Instructor Information
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Assistant Professor
Department of Mechanical Engineering
Thomas J. Watson School of Engineering and Applied Science
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Office hours: Monday, Wednesday, and Friday. 5:40-6:40 pm
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Communication Policy
Students can contact the instructor by email, office hours, and phone.

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4400 Vestal Parkway East
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(607) 777-2000
info@binghamton.edu
Course Information

Description

In the last a few years, rapid advances have been witnessed in modeling, simulations and characterizations of mechanical behavior of advanced energy materials and systems, and tremendous opportunities arise for further understanding of mechanics in energy materials for superior performance. This project-based graduate elective course will address the importance of mechanics in all aspects of energy conversion, energy storage and energy harvesting. This is a designated Community Engaged Learning (CEL) course: a credit-bearing academic course in which students are involved in a community setting such that the experience is linked to course content, enriches learning, and benefits the community in some way. Prerequisite: None. Offered in the Spring. 3 credits

Course Objectives

- Develop an understanding of the importance of mechanics in energy generation, collection, conversion, harvesting, storage, and utilization, as well as a variety of other fields.
- Learn to use finite element analysis or other numerical simulation techniques to develop preliminary results and to solve energy-related problems.
- Learn to use mathematical formulations in combination with experimental data to evaluate efficiency of any energy system.
- Learn to identify the most relevant textbooks, reviews, papers and journals for the research topics. During the course the students will also learn how to critically read and assess research papers and reviews.
- Develop interdisciplinary skills and the ability to think across boundaries, as this interdisciplinary course connects mechanical engineering, petroleum engineering, battery technology, nanotechnology, and material science, etc.
- Learn to explain fundamental scientific concepts and designs to the general public. As the demand for creative, engaging, and meaningful science communication is increasing, one important objective of this course is to train students into engaging and effective communicators by asking them to give student-led lectures and working with high school students.

Format and Procedures

The classroom lectures have multiple formats including traditional lectures, group discussion, group learning projects, laboratory tours, and student-led lectures.

Student-Led Lectures

As part of our effort to explore a new teaching mode, each student will lead a lecture. As the demand for creative, engaging, and meaningful science communication is increasing, STEM students need to be trained to meet this demand. It is hoped that this approach help turn students into engaging
communicators, and student-led lectures will enhance interactivity between students and the instructor, leading to increased student engagement and learning.

**Course Requirements**

**Recommended Texts & Other Readings**


- Other readings will be posted on Blackboard course page: https://blackboard.binghamton.edu

**Credit Hours**

This course is a 3-credit course.

**Copyright Statement**

The publications uploaded to Blackboard are provided to the students for use in research. All copyrights remain with the appropriate parties as listed in the publications themselves.

**Community-Engaged Learning (CEL) Component**

**Goals and Objectives**

The importance of educating the American youth cannot be overstated, as they are our next generation of leaders, inventors, and technologists. Today’s pre-college students will be faced with a wide range of difficult technological challenges as adults, including energy generation, collection and storage, applications of nanotechnology and biotechnology, and a host of legacy environmental issues. Their success in facing these challenges will be influenced by their inspiration and motivation to pursue careers in technical disciplines. It is often during the formative years that students develop an interest or aversion to specific fields, which can influence their career choices. For students who have an interest in science, technology, engineering, and mathematics (STEM), their pre-college years are crucial for establishing foundational knowledge. One approach that has been used successfully to increase student interest and awareness in STEM is improving the education of the pre-college students through personal contact with practicing STEM professionals. This CEL component is being developed to meet this need, which may have a significant impact on students’ development in these important areas.
CEL Tasks

To develop this course into a CEL course, each graduate student attending this course is required to pair with two high school students for the preparation and the presentation of the student-led lectures. The two high school students need to work with the graduate student in choosing a topic for the lecture, conducting literature review, preparing PPT, and finally presenting the PPT. Each graduate student needs to spend at least 24 hours working with the two high school partners, including 23 hours for the preparation of the lecture outside the class, and one hour for the presentation of the lecture in the class. All the high school students attending this course will be invited to complete an anonymous in-depth survey. All the graduate students attending this course will be interviewed.

Specific tasks are listed as follows:

1. Team Formation: The graduate student is responsible for initiating the communication between team members and setting up the first team meeting. On the first meeting, team members should discuss about the topic of the presentation. Then they should email the instructor about their decision and wait for the instructor’s approval.

2. Material Collection: The instructor will approve the topic or suggest another related topic, and then send the team a sample presentation made by previous students. The team members should collect related materials for the preparation of the presentation. The graduate student shall download journal papers and book chapters by making use of the resources on campus; and the high school students shall search the Internet for related videos or articles by making use of the free resources such as YouTube and Wikipedia, etc. The collected materials and links should be shared among team members. This part can be done through email.

