**MIME Capstone Design (ME 497/498)**

**Technical Portfolio Assignment & Format Requirements**

**WHAT IS THIS ASSIGNMENT?**

The Technical Portfolio is THE repository of all of the technical details for your project. You must include all of the content outlined below that pertains to your project type. You will be required to turn in a physical copy of your technical portfolio contained within a 1” white three-ring binder for review and grading.

The Project Technical Portfolio for MIME Capstone Senior Design will include the following items.

**Revision #1 (ME 497):**

* Team Charter

You must include a complete Team Charter document using the approved MIME template. **Please omit the lengthy content explanations and conflict strategies included with the charter form**. This document must be signed by all team members.

* Roles and Responsibilities

This can be as simple as a table describing the roles and responsibilities of each team member. Will each team member be responsible for particular elements of the project that are not described in the team charter?

* Work Breakdown Structure (WBS)

This section will detail your projects Work Breakdown Structure or WBS. Your WBS can be represented schematically or in outline form. As a reminder, a WBS, organizes and defines the total project scope and is a deliverable-oriented decomposition of all work to be done on the project. A WBS does **NOT** detail sequences, durations, resources, risk or cost. Your WBS should be complete down to the work package level. A work package is:

* A unit of work that you and your team use to organize the project work.
* Achieved when you can create reliable cost and schedule estimates

The WBS will be created and revised multiple times throughout your project. You will add details and information as the course progresses. Remember, your WBS must include both design and writing deliverables for the course including both MIME 497 and 498.

**Your WBS must be readable without a magnifying glass!** Use at least 9 pt. font for the WBS content. Print the WBS on 11” high by 17” wide paper, folding the paper to 11” high by 8.5” wide if necessary.

* Project Schedule

This section will be used to describe the proposed or actual timeline involved in design implementation and project completion. Use of a Gantt chart or critical path diagram is recommended. The schedule should encompass all project deliverables, including project documentation.

The implementation schedule will be created and revised multiple times throughout your project. You will add details and information as the course progresses. Remember, your implementation schedule must include both design and writing deliverables for the course including both MIME 497 and 498.

**Your schedule must be readable without a magnifying glass!** Use at least 9 pt. font for the schedule content. Print the schedule on 11” high by 17” wide paper, folding the paper to 11” high by 8.5” wide if necessary.

* Customer Requirements

Present your project Customer Requirements (CRs) and weightings in either table or list format. **The CRs should be numbered and, for maximum clarity, expressed as complete sentences**.

**Revision #2 (ME 497):** Updates to all Revision #1 content as applicable, plus

* House of Quality (HofQ)

For this revision, you must include

* + Your project CRs (listed using full sentences) and CR weightings. Kano type is optional
* Your project ESs (listed using full sentences) and their directional objectives, target values, tolerances, and difficulty ratings
* The HofQ body (CR–ES interactions) and resulting ES importance rankings (which are calculated by built-in formulas)
* The HofQ roof (ES–ES interactions)
* Your design alternative ratings for both CRs and ESs
* **HofQ approvals from your sponsor and MIME advisor**

**NOTE:** Changes to the HofQ in ME498 are permitted only by petition and must be approved by your advisor and instructor. **Unapproved changes will render your HofQ and project results invalid.**

**Your HoQ must be readable without a magnifying glass!** Use at least 9 pt. font for the HoQ content. Print the HoQ on 11” high by 17” wide paper, folding the paper to 11” high by 8.5” wide if necessary.

* Engineering Specification (ES) Justification (if applicable)

If your average technical reader would not understand how you arrived at specific ES targets and/or tolerances (e.g., were they determined from information found in outside sources, derived from engineering calculations, etc.), you must present justification - *with credible supporting evidence-* for those targets and/or tolerances in list or table format.

* Codes and Standards (if applicable)

Most projects will be required to comply with specific engineering codes and standards. In this section, you will list the specific engineering codes and standards that pertain to your project at the design development, implementation, and/or testing phases; and clarify what compliance with each of these regulations means for your project. See example below.

This section should be updated whenever additional relevant codes and standards are identified (for example, when researching safety compliance for testing procedures).

*Example:*

**Code or Standard Name:** USB Electronics

**Code Description/Summary:** Voltage output for USB power delivery must be between 4.75 volts and 5.5 volts.

**Reference:** USB Power Delivery Specification Rev. 3.0. USB Implementers Forum Standard for USB poser deliver, Jan 2017.

**Implications to this project:** We will have to choose our thermocouple generator module such that its output is between 4.75 V and 5.5 V.

**Revision #3 (ME 497):** Updates to all Revision #1 & #2 content as applicable, plus

* House of Quality (HofQ)

For this revision, you must include

* Any updates from the first revision
* The testing procedure numbers (full listing in the Testing Procedures section of your Technical Portfolio)
* **HofQ approvals from your sponsor and MIME advisor**

**NOTE:** Changes to the HofQ in ME498 are permitted only by petition and must be approved by your advisor and instructor. **Unapproved changes will render your HofQ and project results invalid.**

**Your HoQ must be readable without a magnifying glass!** Use at least 9 pt. font for the HoQ content. Print the HoQ on 11” high by 17” wide paper, folding the paper to 11” high by 8.5” wide if necessary.

