

ME 407 Innovative Engineering Analysis and Design

and

**ME 408 Innovative Engineering Design and
Implementation**

APPLICATION GUIDELINE

**Çankaya University
Mechanical Engineering Department**

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INTRODUCTION

This document provides a guideline for the projects courses ME407 and ME408. Formation of student teams, assignment of projects to the teams, events for every week, project timeline, deliverables, and evaluation criteria of the senior design projects within the scope of ME 407 Innovative Engineering Analysis and Design and ME 408 Innovative Engineering Design and Implementation courses are summarized. The planned lectures (seminars) to be given as a partial requirement of ME407 and ME408 are also explained.

In this document, the "Course Coordinator" indicates the Design Projects Commission member responsible for general coordination of ME407 and ME408 courses, making the announcements and arranging the presentations. "Supervisor" means the faculty members mentoring the teams of students. "Team" indicates the group of students working on a specific project. "Sponsor" indicates the industrial company hosting the project.

1. ME 407 Timeline and Major Events

In this section, milestones of the ME 407 Innovative Engineering Analysis and Design course are explained. In Table 1, the critical events, outcomes, and deliverables related to the project activities are summarized on weekly basis.

Table 1: Tentative timeline, significant events, expected outcomes, and deliverables of the ME407 course.

Week No	Event	Expected Outcome	Deliverable / Deadline
0 (Registration Week)	Call for the Projects	Description of the projects proposed by the supervisors.	The form "Call for the Projects" to be prepared by supervisors and submitted to the course coordinator by e-mail. Deadline: End of the week
1	- Meeting of course coordinator with the students registered to ME407 - Formation of the teams, assignment of the projects - Announcement of the teams and projects		List of the students in the teams and projects assigned to each team. Deadline: End of the week
2	Kick-off Meeting: Teams hold a meeting to discuss the project, tentative timeline, and significant work packages - Discussion about TÜBİTAK Undergraduate Project Support Programs		To be prescribed by the supervisor.
3	Weekly Meeting	Literature and patent survey	To be prescribed by the supervisor.
4	Weekly Meeting	Problem definition, design specifications	Project proposal for TÜBİTAK Undergraduate Projects Support Programs
5	Weekly Meeting	Details of the project plan, work packages, and project management	To be prescribed by the supervisor.
6	Weekly Meeting: Brainstorming on conceptual design.	Alternative of conceptual design descriptions and sketches	To be prescribed by the supervisor.
7	Weekly Meetings: Discussion on conceptual design	Alternative conceptual designs	To be prescribed by the supervisor.
8	Weekly Meeting	Finalized conceptual design.	ME407 Interim Report Deadline: End of the week
9	Pitch Deck Presentations	Feedback about the project	PowerPoint Presentation document Deadline: Beginning of the week
10	Weekly Meeting Revision of the work done based on the feedback given in pitch-deck presentations.	Revised conceptual design	To be prescribed by the supervisor.
11	Weekly Meeting Design for manufacturability, material, and process selection	Detailed design calculations	To be prescribed by the supervisor.
12	Weekly Meeting (detailed design calculations)	Detailed design calculations	To be prescribed by the supervisor.
13	Weekly Meeting (detailed design calculations)	Detailed design calculations	To be prescribed by the supervisor.
14	Weekly Meeting	- Finalized detailed design - Virtual model	ME407 Final Report Deadline: Before the end of the week
17	Final Presentations Assigning Letter Grades	Feedback about the project	PowerPoint Presentation document Deadline: Beginning of the week

Formation of the teams and project assignment

The project team formation and the project assignment procedures are described below:

1. Students registered for the ME 407 course are encouraged to form teams of 5 students. Higher or lower number of students in a group require the permission of Department Chair with necessary reasoning and the consent of the supervisor.
2. Before and during the first week of the semester, teams talk to supervisors to seek an agreement on a project proposed by the supervisors. Once a team shakes hand with a supervisor, the team member names and project title information is conveyed to the “design project commission”.
3. If there are groups with less than 5 students, the design project commission may assign additional students to these groups. If a group is not engaged any project yet, considering interest of the students and the prerequisites satisfied by the students, the “design project commission” assigns these groups a project proposed by the faculty members.
4. During the formation of teams, students in Hidromek program, and interdepartmental and interdisciplinary (ID/ID) project groups will be excluded from this procedure.

