**ENGR 4956**

**Community-Based Integration Experience**

*Experiential Engineering Education through Informal Outreach (E3IO)*

Spring 2025 – 4 Semester Hours – CRN 41238

*Independent Study*

A person smiling at camera

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Associate Teaching Professor **Jennifer Love** (*she/her/hers*)

College of Engineering

354 Snell Engineering

617- 373-3551

j.love@northeastern.edu

<https://coe.northeastern.edu/people/love-jennifer/>

<https://www.linkedin.com/in/jennifer-ocif-love/>

**Student Hours:**

Professor Love: Thursdays 1:00 - 1:50pm (in-person 354 SN or virtual <https://tinyurl.com/ProfessorLove>)



**Course Description**

This Experiential Learning Opportunity (ELO) course will explore the field of informal STEM education, a field of science and engineering education outside the formal school & classroom environments. This ELO is designed for Northeastern undergraduate and graduate students, especially those in any science, technology, engineering or math major or minor, but not limited to these disciplines. Enrolled students will explore opportunities to learn about science and engineering principles, frameworks relevant to informal STEM education in K-12 outreach programs, experiential learning theories (Kolb, 1984), curriculum frameworks for K-12 science & engineering education (Next Generation Science Standards and state-specific science, engineering, technology and digital literacy standards), STEM lesson development and delivery with a focus on place-based community needs, student learning assessment tools, and program evaluation.

This “experiential elective model” course will require direct engagement in one of several informal STEM experiences including but not limited to the STEM Field Trip series offered by The Center for STEM Education or through a minimum of 40 course hours of equivalent informal STEM outreach activities within the local greater Boston community.

**Course Goals & Objectives**

In this course, students will have the opportunity to:

1. Define informal STEM education and reflect on the field’s impact to their own academic STEM pathway.
2. Learn and apply experiential learning theories such as project-based learning, asset-based learning and other types of learning that are relevant to high-quality, authentic informal community-based STEM education.
3. Learn how to identify and engage with target audiences and incorporate their specific needs into effective informal STEM experiences (for example, the needs of urban classroom teachers for an off-site field trip with 60 young students at Northeastern’s Boston campus or the needs of an after-school community-based program at a local Boys & Girls Club).
4. Develop and practice inclusive communication skills about science and engineering topics to deepen their own understanding of STEM principles and to more effectively reach diverse populations of young students, including the use of hands-on lessons guided by oral presentations, written communications and graphic media.
5. Design, develop and/or deliver effective informal STEM education lessons and experiences that support K-12 students’ pathways in STEM through continuous engagements with Northeastern University and external partners, including local, state and federal funding agencies.

**Required Course Materials:**

* **CANVAS** – ENGR 4956 course (students automatically enrolled by Registrar).
* **myNortheastern account** – for access to Canvas, Microsoft Teams, Zoom, TRACE online survey and other campus resources.
* **Digification** – free Northeastern access at <https://northeastern.digication.com/app/>, for students to generate their own e-portfolio of their coursework. Example <https://northeastern.digication.com/example-student-e3io/home/published>.
* **Personal Laptop** – Mac or PC for accessing course materials from Canvas and for accessing virtual meetings, if applicable. For computer requirements, refer to <https://coe.northeastern.edu/current-students>.

**Course Meetings:** This is an independent study course so course content can be accessed on Canvas. However, in-person meetings will be required for participating in STEM field trips (generally Fridays 9am – 2pm on Boston campus) and/or other outreach activities, perhaps after-school on other days if enrolled students are available. In-person meetings with the instructor will be arranged with all enrolled students to find a weekly standing time to cover course material and plans together.

**Canvas:** We will use our ENGR 4956 Canvas course weekly or bi-weekly to engage students with announcements, assignments, synchronous and asynchronous learning activities, Discussion Board conversations, grades, course feedback, Zoom and Microsoft Teams links (if applicable), and other course information.