* Design Specifications

Use this section to present the detailed specifications for your final design solution and, as needed, provide additional elaboration on how the specifications were determined. The section may be organized by subsystem, assembly, or other organizational structure.

This section should include:

* Dimensioned, CAD-generated engineering drawings and/or other high-quality graphical representations.
  + Hand-generated drawings are NOT acceptable
  + Drawings should show all view perspectivesor be 3-D—a single 2-D drawing is not sufficient
  + **The level of detail should be such that a third party could implement your solutions based on information provided in this section.**
* Spec sheets for purchased components

**Subteams working on multi-team projects:** Your design specifications development process required consideration of a larger integrated design solution. Thus, in addition to your subteam’s detailed design specs, this section should also include a summary and CAD drawing of the complete integrated design; and any integration considerations impacting your specifications development process should be noted at the appropriate points.

* Bill of Material (BOM)

Your BoM should include item number, part number, quantity, name, material, sourcing information (i.e., if manufactured in-house, by whom and how; if purchased, from what company), and unit and total cost for each listed item.

Since your project details we be available to future teams it is necessary to list any donated materials that you received for your project. You should include the cost of the item as if you had purchased it but indicate that it was donated.

**Your BOM must be readable without a magnifying glass!** Use at least 9 pt. font for the BOM content. Print the BOM on 11” high by 17” wide paper, folding the paper to 11” high by 8.5” wide if necessary.

* Technical Analysis (as appropriate)

Use this section to present the various technical analyses (engineering calculations, experiments, data analyses, etc.) that supported your design specifications development. The section may be organized by subsystem, analysis area (e.g., heat transfer, fluid dynamics, etc.), or other organizational structure. One problem per page is preferred but short problems can be combined on one page. If so, draw a **dark line** between problems to separate them.

Each analyses should be presented in the following manner:

**Analyst:** Name and signature of the person who completed the analysis

**Date:** Date the analysis was completed

If an analysis is longer than one page, you MUST sign and date each page of the analysis.

**Given:** Summarize the problem at hand and given information (including relevant sketches, dimensions, variables, etc..)

**To Do:** State briefly what is unknown – What is the goal of the analysis?

**Solution:** Present the step-by-step solution to the problem. **Show all of your work!** This section should include all assumptions used to solve the problem. As you go along, include equation numbers so the reader can follow your work. Always include units as appropriate in any calculations.

**Answer:** Clearly state the answer to your analysis and include the implications to your project (ie. “From this analysis it was determined that an air flowrate of 0.4 CFM will provide a sufficient vacuum. Our proposed pump design is capable of taking up to 1.4 CFM, so this flowrate is well within the bounds of our design.”

* Testing Procedures (TP)

Use this section to present the testing procedures for verifying prototype compliance with the project ESs. This section will be updated as necessary.

Each procedure should be presented in the following manner:

**TP# and Purpose:** The purpose is a short description of the design aspect being verified by the testing procedure and the TP number should match with your HofQ.

**ES(s) Addressed:** List all ESs that are being addressed by this TP. Include both the ES number and attribute

**Test Equipment:** list all test equipment needed to perform the procedure

**Testing Procedure:** List the specific testing procedure steps presented as an enumerated set of user instructions.

**Passing condition:** List the passing condition associated with each ES being tested with this procedure

**NOTE:** Changes to any Testing Procedures in ME498 are permitted only by petition and must be approved by your advisor and instructor. **Unapproved changes will render your project results invalid.**

**Revision #4 (MIME 498):**  Updates to all Revision #1, #2 & #3 content as applicable, plus

* Testing Results with evidence

Use this section to update your testing procedures with the testing results and any design changes associated with unsatisfactory test results as necessary.

Each procedure should have the following two items added:

**Test Result:** After the tests have been completed, indicate if the test passed or failed and the actual test result

**Test Validation:** “Validation” means legible proof of reported test results. For example, a statement that “The prototype weighed 19.5 kg (43 lb)” should be accompanied by a photograph of the prototype on a scale, with the reported scale reading clearly visible. The validation may be included as a figure (or table) or as a link to online videos that have been uploaded to your team website or YouTube.

**WHAT THIS ASSIGNMENT IS NOT**

The Technical Portfolio is not an engineering notebook. While it is similar, it does not contain ideas, notes, sketches, questions, or thoughts.

**ASSIGNMENT LOGISTICS**

Assignment type: Team

Length: No length requirement

Turn in procedure: 1” three-ring binder with clearly labeled content

Due date: Revision #1 – 4pm, Thursday, October 12, 2017

Revision #2 – 4pm, Thursday, October 26, 2017

Revision #3 – 4pm, Thursday, November 30, 2017

Revision #4 – 4pm, Friday, March 17, 2017

***Required Title Page Layout***

**Project Name**

**Project Number**

**Technical Portfolio**

**Date**

**Team members:**

Team Member #1

Team Member #2

Team Member #3

**Project sponsor:**

*Organization or individual*

**Sponsor mentor(s):**

*Designated sponsor representative(s)*

**MIME advisor(s):**

*MIME faculty member(s) and/or graduate student(s)*

**Supervising instructor:**

*MIME Capstone instructor supervising your project*