ME407 Interim Report (ME407IR)

ME407IR should cover the problem definition, customer requirement, patent and literature review, existing similar products, state-of-the-art (patents, articles, novel technologies), detailed design specifications, and conceptual design. The template for ME407 Interim Report can be reached at webonline.cankaya.edu.tr and <http://me.cankaya.edu.tr/forms/>. Students should download and use these templates while preparing the interim reports.

Pitch Deck Presentation

This is a 10 minute short presentation made to the whole class and faculty members. The aim of this presentation is to inform the audience about the progress of the projects. Teams are expected to present problem definition, customer requirements, patent and literature reviews, existing similar products, state-of-the-art technologies, detailed design specifications, and conceptual design. The objective of this presentation is to get feedback from the faculty members, to improve the design. Students are strongly recommended to do a rehearsal with their supervisors before the presentations.

ME407 Final Report (ME407FR)

ME407FR must be an original technical report describing the work in all aspects. ME407FR should include the problem definition, customer requirements, patent and literature reviews, state-of-the-art review, design specifications, conceptual design, detailed design analysis, and a virtual model (solid model, Simulink model, etc.) representing the designed system. The feasibility of the physical prototype considering design-for-manufacturability should be discussed, and any measures should be presented. The template for ME407 Final Report can be reached at webonline.cankaya.edu.tr and <http://me.cankaya.edu.tr/forms/>. Students should download and use these templates while preparing the final reports.

Final Presentation

A detailed 15 min. long presentation explaining the problem, literature review, conceptual design, preliminary design, and detailed design should be given by the project teams. It should be noted that each member of the team must present at least one part of the work. After each presentation, there will be a detailed question-and-answer session (15 min), in which the faculty members will examine the team as a whole or the team members individually.

Evaluation of ME407

Evaluation of ME407 is based on performance in exams about the lecture topics, student's individual performance in the project, interim report (ME407IR), pitch deck presentation, final report, and final presentation. The reports are evaluated both by the supervisor of the team and by the other faculty members. The presentations are evaluated by all faculty members who attended the presentations. Exam is conducted and graded by the course coordinator. The weight of each items considered in the evaluation of ME407 is given in Table 2.

Table 2: ME407 Evaluation Items and their Corresponding Weights

Grading Item	Content	Individual or Team	Evaluator	Weight %
Pitch Deck Presentations	Problem definition, state-of-the-art review, design specifications, conceptual design.	Team	All Faculty Members	10
Seminar Exam	ME 407 Lecture Subjects (Lecture subjects are given in section 2)	Individual	Course Coordinator	25
Project Performance	Self-motivation, attendance to meetings, self-learning skills, team working skills, problem-solving skills of individuals. (Including Interim Report and Pitch Deck presentations performances)	Individual	Supervisor	40
Final Report	Problem definition, state-of-the-art review, design specifications, conceptual design, detailed design analysis, a virtual model representing the design, feasibility of the physical prototype	Team	All Faculty Members	10
Final Presentation	Definition of the problem, state-of-the-art review, conceptual design, detailed design analysis, a virtual model representing the design, feasibility of the physical prototype	Team	All Faculty Members	15

These percentages will be used as the basis of letter grading. After placing each item in the table, the grades will be collected over 100. If the grading scheme cannot fit into the university's official grading table, normal distribution of grade frequencies will be created.

The rubrics for evaluation of interim report, final report, pitch deck presentation and final presentation are given in Appendix A and also can be reached at webonline.cankaya.edu.tr and <http://me.cankaya.edu.tr/forms/>.

2. ME 407 Lecture (Seminar) Contents

In ME 407 Innovative Engineering Analysis and Design courses (seminars), the following subjects are covered in the lectures, and an exam is held from the lecture topics.

- a. Design Methodology
- b. Project Management
- c. Intellectual Property (IP) Management
- d. Risk and Change Management
- e. Literature and Patent Survey

At the end of the semester, an exam is given from the topics covered in the seminars (lectures). 60% of the score of this exam will be for the questions related to the lecture contents, and 40% of the score will be about the specific questions related to the projects.

3. ME 408 Timeline and Major Events

In this section, milestones of the ME 408 Innovative Engineering Design and Implementation course are explained. In Table 4, the critical events, outcomes, and deliverables related to the project activities are summarized on weekly basis.

Table 4: Tentative timeline, significant events, expected outcomes, and deliverables of the ME408 course.

