

# New ME195A/B Report Writing Outline and Timeline

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*(Note: Text in red indicates the report timeline; Text in blue refers to ME195A assignments and/or their associated ABET requirements. Text in Brown refers to GE assignments in ME195A and ME195B.)*

## 1. Title Page

- a. Title of the project
- b. Team membership (indicate lead)
- c. Instructor/Advisor Name
- d. Course number (e.g., ME195B)
- e. Department name, University name
- f. Date

## 2. Abstract (to be completed in ME195B Final Report)

- a. Content (1 paragraph, 150–300 words): Target to a technical audience and focus on
  - a) **what** was the problem
  - b) **how** it was done; your methods, and/or design
  - c) **main results**, and **conclusions** without going into detailed explanations or background
- b. Tone: Formal, technical, and concise

*Abstract is used for professional/academic reports, conference papers, theses, journal articles. Helps readers quickly decide whether to read the full report.*

## 3. Executive Summary (to be completed in ME195B Final Report)

- a. Content: Written for a non-technical audience focusing on outcome and significance:
  - a) describe the problem you solved (give some context and why your work was necessary)
  - b) describe the solution to came up with (describe with appropriate figures, diagrams, and/or photos)
  - c) describe what actions are recommended or have been taken based on your work (answer the question, "So what?")
- b. Purpose: Gives an overview of key findings or main points, but may also include recommendations, background, or discussion. Especially when written for non-technical audiences like managers or sponsors.
- c. Length: 1 pages in length, multiple paragraphs, and at least one graph or figure that highlights the most important features or results of the project.

*Executive summary is used for design reports, project proposals, **internship or job interviews or reports**, capstone project documentation (audience: reviewers, sponsors, managers, etc.)*

Both an Abstract and a one-page Executive Summary are required in the ME195B final report.

## 4. Acknowledgement (to be completed in ME195B Final Report)

- a. Keep it brief and sincere
- b. One short paragraph to half a page
- c. Use a formal but appreciative tone

- d. Thank your project advisor or instructor(s) who supervised the project, industry sponsors or mentors, collaborators, technicians and staffs, funding sources (if applicable), family or friends

## 5. Tables of Contents

(Table of Contents should be initiated in ME195A and completed in the ME195B Final Report.)

- Abstract
- Executive Summary
- Acknowledgments
- Table of Contents
- List of Figures
- List of Tables
- Main Body of Report (See the sections below for details on each chapter)
- References
- Appendix

*(Note: In the following sections, placeholders such as 'XYZ' are used to prompt you to create specific titles/subtitles for your projects)*

## 6. Chapter 1 Introduction to XYZ (ME195A Report# 1)

- (1) Background and Motivation (*Mission Statement; an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics – ABET Student Outcome 1 (SO1)*)
  - e.g., market needs, community needs, new technology needs, automation needs, energy saving needs, environmental protection needs.
- (2) Project Objectives and Design Specifications (*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 -- ABET SO2*)
  - How would you tackle the problem differently from the existing methods
  - Which technologies or principles or methodologies you are proposing?
  - What specifications and results to be expected (e.g., including materials you choose, geometry, accuracy, speed, weight, capacity, constraints)
- (3) Customer Needs Summary (*ABET SO2*).
- (4) Project Significance and Uniqueness
- (5) Society and Technology (GE Area S) related to your project
- (6) Teamwork (*an ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives – ABET SO5*)
  - Clearly indicate each team member's responsibilities on the project
  - Describe how each member carried out their assigned tasks or contributed to the project

*Ideally, the team should be multidisciplinary—for example, one member specializing in design, another in mechatronics, and a third in thermal and fluid systems.*
- (7) Gantt Chart

*A Gantt chart is a type of bar chart, developed by Henry Gantt, to illustrates a project schedule from the start date to finish date. Terminal elements and summary elements comprise the work breakdown structure of the project.*

## 7. Chapter 2: Literature Review, Current Status, and Theoretical Background Related to XYZ (ME195A Report# 2)

- (1) Explain the theoretical background and engineering principles underlying the project (ABET SO1)
- (2) Existing Solutions (*an ability to acquire and apply new knowledge as needed, using appropriate learning strategies – ABET SO7*)
  - How others have addressed this problem in the past or are currently approaching it
  - The technologies or methods they employed
  - The outcomes or results they achieved
  - The limitations or shortcomings of their approaches
- (3) Technical Challenges

*Be sure to cite the reference or source for each work you list.*

## 8. Chapter 3 XYZ Design Requirements and Concept Development

(ME195A Report# 2 & 3)

