13	T (3.31) Th (4.02)	Quantitative and qualitative data analysis
14	T (4.07) Th (4.09)	Summarizing findings and manuscript outline
15	T (4.14) Th (4.16)	Final manuscript outline
Final	T (4.21) 10am – 12:50pm	Contribution to final manuscript

Academic Integrity:
Academic dishonesty in any form will not be tolerated. At the discretion of the instructor penalties will range from complete loss of credit for the test or assignment to an F for the entire course.

Students should familiarize themselves with UCF's Rules of Conduct. According to Section 1, "Academic Misconduct," students are prohibited from engaging in

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violate academic behavior standards.

For more information about Academic Integrity, students may consult The Center for Academic Integrity.

For more information about plagiarism and misuse of sources, see "Defining and Avoiding Plagiarism: The WPA Statement on Best Practices."

Responses to Academic Dishonesty, Plagiarism, or Cheating
Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, *The Golden Rule*. UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and when necessary respond to academic misconduct. Penalties can include a failing grade in an

assignment or in the course, suspension or expulsion from the university, and/or a "Z Designation" on a student's official transcript indicating academic dishonesty, where the final grade for this course will be preceded by the letter Z. For more information about the Z Designation, click here.

Campus Safety Statement: Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts.

- In case of an emergency, dial 911 for assistance.
- Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Students should make a note of the guide's physical location and review the online version at http://emergency.ucf.edu/emergency_guide.html.
- Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.
- If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see http://www.ehs.ucf.edu/workplacesafety.html (click on link from menu on left).
- To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to ucf.edu and logging in. Click on "Student Self Service" located on the left side of the screen in the toolbar, scroll down to the blue "Personal Information" heading on the Student Center screen, click on "UCF Alert", fill out the information, including e-mail address, cell phone number, and cell phone provider, click "Apply" to save the changes, and then click "OK."
- Students with special needs related to emergency situations should speak with their instructors outside of class.
- To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video.

Additional course policies

1. As with any research project, you must be present to do the research. Attendance is extremely important for success in this course and all class meetings will involve graded in-class activities. In-class assignment points are only able to be made-up for university-approved absences. Students need to contact the instructor BEFORE the class that will be missed. However, the two lowest in-class assignments are dropped to accommodate for students who need to miss class for reasons not included in the university policy.
2. Written communication with the instructor should be sent via UCF email. Note that I will not be able to respond to course inquiries sent from third-party email addresses (e.g. Gmail) where student identity cannot be confirmed, in order to comply with FERPA regulations.
3. Information in the syllabus may be subject to change with reasonable advance notice.