Week No	Event	Expected Outcome	Deliverable / Deadline
1	Weekly Meeting (planning the implementation phase)	Implementation plan	To be prescribed by the supervisor.
2	Weekly Meeting (discussion on materials and processes)		To be prescribed by the supervisor.
3	Weekly Meeting (discussion on materials and processes, preparation of the test plan)	Selection of materials and processes	To be prescribed by the supervisor.
4	Weekly Meeting (selection and/or design of test setups)	Test plan (including setups)	To be prescribed by the supervisor.
5	Weekly Meeting (manufacturing of the prototypes)		To be prescribed by the supervisor.
6	Weekly Meeting (manufacturing of the prototypes, preparation of test setups)		ME408 Interim Report Deadline: End of the week
7	Pitch Deck Presentations		
8	Weekly Meeting	Prototypes manufactured; test setups finalized	To be prescribed by the supervisor.
9	Weekly Meeting (discussion of results of the prior tests)	Prior test results	To be prescribed by the supervisor.
10	Weekly Meeting (testing)		To be prescribed by the supervisor.
11	Weekly Meeting (testing)		To be prescribed by the supervisor.
12	Weekly Meeting (assessment of the test results and findings, discussion on any revisions on the design)	Final test results	To be prescribed by the supervisor.
13	Weekly Meeting (discussion on the finding and results)		To be prescribed by the supervisor.
14	Closure Meeting (overall assessment of the project and its outcomes)		ME408 Final Report Deadline: End of the week
17	Final Presentations Assigning Letter Grades		To be prescribed by the supervisor.

ME408 Interim Report (ME408IR)

ME408IR should contain information about the implementation and testing. Any revision on the design should also be presented here. If the project outcome is a physical prototype, engineering drawings, product tree, details of the manufacturing processes (route sheets, operation sheets, etc.) must be presented. Tests to verify the design in relation to the engineering specifications and corresponding expected results should be presented. The template for ME408 Interim Report can be reached at webonline.cankaya.edu.tr and <http://me.cankaya.edu.tr/forms/>. Students should download and use these templates while preparing the interim reports.

Pitch Deck Presentations

Teams are expected to present their implementation and testing plan in this pitch deck presentation in 10 minutes.

ME408 Final Report (ME408FR)

ME408FR should include problem definition, state-of-the-art review, design specifications, conceptual design, detailed design, implementation of the resulting prototype, and the test results. ME408FR must be an original technical report describing the work in all aspects. The template for ME408 Final Report can be reached at webonline.cankaya.edu.tr and <http://me.cankaya.edu.tr/forms/>. Students should download and use these templates while preparing the final reports.

Final Presentations

A detailed 15 minute long presentation explaining the problem, design specifications, state-of-the-art, conceptual design, analysis, detailed design, implementation, and testing should be given by the project teams. It should be noted that each member of the team must present at least one part of the work. After the presentations, there will be a detailed question-and-answer session (15 min), in which the faculty members will examine the team as a whole or the team members individually.

Evaluation of ME408

Evaluation of ME408 is based on performance in exams about the lecture topics, student's individual performance in the project, interim report (ME408IR), pitch deck presentation, final report, and final presentation. The reports are evaluated by the supervisor of the team and by other faculty members. The presentations are evaluated by all faculty members who attended the presentations. Exams are conducted and graded by the course coordinator. The weight of each item considered in the evaluation is given in Table 5.

Table 5: ME408 Evaluation Items and their Corresponding Weights

Grading Item	Content	Individual or Team	Evaluator	Weight %
Pitch Deck Presentations	Problem definition, design specifications, conceptual design, detailed design, implementation, test plan.	Team	All Faculty Members	10
Seminar Exam	ME 408 Lecture Subjects (Lecture subjects are given in section 4)	Individual	Course Coordinator	25
Project Performance	Self-motivation, attendance to meetings, self-learning skills, team working skills, problem-solving skills of individuals. (Including Interim Report and Pitch Deck presentations performances)	Individual	Supervisor	40
Final Report	Problem definition, state-of-the-art review, design specifications, conceptual design, detailed design, implementation, and the resulting prototype, test results	Team	All Faculty Members	10
Final Presentation	Definition of the problem, state-of-the-art review, conceptual design, analysis, detailed design, implementation, and testing	Team	All Faculty Members	15

The rubrics for evaluation of interim report, final report, pitch deck presentation and final presentation are given in Appendix A and also can be reached at webonline.cankaya.edu.tr and <http://me.cankaya.edu.tr/forms/>.