- (1) Design Requirements
  - Functional Requirements
  - Performance Specifications
  - Budget and Material Constraints
  - Safety, Ethical, and Environmental Considerations (ABET OS2)
- (2) Concept Development and Selections (*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 – ABET SO4*)
  - Design Concepts Generation, Brainstorming and Initial Ideas (illustrate and options the team had come up at the early stage of ME 195A)
  - Evaluation of Concepts
  - Selected Design Justification. How the team selected the most optimal solution through:
- (3) Detailed Design and Analysis
  - CAD Models and Engineering Drawings
  - Design Calculations and Simulations (e.g., FEA, MATLAB)
  - Material Selection and Component Specifications
  - Analysis/comparison of pros and cons of all the available options (e.g., using Ansys) and show the Idea Selection Methods to support your optimal solution
  - Preliminary experiments (if needed)
  - Budget and Cost Analysis
- (4) Show how your final design is related to and meet Engineering Codes and Standards (ABET OS2)

## 9. Chapter 4 XYZ Circuitry, Microcontroller, and System Interface (if applicable)

(ABET SO4)

- (1) Develop circuitry (ME195A Report# 2 & 3), interface, and programming codes (ME195B Report# 1 & 2)
  - Explain how you designed custom circuitry or incorporated commercially available electronic components

- Include how the interface to be implemented
  - Explain how programming was developed to control your system or device
  - Describe the software, and cite the key block of codes (place the rest of codes in Appendix)
- (2) Summarize microcontroller and electronic component features (ME195A Report# 2 & 3)
- Provide an overview of the key features of the microcontroller(s) and other critical electronic components used in your design
  - Justify your selection based on project requirements
- (3) Include a functional block diagram (if applicable) (ME195A Report# 2 & 3)
- Present a clear block diagram illustrating how the electronic system operates
  - Show the flow of signals, control, and data processing
- (4) Describe system integration and data acquisition (ME195B Report#1 & 2)
- Explain how the prototype is interfaced with the electronic system
  - Specify the data acquisition (DAQ) hardware and the software used for data collection, processing, and analysis

## 10. Chapter 5 Prototyping and Fabrication of XYZ (ME195B Report# 1 & 2)

- (1) Describe the materials and processes used (e.g., 3D printing; CNC machining)
- (2) Describe the assembly procedures
- (3) Show the challenges during build/fabrications
- (4) Show the cost (economic) effectiveness of your prototype and its benefits to society (ABET SO4)
- (5) Indicate whether or not the developed prototype meets the Safety, Environment, and Engineering Codes (ABET SO2 & SO4) requirements
- (6) Overview the final system and describe any modifications from initial design

## 11. Chapter 6 Testing and Results Analyses of XYZ (*an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions - ABET SO6*) (ME195B Report# 2 & Final)

- (1) Testing Plan and Methodology
  - Show the overall of your experimental setup
  - Show how you set up different operating conditions
  - Show your methodology
- (2) Data Collection and Analysis
  - Show your data under different operating conditions
  - Analyze your data using computer (e.g., Fast Fourier Transformation, LabVIEW, MATLAB, etc.)
- (3) Discussion of Results
  - Show the testing results in figures and/or tables.
  - Indicate what does each curve or plot means, how do they indicate the functions of your prototype
  - How do these results match your specification, as well as meet your design criteria

## 12. Chapter 7 Conclusions and Future Work (ME195B Final Report) (ABET SO6)

- (1) Draw conclusions based on your design, calculations, and simulations
- (2) Evaluate your experimental results and whether they meet the design specifications
- (3) Reflect on the effectiveness of your team collaboration
- (4) Assess conclusions drawn from your cost analysis
- (5) Identify the limitations of your project
- (6) Propose potential improvements for future development

**13. Reference (All Reports) (throughout all ME195A & B reports)**

Include a comprehensive list of all resources and references consulted during the course of your project. The most commonly used citation style in senior design project reports is the **IEEE citation style**. This format is concise, numerically ordered, and widely accepted in engineering academia and industry. See: [https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE\\_Reference\\_Guide.pdf](https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf)

**14. Appendix (throughout all ME195A & B reports)**

- A. Detailed calculations
- B. Technical Drawings
- C. Programming Codes or Schematics (if applicable)
- D. Raw Data (from simulation or testing)
- E. Project Log
- F. Safety Documentation
- G. Material Features, Part Information, and Manufacturing Datasheet