

SMT 507 REVISED January 22, 2016
Integrated Approaches in Biology Education (3 credits)

Instructors

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Schedule

Class is on Thursday nights (5:30-8 pm) in Estabrooke Hall Room 216

Office Hours

Please feel free to email me and we will figure out a time to meet.

Learning Goals

- 1) Examine common conceptual difficulties in the life sciences and evaluate the evidence for how we know students struggle with these concepts.
- 2) Write proficiency-based learning rubrics for both biological concepts and core competencies.
- 3) Develop and teach NGSS-aligned life science instructional activities. Use feedback from instructors/classmates to help you develop your teaching skills.
- 4) Critically read and present discipline-based education research literature in the life sciences.
- 5) Write about common conceptual difficulties in the life sciences in order to practice skills such as: organizing information, aligning ideas to NGSS, and making an evidence-based argument.
- 6) Develop a place-based authentic research activity (water quality issue in Orono) for a local middle school class.

Jan 21st

Week 1:

-Introductions and go over the syllabus

-What is NGSS? <https://www.youtube.com/watch?v=o9SrSBGDnfU>

-Jo and Lori talk about NGSS and how it impacts their teaching

-Look at the high school NGSS disciplinary core ideas for the life sciences. Everyone cuts them out and sorts them into three piles:

A) Disciplinary core ideas that you feel pretty comfortable teaching

B) Disciplinary core ideas you feel okay about teaching

C) Disciplinary core ideas you would struggle to teach

What biology concepts do we struggle with as a class? Share your piles with the class

-How do you find biology education research papers?

There are a variety of places to find biology education research papers:

1. Start with the journal CBE-Life Sciences Education <http://www.lifescied.org/> You can search for topics within the journal and look at the articles in the journal to find other articles of interest. All the papers in CBE-Life Sciences Education are open access.
2. Search the database ERIC which is available through the UMaine library <http://www.library.umaine.edu/indexesdb/Indexes.asp>
3. Try searching some additional biology education journals and websites: American Biology Teacher, Journal of College Science Teaching, JMBE, GSAPrep, and CourseSource
4. Do Google Scholar and PubMed searches

- Introduction of the upcoming Biology Concept Writing Assignment: **Paper worth 100 points**
Write a ~5 page paper with several primary literature references about the life science concept you might struggle to teach. For this paper address (any order is fine):
 1. Where does your concept appear in NGSS and what is the learning trajectory?
 2. What is the scope and depth of the research about learning for your concept?
 3. What conceptual difficulties do students have with this topic?
 4. What does research say about where these conceptual difficulties come from?
 5. How did the researchers and teachers determine there are conceptual difficulties with this concept?
 6. How does the research on why students struggle with this disciplinary core idea inform proficiency based learning rubrics?
- The first draft of the paper is due March 3rd

Jan 28th

Week 2:

- Introduce Proficiency-Based Learning (PBL)
 - Jo focuses on the high school level and how PBL may be used in diplomas
 - Michelle focuses on learning goals at the college level
 - Work on developing PBL rubrics for the SMT507 course objectives
 - Objective #6: Michelle/Jo will show as an example, *Michelle will also present about the local water quality issue <https://oronoveaziewater.wordpress.com/background/>*
 - Objective #1: The class will work on writing it and we will compare it to what Michelle/Jo/Lori wrote
 - Objective #3: We will write a PBL rubric together
- The PBL rubrics will be used as a template for self assessment and to give you feedback throughout the course.
- Break into teams of two and select a disciplinary core idea (Michelle/Jo will have a list) and work on a PBL rubric to focus on for an upcoming lesson. By the next class period your team of two should have a PBL rubric that has been through several iterations

Next week read paper about Backwards Design before coming to class. Deborah Allen and Kimberly Tanner Putting the Horse Back in Front of the Cart: Using Visions and Decisions about High-Quality Learning Experiences to Drive Course Design

Feb 4th Backwards Design

Week 3:

- Discuss Putting the Cart in front of the Horse paper and the importance of backwards design.
 - Ken has some templates that he has used and will share them with the class
- In teams of two you will design a ~15 minute lesson related to the NGSS disciplinary core idea and the PBL rubric you worked on in the previous week
- How can we use the information in the backwards design paper to plan the lesson?
- 2x15 minute lesson presentations in weeks 4 and 5 are worth 100 points total**
- Spend the remaining time planning your lesson with a teaching mentor (Michelle, Lori, or Jo)
- Amanda presentation about local water quality issue, 30-45 min*

Feb 11th

Week 4:

- All four groups (2 people per group) present a 15 min lesson
- Michelle/Lori/Jo will give feedback
- Select a new partner and new NGSS disciplinary core idea, develop a PBL rubric, and design another 15 minute lesson
- Tim and Tom presentation about local water quality issue, 30-45 min*