4. ME 408 Lecture Contents

In ME 407 Innovative Engineering Analysis and Design courses (seminars), the following subjects are covered in the lectures, and an exam is held from the lecture topics.

- a. Innovation, Entrepreneurship, Sustainable Development
- b. Engineering and Law
- c. Lifelong Learning
- d. Environmental and Social Effects of Engineering Applications
- e. The problems of the current times reflected in the field of engineering

At the end of the semester, an exam is given from the topics covered in the seminars (lectures). 60% of the score of this exam will be for the questions related to the lecture contents, and 40% of the score will be about the specific questions related to the projects.

5. General Notices

Interim and Final report Submission Details

Each group should upload a soft copy of interim and final reports to Webonline by the announced deadline. Webonline will generate a Turnitin originality report regarding the report. It should be noted that the similarity index indicated on the originality report should be less than 20%. Otherwise, it may be treated as plagiarism and be penalized.

6. TÜBİTAK Undergraduate Projects Support Programs

Students and supervisors are encouraged to apply for the TÜBİTAK grants for the senior design projects. Undergraduate level projects are supported through two different programs: 2209-A Undergraduate Students Research Projects Support Program and 2209-B Industry-Oriented Senior Projects Support Program. Details of the programs are explained in the websites below:

2209-A: <https://www.tubitak.gov.tr/tr/burslar/lisans/burs-programlari/icerik-2209-a-universite-ogrencileri-arastirma-projeleri-destekleme-programi>

2209-B: <https://www.tubitak.gov.tr/tr/burslar/lisans/burs-programlari/icerik-2209-b-sanayiye-yonelik-lisans-bitirme-tezi-destekleme-programi>

Applications for 2209-B can be made until the end of the last workday of every month of the year. Therefore, it would make sense to apply for 2209-B until the end of October, considering the timeline of the senior projects.

Applications for 2209-A can only be made twice a year (generally in March and October). According to the regulations, a student cannot apply for 2209-A in their last semester before graduation. Therefore, it would be meaningful to apply for 2209-A in October. The deadline for the applications is announced on the website of the program.

Appendix A

A1. Rubric for Evaluation of ME407IR

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. Supervisors may download and use it for grading. (Guide only)

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Structure 10%	Paragraphs are poorly organized; the use of sections is illogical and hinders document navigation	Paragraphs are usually well-organized; use of sections is logical and generally allows easy navigation of the document	All paragraphs are well-organized; use of sections is logical and allows easy navigation through the document
	Figures, Tables, and Equations 10%	Figures, tables and equations are not clearly or logically identified and fail to support the text	Some figures, tables and equations are clearly and logically identified and adequately support the text	All figures, tables and equations are clearly and logically identified and strongly support the text
	Formatting 10%	Document is formatted poorly	Formatting of the document is generally consistent and adequate	Formatting of the document is professional
	Wording 10%	Sentences are poorly written; there are numerous incorrect word choices and errors in grammar, punctuation and spelling	Sentences are generally well-written; there are a few incorrect word choices and errors in grammar, punctuation and spelling	Sentences are well-written; there are no incorrect word choices, and the text is free of errors in grammar, punctuation and spelling
	Documentation and References 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
TEKNİK İÇERİK	Overview 5%	Fails to explain the scope of the work done	Provides an adequate overview and general explanation on the scope of the work done	Provides a thorough overview and thoroughly the scope of the work done
	Problem Definition 10%	Fails to adequately explain the problem	Adequately explain the problem	Demonstrates in-depth research on the problem
	Literature Review 10%	Fails to present the state-of-the-art, no or inadequate literature and/or patent review	The literature and the patents presented adequately describe the state-of-the-art	A critical review of the literature and the patents are presented, state-of-the-art is thoroughly discussed
	Design Specifications 10%	No design specification presented	Design specifications are presented in relation to the performance of the design	Design specifications are presented and their respective effects on the performance of the design is discussed
	Conceptual Design 10%	No conceptual design presented	Conceptual design is made, but the relation with the specifications is not clearly stated	Conceptual design is made, the components/sub-systems of the design are adequately linked to specifications
	Conclusion and Discussion 5%	Fails to summarize the work, no discussion presented	Adequately summarizes the work and discusses the findings/results	Provides a thorough summary of the work and presents a critical discussion
Total: 100				

