# Department of Mechanical Engineering-Engineering Mechanics

**ENT4950/4960 Capstone Credits Project Submission Template for ME-EM Students (Project Brief)**

**To Verify Senior Design Objectives will be met through Enterprise Concentration**

**Project Title:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Enterprise Team:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Submission Date: \_\_\_\_\_\_\_\_\_\_\_

**Enterprise Advisor Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_@mtu.edu

**ME SENIOR DESIGN STUDENTS ON THIS PROJECT**

1. Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ M#: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_\_\_\_\_\_\_\_@mtu.edu

[ ]  ENT 4950 & 4960 [ ]  ENT 4950 ONLY [ ]  ENT 4960 ONLY

Semester(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**OFFICE USE ONLY:** Prerequisites Completed: ☐ (Academic Advisor Initials: )

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[ ]  Check this box for additional students shown on following page (more than 2 ME capstone team members).

**OFFICE USE ONLY BELOW THIS LINE ON THIS PAGE:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ABET Criterion 3: Student Outcomes** (as approved by enterprise advisor):

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to 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
3. an ability to communicate effectively with a range of audiences
4. an ability to 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
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies Program-specific criteria (for academic department use only)

Approved by:

 ME-EM Associate Chair, Director of Undergraduate Studies Date

Date Forwarded: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ENT Advisor Approval Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ M#: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_\_\_\_\_\_\_\_@mtu.edu

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***Instructions for the Enterprise Project Brief Template***

*The Project Brief is a proposal for a project that you want to count towards Senior Capstone Design credit in Mechanical Engineering. This proposal must be approved by your Enterprise Advisor and by the ME-EM Director of Undergraduate Studies. The purpose of the project brief is to demonstrate that the proposed project has sufficient scope and rigor to be considered as Senior Design. The Project Brief is an exercise in technical communications. The template and instructions below are to help develop an acceptable Project Brief. Each element in the template can be adapted to your specific project and you can add sections to the template if needed for your project.*

*Please complete this document electronically (not handwritten, use text boxes above). Delete/replace the instructions (blue text) before submitting the Project Brief.*

***Frequently Asked Questions:***

*I don’t know the design requirements yet. How do I fill out the Project Scope and Constraints section?*

* *At a minimum you should be able to describe the overall goal of the project (redesign X to improve Y; design, build, and test X, etc.) and describe what engineering tools will be needed for this project.*

*My sponsor has not finalized the project. How do I fill out the Project Brief?*

* *Remember that the purpose of the Project Brief is to communicate how this project has sufficient scope and rigor to be considered as Senior Design. Senior Design projects use advanced engineering tools, are subject to periodic reviews, and have some type of constraints and/or standards that have to be met. Even if you do not have all of the details and deliverables, you ought to know the nature of the project (simulation, hardware testing, design and build) and the types of engineering tools that will be required (FEA, CNC machining, DAQ, etc.). You are responsible for communicating how this project is a “culminating design experience” in mechanical engineering.*

*If there is a substantial change in the project after it has been approved or if the project changes between semesters you can submit a new Project Brief.*

*I don’t know who is assigned to this project. How do I fill out the Project Team section?*

* *Include those team members you know are assigned and explain that the team may include additional members later in the semester. Everyone who is an ME student enrolling in ENT4950 and/or ENT4960 must be included before submitting the project brief.*

*I only know what my project is planned to be for 1 semester (ENT4950 only). How do I handle this?*

* *Check the correct boxes above and adjust the timeline and other information below to show 1-semester project. Then you will have to repeat this registration process – using this template again – for ENT4960 registration.*

**Project Title: *Include a descriptive title of your project.***

**Objective:** *Explain the overall objective of your project in one sentence.*

**Background**

*This is the section where you educate your audience on the project. Common points of discussion include:*

* *A concise overview of problem domain.*
* *Definition of any specialty technical terms or acronyms used in this project or problem domain.*
* *Motivation for the project.*
* *Previous work by individuals and/or enterprise teams on this project or in this problem domain.*
* *Images or figures that illustrate the problem domain and/or project.*

**Project Scope and Constraints**

*This is the section where you communicate the scope of the project, technical tools that will be used on the project, design constraints for the project, profession standards to be used on the project. This is the section where you convince your audience that this project is at a level of Senior Capstone. Common points of discussion include:*

* *Specific goals to achieve during this project.*
* *Rough definition of design requirements and constraints.*
* *What successful completion means for this project.*
* *Scope of work to be conducted – experimental, computational, design, build, test, etc..*
* *Engineering tools that will be used – FEA, CFD, DAQ, Matlab, Machine Shop Facilities, 3D printing, etc..*
* *Desired skill sets for the project team – majors other than ME, graduate student support, etc.*

**Project Goals**

*This section is a short summary (bullet list) of goals and outcomes for this project.*

* *Desired outcome*
* *Design for X*
* *Performance goals etc...*
* *Some analysis deliverables along with design prototype, etc.*
* *Goal 3…*
* *Goal 4… etc*.

**Sponsor Can Provide:**

*This section is a short summary (bullet list) of any resources provided by a sponsor for this project.*

* *Any unique data, information, hardware, testing equipment, etc.*
* *Any technical support that will be necessary.*
* *Any other resources, including financial, that will be necessary.*

**Project Team**

*This section is where you list the team members and the structure of the team.*

* *Describe the roles and responsibilities of each team member including those who are not seniors enrolling in ENT4950 or ENT4960.*
* *How does each team member provide leadership?*
* *If someone’s role is primarily supervision of others who are doing detailed design engineering, then describe previous design related activities in this enterprise.*

**Timing**

Project Start: *Thursday of Week 1, Semester 1 (fill in with which semester, Fall 2022, etc.)*

Project Completion: *Finals Week, Semester 2 (fill in with which semester, Spring 2023, etc, could be same semester for a one-semester project submission)*

*The template timeline must be edited/adapted to show specific milestones related to your project. Do not submit the template timeline verbatim. Adjust the timeline to show 1- or 2- semester project as applicable. In order to receive approval your project must include a mid-project review and final review with your customer/sponsor, advisor, external panel, etc. These reviews serve as an independent assessment of your progress and help guide mid-project design changes.*

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| Preliminary project milestones forENT4950 |
| Week 1 | Begin Semester |
| Week 2 | Initial Contact with Advisor and Sponsor |
| Week 6  | Draft Project Plan Complete |
| Week 7 | Project Plan Approved |
| Week 11 | Mid-Semester Design Review, Concepts Review |
| Week 12 | Concept Selection Complete |
| Exam week | Panel Review |

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| Preliminary project milestones for ENT4960 |
| Week 1 | Begin Semester |
| Week 4 | Alpha Proto Near Completion, Begin Evaluation |
| Week 8 | Alpha Proto Complete, Testing and Revision Iteration |
| Week 14 | Final Documentation, Presentation, and Panel Review |