**Course Grading & Assessment**

Assessment of students’ performance in this course will be based on an “ungraded” approach since traditional and modern assessment approaches often drive students to focus on what score they need as opposed to what they need to learn. Ungrading shifts the emphasis back onto learning and provides a less stressful, more equitable assessment to measuring student performance (Blum & Kohn, 2020). Some examples of ungrading include self-assessment (dialogue, survey responses and feedback), peer assessment, student-built portfolios, and mastery-based grading which focus on improving an ability and specific skills instead of earning a grade. Therefore, specific performance assessments will include weekly reflections, peer-reviewed informal STEM lesson plans, instructor and peer-reviewed feedback on actual STEM lesson delivery, feedback on survey tools that evaluate the lesson’s effectiveness, and student-generated e-portfolios. There will be no exams or quizzes. A course grade would be based on a student’s self-proposed final grade based on the student’s prior achievements, in consultation with the instructor.

**Academic Integrity Policy:** The College of Engineering fully supports the goals of the University Academic Integrity Policy <http://www.northeastern.edu/osccr/academic-integrity-policy/>:

*A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.*

The College of Engineering supports an academic environment in which academic integrity is upheld in all settings. Research suggests that contextual factors, rather than personal ones, contribute the most to the likelihood that a student will engage in unethical behavior. Among these factors, the most significant ones are students’ attitude towards cheating; students’ perceptions of their peer cheating behavior; peer disapproval of cheating; and instructor and institutional attitudes towards cheating. This emphasizes the importance of establishing an environment where cheating is unambiguously rejected. The most effective way to address academic integrity is to foster an “ethical community”, where students, faculty and staff join forces to promote academic integrity. The university’s code of student conduct helps define our community values and communicate rules and standards. However, the code is only effective and fair to all if it becomes part of our culture.

Plagiarism and cheating will not be tolerated; they will be dealt in accordance with University policies described in the Student Handbook.

Although students are encouraged to discuss assignments and work together to develop a deeper understanding of the topics presented in this course, **submission of someone else’s work as your own (including resources found online or through ChatGPT) is not permitted (i.e., copying of answers or any document/file is not allowed)**. Each student is expected to prepare and submit their own individual assignments. If two students’ works are suspiciously similar, your professors will request individual meetings with each student involved to determine the facts. If a situation arises in which you are uncertain if cooperation with another student would constitute cheating or some other violation of Northeastern’s Academic Integrity Policy, please ask the instructor for guidance and clarification of these rules.

**A student copying another’s work or allowing their work to be copied will be in violation of the Academic Integrity Policy**. **Violators will be referred to the Office of Student Conduct & Conflict Resolution (OSCCR) for review, where penalties may include but are not restricted to: zero credit on the work, student placed on academic probation, and submission to the student’s University permanent record.**

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields.  Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

**Special Accommodations:** If you have specific physical, psychiatric, or learning disabilities that you believe may require accommodations for this course, please meet with your professor after class or during Student Hours to discuss appropriate adaptations or modifications which might be helpful for you. The Disability Access Services, which is located on campus in 020 Dodge Hall (ext 2675) can provide you with information and other assistance to help manage any challenges that may affect your performance in your coursework. You will need to provide documentation of your disability to the DAS if you do require special accommodations for your coursework (a note taker, for example).

Northeastern University and Disability Access Services are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university.  To receive accommodations, students must provide appropriate documentation that demonstrates a current substantially limiting disability. For more information, visit <https://disabilityaccessservices.sites.northeastern.edu/>.

**Diversity and Inclusion:** Northeastern University is committed to equal opportunity, affirmative action, diversity and social justice while building a climate of inclusion on and beyond campus.  In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration and an awareness of global perspectives on social justice. It is my intention as your professor that students from all backgrounds and perspectives will be well served by this course, and that the diversity that students bring to this class will be viewed as an asset. We welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this course are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the course. Your suggestions are encouraged and appreciated.