A2. Rubric for Evaluation of ME407FR

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. Supervisors may download and use it for grading. (Guide only)

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Structure 10%	Paragraphs are poorly organized; the use of sections is illogical and hinders document navigation	Paragraphs are usually well-organized; use of sections is logical and generally allows easy navigation of the document	All paragraphs are well-organized; use of sections is logical and allows easy navigation through the document
	Figures, Tables, and Equations 10%	Figures, tables and equations are not clearly or logically identified and fail to support the text	Some figures, tables and equations are clearly and logically identified and adequately support the text	All figures, tables and equations are clearly and logically identified and strongly support the text
	Formatting 10%	Document is formatted poorly	Formatting of the document is generally consistent and adequate	Formatting of the document is professional
	Wording 10%	Sentences are poorly written; there are numerous incorrect word choices and errors in grammar, punctuation and spelling	Sentences are generally well-written; there are a few incorrect word choices and errors in grammar, punctuation and spelling	Sentences are well-written; there are no incorrect word choices and the text is free of errors in grammar, punctuation and spelling
	Documentation and References 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
TECHNICAL CONTENT	Overview 5%	Fails to explain the scope of the work done	Provides an adequate overview and general explanation on the scope of the work done	Provides a thorough overview and thoroughly defines the scope of the work done
	Problem Definition 5%	Fails to adequately explain the problem	Adequately explain the problem	Demonstrates in-depth research on the problem
	Literature Review 5%	Fails to present the state-of-the-art, no or inadequate literature and/or patent review	The literature and the patents presented adequately describe the state-of-the-art	A critical review of the literature and the patents are presented, state-of-the-art is thoroughly discussed
	Design Specifications 5%	No design specification presented	Design specifications are presented in relation to the performance of the design	Design specifications are presented and their respective effects on the performance of the design is discussed
	Conceptual Design 5%	No conceptual design presented	Conceptual design is made, but the relation with the specifications is not clearly explained	Conceptual design is made, the components/sub-systems of the design are adequately linked to specifications
	Analysis 10%	Fails to provide a descriptive model (analytical or numerical) of the design (fully or partially)	A model describing the design is presented, but the solution (analytical or numerical) and/or the results are either inadequate or not reliable	A clear descriptive model of the design is presented. The solution and the results are adequate and reliable.
	Virtual Model 10%	A virtual model of the design is not presented, or the model is inadequate	An adequate virtual model is presented but the details are either missing or unclear	The virtual model presented describes all the aspects and details of the design
	Conclusion and Discussion 5%	Fails to summarize the work, no discussion presented, no discussion on feasibility of the prototype	Adequately summarizes the work and discusses the findings/results and feasibility of the prototype	Provides a thorough summary of the work and presents critical discussion on findings/results and feasibility of the prototype
Total: 100				

A3. Rubric for Evaluation of ME408 Interim Report

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. Supervisors may download and use it for grading. (Guide only)

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Structure 10%	Paragraphs are poorly organized; use of sections is illogical and hinders document navigation	Paragraphs are usually well-organized; use of sections is logical and generally allows easy navigation of the document	All paragraphs are well-organized; use of sections is logical and allows easy navigation through the document
	Figures, Tables, and Equations 10%	Figures, tables and equations are not clearly or logically identified and fail to support the text	Some figures, tables and equations are clearly and logically identified and adequately support the text	All figures, tables and equations are clearly and logically identified and strongly support the text
	Formatting 10%	Document is formatted poorly	Formatting of the document is generally consistent and adequate	Formatting of the document is professional
	Wording 10%	Sentences are poorly written; there are numerous incorrect word choices and errors in grammar, punctuation and spelling	Sentences are generally well-written; there are a few incorrect word choices and errors in grammar, punctuation and spelling	Sentences are well-written; there are no incorrect word choices and the text is free of errors in grammar, punctuation and spelling
	Documentation and References 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
Sub Total: 50				
TECHNICAL CONTENT	Overview 10%	Fails to explain the scope of the work done	Provides an adequate overview and general explanation on the work done	Provides a thorough overview and thoroughly defines the scope of the work done
	Implementation Plan 15%	Fails to present an adequate implementation plan	An implementation plan is presented, but the details (product tree, route sheets, etc.) are not clear.	A detailed implementation plan is presented
	Test Plan 15%	Fails to present an adequate test plan	A test plan is presented, but the tests are not clearly linked to the specifications and/or expected results are not clear.	A detailed test plan clearly relating each test to specifications and clearly stating the expected results is presented
	Conclusion and Discussion 10%	Fails to summarize the work, no discussion presented, no discussion on feasibility of implementation and testing	Adequately summarizes the work and discusses the findings/results and feasibility of implementation and testing	Provides a thorough summary of the work and presents critical discussion on findings/results feasibility of implementation and testing
Total: 100				

