



Senior Projects Guidelines

PURPOSE – STRUCTURE – SPONSORSHIP

1. Purpose of IME Senior Projects

IME senior projects are the culminating experience for IME students who plan to graduate with a Bachelor of Science degree in Industrial Engineering or Manufacturing Engineering. IME senior projects tackle significant real-world problems for which organizations need effective solutions. These projects require the students to gain deep understanding of the problem, its roots, impact, and potential solution directions, design an appropriate solution approved by the sponsors, and build a prototype or conduct initial implementation of the solution. In the process the students are required to use many methods and tools they learned at Cal Poly.

Most senior projects culminate in the design of effective processes, products and systems for manufacturing operations, supply chains, organizations that provide services at the city, county, and state levels.

Every IME senior project includes the following components.

1. Project plan for the duration of the senior project (as a report appendix)
2. Documented communication with and visits of the client organization (as a report appendix)
3. Design reviews and presentations to the project sponsors, IME faculty, industrial advisory board (IAB) members and guests, and IME peers (subject to NDA, if any)
4. Professional quality senior project report submitted to instructors and sponsors

The final senior project report includes the following sections.

1. Introduction to the problem, including problem definition and significance (business economic considerations, safety, ethics, regulations, etc.)
2. Background of the problem, consisting of the historical factors that led to the current state, and motivation for the senior project including consequences if the problem is not solved or improved
3. Detailed description of current state of the process, including time studies, process charts, quality data, layout, and other relevant information, using drawings, photos, and/or videos; Collected data organized in a searchable and modifiable database, and presented using multiple visualization methods
4. Comprehensive academic, commercial, and organizational literature review, including analysis section leading from the literature about the problem to solution directions; Literature typically includes academic and commercial articles, blogs, as well as expert, user and management interviews
5. Design of potential solutions, including design specifications, process charts, design considerations, and multiple (at least three) design alternatives; Multiple levels of physical and data automation – from manual/labor intensive to highly automated physical processing and data integration
6. Evaluation of alternative solutions, including feedback provided by stakeholders and experts, data visualization, and quantitative techniques such as hypothesis testing, design of experiments, regression, simulation modeling, decision trees and matrices, analytical hierarchy process, and goal programming
7. Impact analysis of proposed solutions using at least three economic performance measures (e.g., IRR, payback period, NPV, satisfaction survey, breakeven analysis, cost/benefit ratio), as well as ethical, diversity and sustainability impact analysis of the proposed solution(s)
8. Validated and verified solution(s) selection process, and further detailed design of the selected solution(s) in preparation for implementation
9. Prototype or partial implementation during the third senior project quarter, including detailed training and user guides
10. Recommendations of future directions, including solution implementation, scale adjustments, and industry forecast

The typical progression of senior projects is for sections 1-4 to be completed during the first academic quarter (3 months) ending in December 2024, sections 5-8 during the second quarter ending in March 2025, and sections 9-10 during the third quarter ending in June 2025.

There are many types of senior projects. Typically requested types of senior projects are listed next. The components of these project types may be modified by specific senior project client organizations.

2. Typical Industrial and Manufacturing Engineering Senior Projects

- 2.1 Manufacturing process measurement/metrics/improvement/optimization
- 2.2 Service process measurement/metrics/improvement/optimization
- 2.3 Supply chain and logistics process measurement/metrics/improvement/optimization
- 2.4 New product development
- 2.5 Information systems automation, integration, and data analytics
- 2.6 Automation of a manufacturing or service process
- 2.7 Facility layout and process design
- 2.8 Product re-design for manufacturing (DFM) including prototype and production cost estimates
- 2.9 New fixture/tooling design
- 2.10 New processing equipment design
- 2.11 New inspection equipment or inspection methods design

3. Funding

Industry-funded projects are processed through the Cal Poly Division for Research and Economic Development. The standard project cost to the client organization in academic year 2024-2025 is \$5000 + reimbursement of project expenses. Funds are typically used for travel to sponsor sites, and purchasing of project-required materials, equipment and/or software.

For small companies the standard project cost to the client organization is \$3000 plus reimbursement of project expenses.

Conducting unfunded projects requires filing a Petition for Funding Exception and approval by the senior project course coordinators and the IME Department Chair. Such projects may include faculty research projects and projects for non-profit organizations with limited funds.