Feb 18th

Week 5:

- All four groups (2 people per group) present a 15 min lesson
- Create a self-assessment rubric **Completing the rubric 5 points**
- Michelle/Jo will give feedback
- Farahad/Michelle G presentation about local water quality issue, 30-45 min

Feb 25th

Week 6: **Conceptual Difficulty Presentations worth 50 points**

-Each person does a 5 min (5 slides in 5 minutes) presentation on one life science concept they might struggle to teach in preparation for writing the paper. These questions should be addressed in the presentation:

- 1) Why did you pick this concept?
- 2) Where does this disciplinary core idea appear in NGSS and what does the standard say?
- 3) What research has been done on why students struggle with this topic?
- 4) What evidence do researchers have that students struggle with this concept?

-Math teacher Deb Soderberg visits class to talk about her needs for a math unit involving water quality, we also tell her what we have learned about the issue and she will tell us about what might work for her class 60 min

March 3rd

Week 7

- Biology concept paper draft is due to a classmate for comment (**feedback to classmate worth 25 points**), the classmate will give detailed feedback by March 10th, an updated draft is due to Michelle on March 17th, Michelle with edit but not grade
- Molly visits the class and talks about teaching students about data analysis
- Workshop to design the classroom unit on water quality. Each student gets a 5 min pitch and then we come up with learning goals and a plan together, we will share the learning goals and plan with Deb and she will give us feedback **Participation in the water quality project through week 14 is worth 50 points**
- Write 3-5 questions you have for the teacher panel in week 9

Spring break

March 24th

Week 8

- Discuss feedback from Deb and develop a plan to revise the water quality activity
- What are multi-media lessons? Michelle, Jo and Lori give examples
- Each student will develop a 30-minute multi-media lesson on a NGSS-aligned life science disciplinary core idea of his/her choice. A PBL rubric should be included with the presentation. **30 minute presentation worth 100 points**
- Email 3-5 questions you have for the teachers to Michelle **Teacher questions worth 10 points**

March 31st

Week 9

- Final conceptual difficulty paper due for a grade
- Fill out a self-assessment rubric after writing the paper **Completing the rubric 5 points**
- Ask me anything: science teacher version
 - We will have a panel of teachers come to class and you can ask questions about their job, how they teach, what they wish they knew their first few years of teaching, how earlier grades prepare students for later grades, importance of NGSS and standards based grading etc.
- Panel will include teachers from multiple schools and grade levels

April 7th
Week 10

- Three multi-media life science presentations.
- Fill out a self-assessment **Completing the rubric 5 points**
- Work on the water quality activity*

April 14th
Week 11

- Three multi-media life science presentations.
- Fill out a self-assessment **Completing the rubric 5 points**
- Work on the water quality activity*

April 21st
Week 12

- Two multi-media life science presentations.
- Fill out a self-assessment **Completing the rubric 5 points**
- Work on the water quality activity*

Week 13
April 28th

- Practice the water quality activity

Week 14
May 5th-13th

- Teach the water quality activity at Orono middle school, will need to figure out a time that works for Deb and the class

-Written reflection on the water quality activity 50 points. Please answer the following questions:

Describe a significant event that occurred as a part of the service-learning experience.

Why was it significant to you?

Describe an incident or situation that created a dilemma for you in terms of what to say or do. What is the first thing you thought of to say or do? List three other actions you might have taken. Which of the above seems best to you now and why do you think this is the best response?

Fill out a self-assessment rubric

Grading

Assignment	Points
Biology Concept Writing Assignment	100
2x15 minute lesson presentations	100
Three self-assessment rubrics	15 total (3*5 points each)
5 min Conceptual Difficulty Presentation	50
Comments on a classmate's biology concept paper draft is due to a classmate for comment	25
Participation in the water quality project throughout the semester	50
30 minute multi-media presentation	100
Questions to teachers	10
Written reflection for the water quality activity	50

University of Maine administrative policy statements

Academic honesty:

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students with disabilities:

If you have a disability for which you may be requesting an accommodation, please contact Disabilities Services, 121 East Annex, 581-2319, as early as possible in the term.

Course schedule disclaimer (disruption clause):

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Sexual violence policy:

Sexual discrimination reporting: The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

Behaviors that can be “sexual discrimination” include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

Why do teachers have to report sexual discrimination?

The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise— for example, if more than one victim reports having been assaulted or harassed by the same individual.

What will happen to a student if a teacher reports?

An employee from the Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution’s obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution’s ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution’s response.

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000.**

For confidential resources off campus: **Rape Response Services: 1-800-310-0000** or **Spruce Run: 1-800-863-9909.**

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: **Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.** Or see the OSAVP website for a complete list of services at <http://www.umaine.edu/osavp/>