

Petition for CM 4861 Design Substitution

Verification of capstone design objectives through an alternative design experience

Project Title: _____

Course: _____ **Credits:** _____ **Semester/Year:** _____

Abstract: Attach an abstract delineating the project's objectives and deliverables. See reverse for guidelines. This project must require the use of knowledge and skills acquired in your earlier engineering course work and incorporate **appropriate engineering standards, multiple realistic constraints, and an economic analysis.**

I am requesting to use this project as a substitution for CM 4861 CM Design Laboratory 2 (1 credit). I am a team member of this project and am capstone design ready, having successfully completed the following courses: CH 2410 Organic Chemistry I, CM 3120 Transport/Unit Operations II, CM 3215 Transport Laboratory, CM 3230 Thermodynamics for Chemical Engineers, and CM 3510 Chemical Reaction Engineering.

Name	Signature	Date

Have your project's faculty advisor complete the portion below then submit to the chemical engineering academic advisor.

Due: Friday of week 4 of fall semester

ABET Criteria: At a minimum, this project must meet the same ABET criteria as CM 4861 (criteria 1, 2, 3, 4, 5, and 7 listed below). Identify the ABET criteria below which will be required for this project. The students will be expected to:

- Required (1) Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Required (2) Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Required (3) Communicate effectively with a range of audiences.
- Required (4) Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Required (5) Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- (6) Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Required (7) Acquire and apply new knowledge as needed, using appropriate learning strategies.

I will supervise this project, and it meets the ABET criteria selected above.

Project Faculty Advisor

Date

- Students eligible
- Meets ABET criteria
- Suitable project

Approved by: _____
Chemical Engineering ABET Committee Chair Date

Approved by: _____
Chem Engg Department Chair or Lead Design Instructor Date

Capstone Design Abstract Guidelines

Your project abstract must clearly address the following topics:

- **Background.**
- **Functional Requirements.** This is what the device or process should be able to do.
- **Realistic Constraints.** You must demonstrate consideration of realistic design constraints and at a minimum address:
 - **Engineering Codes and Standards.** Codes are legally enforceable, such as ASME BPV, OSHA, 1990 Clean Air Act, RCRA, CERCLA (Superfund), etc., whereas standards are best practices, such as TEMA, ASTM, etc.
 - **Economic Factors,** which include process or product cost, market pricing, market opportunities, target markets, pricing, minimum selling price, availability of raw materials, etc.
 - **Physical Limitations,** which include size, weight, ergonomics, user interface, service life, ability to operate in a hazardous environment, etc.
 - **Health and Safety Issues,** which include laboratory practices, OSHA regulations, operator exposure to toxic chemicals, mechanical guarding, hot surfaces, fire and explosion situations, fail-safe mode, handling spills, etc.
 - **Environmental Concerns,** which include EPA regulations, identifying and handling air emissions and liquid/solid wastes, etc.
 - Additional realistic constraints should also be addressed where applicable. This may include: sustainability, manufacturability, constructability, ethical considerations, social ramification, political factors, legal issues, etc.
- **Intended Deliverables.** At a minimum you must include an:
 - **Economic Analysis** as part of your project deliverables. This analysis should address economic factors from both customer and sponsor perspectives where possible. Your abstract should give a brief description of your intended economic analysis that indicates the types of economic factors that will be considered.
- **Sponsor Interactions.**
- **Team Organization.** Include a description of your team make-up including team member names, their major, and their year in school.

If your project is through the Enterprise Program then the abstract must be completed using the Enterprise Project Summary form <https://www.mtu.edu/enterprise/team-resources/>. The topics above should be addressed in the Project Summary form in the following areas. The first four items are your **Background**:

Background & Overview

Problem/Opportunity Statement

Project Significance

Illustration, Drawing, Image, or Graphic Describing the Project

Anticipated Outcomes of the Student Team

<**Intended Deliverables** go here. Remember this must include a brief description of your economic analysis.>

Key Functional Requirements of the Material, Product, Process, or System

<**Functional Requirements** go here.>

Special Notes

<**Realistic Constraints** go here. Remember at a minimum this must address: engineering codes and standards, economic factors, physical limitations, health and safety issues, and environmental concerns.>

Sponsor Contact Information

Sponsor to Provide

<**Sponsor Interactions** go here.>

Michigan Tech to Provide

<**Team Organization** goes here.>