A4. Rubric for Evaluation of ME408 Final Report

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Structure 20%	Paragraphs are poorly organized; use of sections is illogical and hinders document navigation	Paragraphs are usually well-organized; use of sections is logical and generally allows easy navigation of the document	All paragraphs are well-organized; use of sections is logical and allows easy navigation through the document
	Figures, Tables, and Equations 10%	Figures, tables and equations are not clearly or logically identified and fail to support the text	Some figures, tables and equations are clearly and logically identified and adequately support the text	All figures, tables and equations are clearly and logically identified and strongly support the text
	Formatting 10%	Document is formatted poorly	Formatting of the document is generally consistent and adequate	Formatting of the document is professional
	Wording 10%	Sentences are poorly written; there are numerous incorrect word choices and errors in grammar, punctuation and spelling	Sentences are generally well-written; there are a few incorrect word choices and errors in grammar, punctuation and spelling	Sentences are well-written; there are no incorrect word choices and the text is free of errors in grammar, punctuation and spelling
	Documentation and References 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
	Sub Total: 50			
TECHNICAL CONTENT	Overview 5%	Fails to explain the scope of the work done	Provides an adequate overview and general explanation on the scope of the work done	Provides a thorough overview and thoroughly defines the scope of the work done
	Problem Definition 5%	Fails to adequately explain the problem	Adequately explain the problem	Demonstrates in-depth research on the problem
	Literature Review 5%	Fails to present the state-of-the-art, no or inadequate literature and/or patent review	The literature and the patents presented adequately describe the state-of-the-art	A critical review of the literature and the patents are presented, state-of-the-art is thoroughly discussed
	Design Specifications 5%	No design specification presented	Design specifications are presented in relation to the performance of the design	Design specifications are presented and their respective effects on the performance of the design is discussed
	Conceptual Design 5%	No conceptual design presented	Conceptual design is made, but the relation with the specifications is not clearly explained	Conceptual design is made, the components/sub-systems of the design are adequately linked to specifications
	Detailed Design 5%	A model describing the design and its solution, and a virtual model representing the design is either not presented or inadequate, details of the design (components, dimensions, etc.) are missing	A model adequately describing the design and its solution, and a virtual model representing the design is presented, but details of the design (components, dimensions, etc.) are not clearly stated	A detailed model describing the design and its solution, and a clear virtual model representing the design is presented, details of the design (components, dimensions, etc.) are clearly stated
	Implementation 10%	The report fails to adequately present how the prototype is implemented or the teams fails to implement the prototype	The prototype is partially implemented and/or the report partially explains how the prototype is implemented	The prototype is adequately implemented, the report clearly presents all implementation details.
	Testing 5%	The report fails to adequately present how the prototype is tested or the teams fails to test the prototype	The prototype is partially tested and/or the report partially explains how the prototype is tested	The prototype is adequately tested, the report clearly presents the details of the testing and the results of the tests.
	Conclusion and Discussion 5%	Fails to summarize the work, no discussion on possible improvements	Adequately summarizes the work and discusses the findings/results and possible improvements	Provides a thorough summary of the work and presents critical discussion on findings/results and possible improvements
Sub Total: 100				

A5. Rubric for Evaluation of ME407 Pitch Deck Presentation

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. The spreadsheet will be provided to faculty members before the presentations.