3. PPT Preparation: The high school students should make an initial draft of the PPT for the presentation based on the collected materials and the sample presentation, and then the graduate student should revise it and send back to the high school students. There can be several more cycles for the PPT revision. This part can be done through email.

4. Presentation Rehearsal: The team should meet for the second time for the presentation rehearsal. Decide who presents what. Both the graduate student and the two high school students should present. Each presenter presents roughly one third of the content.

5. Presentation for the Class: The team will present their PPT in the high school class. Both the graduate student and high school student could present what they have been doing in a language that high schoolers can understand. Get a team photo taken during the presentation and/or record the presentation.

Grading

<table>
<thead>
<tr>
<th>Name</th>
<th>Points Possible</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>100</td>
<td>20%</td>
</tr>
<tr>
<td>Student-Led Lectures</td>
<td>100</td>
<td>40%</td>
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Last Updated 10/24/2016

<table>
<thead>
<tr>
<th>Quizzes</th>
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<th>20%</th>
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</thead>
<tbody>
<tr>
<td>High School Students’ Feedback</td>
<td>100</td>
<td>20%</td>
</tr>
</tbody>
</table>

Accessing Grades
Grades will be available on Blackboard.

Course Policies

Late Policy
Late submission of homework or projects will not be accepted.

Attendance & Participation
Students should send the instructor a brief e-mail to explain their absence in advance. Students who repeatedly arrive late to the lecture will have their Class Attendance grade lowered.

Students are encouraged to ask questions and participate in discussions during the class. The assessment of your participation will be used to manage borderline grades. While your participation grade is subjective, it will not be random or arbitrary. And, clearly, more frequent quality comments are better than less frequent quality comments.

Use of Mobile Devices
As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone’s learning experience if your cell phone, tablet, laptop, etc. makes noise or is visually distracting during class. For this reason, you are asked to turn off your mobile devices and close your laptops during class.

Academic Integrity
Binghamton University provides explicit guidelines in the Student Academic Honesty Code (see the University Bulletin - Academic Policies and Procedures for All Students). Unless specified otherwise in the syllabus, the work you submit for grading is expected to be yours and yours alone. Not acknowledging another's work with proper references, taking credit for someone else's work, letting your work appear in another student's paper, or fabricating "results" are grounds for failing the assignment and/or the course. If you have any questions about what constitutes plagiarism or cheating, please ask the instructor.

Disability-Related Equal Access Accommodations Statement
Students wishing to request academic accommodations to insure their equitable access and participation in this course should notify the instructor as soon as they are aware of their need for such arrangements. Authorizations from Services for Students with Disabilities (SSD) are generally required. You are encouraged to contact SSD at (607) 777-2686 to schedule an appointment with the Director or Learning Disabilities Specialist. The SSD website (www.binghamton.edu/ssd/) includes information regarding their Disability Documentation Guidelines. The office is located in UU–119.
Campus Help for Students

ITS Helpdesk
Walk-in: Located in the Computer Center first floor lobby.
Call: 607-777-6420; E-mail: helpdesk@binghamton.edu.
https://www.binghamton.edu/its/

Blackboard Support
E-mail: blackboard@binghamton.edu
http://www.binghamton.edu/uctd/

Libraries
The Libraries offer a wide variety and range of services including research assistance, instruction, user-friendly interfaces, digital preservation, digital scanners, and resource sharing.
Text: 607-205-8173; Call: 607-777-2345; Email: refquest@binghamton.edu
http://www.binghamton.edu/libraries

Dean of Students
If you are experiencing undue personal or academic stress at any time during the semester or need to talk with someone about a personal problem or situation, I encourage you to seek support as soon as possible. I am available to talk with you about stresses related to your work in my class. Additionally, I can assist you in reaching out to any one of a wide range of campus resources, including:
1. Dean of Students Office: 607-777-2804
2. Decker Student Health Services Center: 607-777-2221
3. University Police: On campus emergency, 911
4. University Counseling Center: 607-777-2772
5. Interpersonal Violence Prevention: 607-777-3062
7. Office of International Student & Scholar Services: 607-777-2510

University Counseling Center
At some point during their college experience, students may encounter personal, social, or developmental issues that call for assistance beyond the advice provided by friends and family. That’s where the University Counseling Center (UCC) can help. The UCC provides a variety of free and confidential counseling services delivered by professional counselors. All currently enrolled Binghamton University undergraduate students, graduate students and affiliated entities are eligible to receive these services free of charge. Services and programs available through the center include individual and group counseling, consultation, referral, and psychoeducational programs. For more information or to make an appointment, visit https://www.binghamton.edu/counseling