

SS: DESIGN BASED BIOTECHNICAL LEARNING

EDCI 2984 (CRN: 40437) | 3 SEMESTER HOURS | WINTER 2021

COURSE DESCRIPTION: EDCI 2984 is a unique presentation and use of technological/engineering design based biotechnical learning (T/E DBBL) to explore the integration of STEM (science, technology, engineering, and mathematics) content knowledge and practices. The purpose of the course is to engage students in a minds-on, hands-on experience of the disciplinary connections among STEM content and practice knowledge as employed through the design and construction of working biotechnical prototype solutions, each of which address authentic human needs. An emphasis is placed on ethical decision-making based on technological solutions being designed appropriately for local and/or global communities.

DBBL PROTOTYPES: The course uses an integrative STEM education approach for intentionally teaching design and science concepts and practices by engaging students in the design, construction, and evaluation of working biotechnical prototypes. Students will construct two physical prototypes intended to address the global need for developing environmentally sustainable alternative fuels, each of which will capitalize on the characteristics of select microbes harnessed within a biotechnical system.

TIME: 9:00AM - 1:00 PM; M, T, W, TH, F, S

PLACE: On Campus/In Person: 112 Seitz STEM Education Collaboratory

OBJECTIVES: as a result of participation in this course students will be able to:

- 🔗 Apply the concepts and practices of technological/engineering design
- 🔗 Demonstrate tacit knowledge (skills, tools, methods) of working in biotechnical systems design
- 🔗 Utilize iterative phases of technological/engineering design in producing working biotechnical prototypes
- 🔗 Employ principles and techniques of scientific inquiry for predictive analysis of prototype elements
- 🔗 Prepare artifact proposals (design journal, physical model/prototype, etc.) demonstrating understanding of select STEM disciplinary concepts integral to the designed solution
- 🔗 Evaluate performance of working biotechnical prototype to improve on solution design
- 🔗 Deliver a compelling oral presentation justifying ethical and functional design choices made in constructing a working biotechnical prototype
- 🔗 Articulate the relevance of the designed biotechnical systems to ethical appropriate technologies required to meet current/pending global energy challenges

REQUIRED TEXT:

- 🔗 Wells, John G., (2019). *Design Based Biotechnology Literacy® Teaching Guide*, pp. 1-486. Technology Education Biotechnology Curriculum®. Blacksburg, VA: Biosens

REQUIRED READINGS: As assigned

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