Please visit <https://diversity.northeastern.edu/> and <https://coe.northeastern.edu/about/coe-diversity/> for more information on Diversity and Inclusion.

**Neurodiversity Inclusivity Statement:**

We are committed to ensuring that students with a variety of neurological differences are well supported in this course. We believe that the diverse neurological perspectives students bring to class are valuable assets and enhance our collective learning experience.

The COE Neurodiversity Initiative is dedicated to advancing inclusivity by embracing the concept of neurodiversity, which views differences in brain function and behavioral traits as natural variations within human diversity. Our mission is to advance a strength-based approach, increase acceptance of neurodiversity, and enhance understanding within educational, work, and social settings. To support this mission, the COE Neurodiversity Initiative provides personalized 1:1 and group weekly meetings with coaches, co-op coaching, and referral pathways, all aimed at empowering students to navigate campus life and reach their full potential. No diagnosis or fees are required to access our services. For additional information, please contact us at neurodiversityinitiative@northeastern.edu.

**Lived Name / Pronoun:** We will gladly honor your request to address you by a preferred name or appropriate gender pronoun.

# **Title IX:** *Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.* Northeastern’s Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff. If you or someone you know has been a survivor of a Prohibited Offense, ***confidential*** support and guidance can be found through University Health and Counseling Services staff (<http://www.northeastern.edu/uhcs/>) and the Center for Spiritual Dialogue and Service clergy members (<http://www.northeastern.edu/spirituallife/>). By law, those employees are not required to report allegations of sex or gender-based discrimination to the University. Alleged violations can be reported non-confidentially to the Title IX Coordinator within *The Office for Gender Equity and Compliance* at: titleix@northeastern.edu and/or through NUPD (Emergency 617.373.3333; Non-Emergency 617.373.2121). Reporting Prohibited Offenses to NUPD does NOT commit the victim/affected party to future legal action. Faculty members are considered “responsible employees” at Northeastern University, meaning they are required to report all allegations of sex or gender-based discrimination to the Title IX Coordinator. In case of an emergency, please call 911. Please visit [www.northeastern.edu/titleix](http://www.northeastern.edu/titleix) for a complete list of reporting options and resources both on- and off-campus.

**Navigate:** Your instructor will use the Navigate system to report declining or unsatisfactory academic performance or unsatisfactory participation (2 absences in a row, for example) to the student and their academic advisor and to propose an action plan to ensure student success.

**Resources:** The following resources were used to design this course but are not required reading.

Blum, S. D., & Kohn, A. (2020). Ungrading: why rating students undermines learning (and what to do instead) (S. D. Blum, Ed.). West Virginia University Press.

Bottomley, L. (2017). *Essential components found in K-12 engineering activities devised by engineering educators. 2017 ASEE Annual Conference & Exposition*, June 2017, Columbus, Ohio. <https://peer.asee.org/28292>

Community-Engaged Teaching and Research at Northeastern University

<https://cetr.northeastern.edu/course-syllabus-design-for-community-engaged-courses/>

Duggan, C., Love, J.O., Fuchs, N.L., Chernich, E. and Fung, B. (2020). An effective model for leveraging field trips to broaden participation in STEM. *2020 ASEE Virtual Annual Conference & Exposition*, June 22-26, 2020. Paper ID#29190, <https://doi.org/10.18260/1-2--35523>

<https://informalscience.org/>

Kolb, D. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, N.J.: Prentice-Hall.

Landherr, L. (2023). *Ungrading in Chemical Engineering: Attempting to Eliminate Exams, Deadlines, and Anxiety by Refocusing on Learning Instead of Grades.* Paper presented at 2023 ASEE Annual Conference & Exposition, Baltimore, MD. <https://peer.asee.org/44552>

Teach Engineering. (2023). <https://www.teachengineering.org/getinvolved/submitcurriculum>