

Course Syllabus

Course Title: Energy Engineering Design 2 (Component-Level Detailed Design)

Semester: Fall 2025

Instructor: Assoc. Dr. Galip Yılmaz

Research Assistants: Res. Asst. Dr. Bilge Tunçel, Res. Asst. Fatma Ahsen Aktitiz, Res. Asst. Yaşarata Korkmaz

Meeting Time: Weekly project meetings + scheduled checkpoints

1. Course Description

Design 2 focuses on the detailed engineering design of a critical component belonging to the system developed in Design 1. Students will transform conceptual solutions into manufacturable, analyzable, and verifiable engineering designs.

The course emphasizes engineering calculations, CAD development, material selection, simulation, optimization, and evaluation of performance, cost, reliability, and sustainability.

2. Learning Outcomes

By the end of this course, students will be able to:

- Translate system requirements into component-level specifications.
- Perform detailed engineering calculations.
- Develop CAD models and engineering drawings.
- Apply numerical/experimental tools (CFD, FEA, thermal, control, etc.) for validation.
- Evaluate manufacturability, safety, and cost.
- Present professional engineering reports and oral presentations.

3. Relationship to Design 1

Students must base their work on the system developed in Design 1. The selected component should:

- Play a critical role in system performance,
- Have clear functional requirements,
- Allow engineering analysis and improvement.

4. Course Schedule

Kick-off & Planning

Week 1: Course introduction, expectations, review of Design 1 outputs.

Week 2: Component selection and approval by instructor. Mini-presentations of the project ideas by each group.

Development Phase

Weeks 3–5: Requirement definition, preliminary CAD, first calculations, etc.

Week 6: Progress Meeting 1 + Report 1, 16 March

Detailed Engineering Phase

Weeks 8–11: Advanced modeling, simulations, optimization, etc.

Week 11: Progress Meeting 2 + Report 2, 11 May

Finalization Phase

Weeks 13–14: Final design improvements, report and presentation preparation, etc.

Final Deliverables

Final Presentation: 26 June mandatory presentation via poster.

Final Report Deadline: 28 June

Make-up

Make-up Presentation: 12 July

Make-up Report Deadline: 14 July

5. Grading

Meeting Notes / Participation: 10% + 10%

Report 1: 20%

Report 2: 20%

Final Report: 10%

Final Presentation: 30%

6. Expected Deliverables

- Component requirement list
- Engineering calculations
- Material and manufacturing evaluation
- CAD models & technical drawings
- Simulation/validation results
- Integration explanation with the overall system
- Poster of the project

7. Software & Tools (depending on project)

Examples may include: MATLAB / Simulink, ANSYS, SolidWorks, AVL, Python, CFD/FEA tools, etc.

8. Policies

- Attendance to meetings and presentations is mandatory.
- All engineering assumptions must be clearly justified.
- Plagiarism or copying from previous years is not allowed.
- Late submissions reduce grades unless officially approved.

9. Professional Expectations

Students are expected to work as an engineering design team. Division of labor, documentation of contributions, and professional communication are required.

10. AI Policy

Use of AI tools (e.g., ChatGPT or similar systems) is permitted only as a support tool for brainstorming, language editing, or formatting; however, all technical analysis, modeling, calculations, and interpretations must be the students' own work. Any use of AI must be clearly disclosed in the report, and students are fully responsible for the accuracy, originality, and integrity of their submissions.