UNDERGRADUATE RESEARCH CO-OP FELLOWSHIP (URCF)

DEPARTMENT OF ENGINEERING AND COMPUTING EDUCATION COLLEGE OF ENGINEERING AND APPLIED SCIENCE

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: April 27, 2025

PROJECT TITLE: <u>Investigating the Impact of Language Practices and Literacy on</u> <u>Engineering Education</u>

Physical Requirement : The research will primarily be desk-based and require extended periods of sitting and using computers for data analysis, writing, and collaboration. While fieldwork may not be physically demanding, it may require traveling to various locations, carrying equipment (e.g., laptops, recording devices), and participating in potentially extended research sessions (e.g., long interviews or focus groups). Project's Technical Skills Requirement : Strong writing skills, Familiarity with qualitative research, ability to transcribe audio files, Knowledge of different software tools including Microsoft Office, basic knowledge of coding or programming, Ability to work effectively as part of a research team, Proficiency in using online survey tools (e.g., Google Forms, SurveyMonkey), Basic understanding of graphic design or tools like Canva or Adobe Illustrator Project's Available Positions : 2

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Project Description

Project Overview

Literacy refers to the ability to understand, interpret, and effectively use written, oral, and visual forms of communication specific to the discipline. This includes not only reading and writing skills but also the capacity to engage with and produce technical texts, such as research papers, lab reports, design specifications, and technical documentation. Engineering literacy also involves the ability to comprehend complex concepts conveyed through formulas, graphs, and diagrams, and to communicate technical ideas clearly and persuasively to diverse audiences. In engineering education, literacy extends beyond traditional reading and writing to encompass discipline-specific practices that are essential for problem-solving, critical thinking, and effective communication in the engineering field. These practices include: (1) writing clear, concise, and precise documents

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unique to the field, (2) reading and understanding complex texts that contain specialized language and concepts, (3) interpret and manipulate mathematical and technical information effectively, (4) present ideas clearly through different discoursive practices, and (5) engaging in the discourse of problemsolving.

Therefore, studying literacy in engineering education is critical for several reasons, including the ability to navigate disciplinary texts, understanding linguistic and cultural norms, communicating new technologies, collaborating with others, effectively participating in decision and meaning-making, improving educational practices, and, overall, ensuring persistence, retention, and engagement of those who seek to become engineers. Thus, literacy in engineering education is not only about mastering technical language but also about ensuring that all students have the discoursive skills necessary to succeed in academic, professional, and collaborative settings.

Purpose:

This study aims to investigate the role that literacy practices in engineering education play in shaping access to and participation in the field. By examining the ways in which reading, writing, and communication are approached in engineering programs, the project seeks to understand how certain literacy practices may create opportunities or barriers for students. The study will explore how the literacy expectations in engineering education, including technical writing, reading comprehension, and the use of discipline-specific language, affect students' ability to succeed and persist in the field.

Project Objectives:

The study is designed to achieve the following objectives: 1. Examine the Role of Literacy in Engineering: Identify how literacy practices in engineering, such as technical writing, reading comprehension, and discipline-specific vocabulary, create either inclusive or exclusive environments for students.

 Analyze Institutional Literacy Expectations: Investigate how literacy expectations in engineering education—both written and verbal—become normalized, and how these expectations may unintentionally reinforce barriers for students who are less familiar with the dominant engineering discourse.
Impact on Student Engagement and Persistence: Explore how literacy practices in engineering, such as the use of specialized discourse, writing styles, and reading materials, impact students' sense of belonging, motivation, and ability to succeed in the field.

4. Assess the Accessibility of Educational Materials: Evaluate the accessibility of written and instructional materials, including textbooks, syllabi, assignment instructions, and other resources, and how these materials support or hinder students' literacy development and participation in engineering education.

5. Develop Educational Tools: Create a practical resource for faculty and students that addresses effective literacy practices in engineering education and provides strategies for making engineering literacy more accessible to

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all students.

Outcomes:

By the end of the project, student researchers will have: 1. Conducted an investigation into the role of literacy practices—such as reading, writing, and communication—within engineering education and their impact on access and persistence in engineering. 2. Developed an understanding of how discipline-specific literacy expectations can act as barriers to participation for students. 3. Created a multimodal resource (such as a handbook or infographic) for engineering faculty, designed to promote literacy practices that support all students in the field. 4. Produced an ethnographic report that highlights the ways in which literacy

practices impact student success and persistence within engineering education.

Methodology:

The project will adopt a qualitative approach, focusing on ethnographic methods to investigate literacy practices in engineering classrooms and instructional materials. Students will observe and analyze literacy-based activities, such as reading comprehension exercises, technical writing assignments, and communication tasks within engineering courses. In addition, interviews will be conducted with engineering students and faculty to understand how literacy practices are perceived, and how they impact students' ability to engage with the curriculum. Data will be synthesized to develop recommendations to facilitate literacy development in engineering contexts with a particular emphasis on helping students and faculty understand the value of nurturing disciplinary literacy.

Timeline:

This project is designed to be completed over the course of one semester, with the following phases:

Weeks 1-2: Conduct a literature review on literacy practices in engineering education and the role of the development of disciplinary literacy as it related to persistence in engineering.

Weeks 3-5: Design and distribute surveys to engineering students and faculty to gather insights on their experiences with literacy practices and expectations in the field. Continue working on literature review. Weeks 6-8: Conduct ethnographic observations in engineering classrooms and engineering common spaces, focusing on literacy practices such as group work

and dynamics, reading assignments, technical writing tasks, and communication exercises.

Weeks 9-12: Analyze data from observations and interviews, identifying key themes related to how literacy practices affect student engagement, identity, and success in engineering.

Weeks 13-15: Develop a multimodal resource (such as a handbook or infographic) to share recommendations on inclusive literacy practices in engineering and prepare a final report detailing findings and outcomes. Future work: dissemination to present work in the form of a paper at a conference

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Intended Impact:

This study will allow undergraduate students to gain valuable experience in educational research while exploring an important aspect of engineering education—literacy. By identifying how literacy practices in engineering education can either support or hinder access and success for all students, the study will contribute to creating a better understanding of the impact of disciplinary literacy within engineering programs. The multimodal resource developed in the project will provide actionable recommendations to faculty and staff, helping them to design courses that emphasize the development of disciplinary literacy. Ultimately, this study aims to create a deeper understanding of how literacy impacts student engagement and retention, leading to robust models that better prepare engineering students.