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Formatting, structure, visual content 10%	Presentation is formatted poorly, slides are poorly organized, figures/tables fail to support the technical content	Formatting of the presentation is generally consistent and adequate, slides are usually well-organized, figures/tables adequately support the technical content	Formatting of the presentation is professional, slides are well-organized, figures/tables strongly support the text
	Wording 10%	There are numerous incorrect uses of technical wording and terminology	There are a few incorrect uses of technical wording and terminology	No incorrect use of technical wording and terminology
	Fluency 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
TECHNICAL CONTENT	Problem Definition 15%	Fails to adequately explain the problem	Adequately explain the problem	Demonstrates in-depth research on the problem
	Literature Review 20%	Fails to present the state-of-the-art, no or inadequate literature and/or patent review	The literature and the patents presented adequately describe the state-of-the-art	A critical review of the literature and the patents are presented, state-of-the-art is thoroughly discussed
	Design Specifications 15%	No design specification presented	Design specifications are presented in relation to the performance of the design	Design specifications are presented and their respective effects on the performance of the design is discussed
	Conceptual Design 20%	No conceptual design presented	Conceptual design is made, but the relation with the specifications is not clearly explained	Conceptual design is made, the components/sub-systems of the design are adequately linked to specifications
	Total: 100			

A6. Rubric for Evaluation of ME408 Pitch Deck Presentation

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. The spreadsheet will be provided to faculty members before the presentations.

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Formatting, structure, visual content 10%	Presentation is formatted poorly, slides are poorly organized, figures/tables fail to support the technical content	Formatting of the presentation is generally consistent and adequate, slides are usually well-organized, figures/tables adequately support the technical content	Formatting of the presentation is professional, slides are well-organized, figures/tables strongly support the text
	Wording 10%	There are numerous incorrect uses of technical wording and terminology	There are a few incorrect uses of technical wording and terminology	No incorrect use of technical wording and terminology
	Fluency 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
TECHNICAL CONTENT	Implementation Plan 35%	Fails to present an adequate implementation plan	An implementation plan is presented, but the details (product tree, route sheets, etc.) are not clear.	A detailed implementation plan is presented
	Test Plan 35%	Fails to present an adequate test plan	A test plan is presented, but the tests are not clearly linked to the specifications and/or expected results are not clear.	A detailed test plan clearly relating each test to specifications and clearly stating the expected results is presented
	Sub Total / 100			

A7. Rubric for Evaluation of ME407 Final Presentations

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. The spreadsheet will be provided to faculty members before the presentations.

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Formatting, structure, visual content 10%	Presentation is formatted poorly, slides are poorly organized, figures/tables fail to support the technical content	Formatting of the presentation is generally consistent and adequate, slides are usually well-organized, figures/tables adequately support the technical content	Formatting of the presentation is professional, slides are well-organized, figures/tables strongly support the text
	Wording 10%	There are numerous incorrect uses of technical wording and terminology	There are a few incorrect uses of technical wording and terminology	No incorrect use of technical wording and terminology
	Fluency 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
TECHNICAL CONTENT				
	Problem Definition and Literature Review 10%	Fails to adequately explain the problem. Fails to present the state-of-the-art, no or inadequate literature and/or patent review	Adequately explain the problem. The literature and the patents presented adequately describe the state-of-the-art	Demonstrates in-depth research on the problem. A critical review of the literature and the patents are presented, state-of-the-art is thoroughly discussed
	Design Specifications 10%	No design specification presented	Design specifications are presented in relation to the performance of the design	Design specifications are presented and their respective effects on the performance of the design is discussed
	Conceptual Design 10%	No conceptual design presented	Conceptual design is made, but the relation with the specifications is not clearly explained	Conceptual design is made, the components/sub-systems of the design are adequately linked to specifications
	Analysis 20%	Fails to provide a descriptive model (analytical or numerical) of the design (fully or partially)	A model describing the design is presented, but the solution (analytical or numerical) and/or the results are either inadequate or not reliable	A clear descriptive model of the design is presented. The solution and the results are adequate and reliable.
	Virtual Model 20%	A virtual model of the design is not presented or the model is inadequate	An adequate virtual model is presented but the details are either missing or unclear	The virtual model presented describes all the aspects and details of the design
Total: 100				

A8. Rubric for Evaluation of ME408 Final Presentations

An Excel spreadsheet for grading, in which the following rubric is implemented, is available in ME407 and ME408 pages at webonline.cankaya.edu.tr. The spreadsheet will be provided to faculty members before the presentations.

		Does Not Meet Expectations (0 - 4 points)	Meets Expectations (5 - 7 points)	Exceeds Expectations (8 - 10 points)
FORMATING	Formatting, structure, visual content 10%	Presentation is formatted poorly, slides are poorly organized, figures/tables fail to support the technical content	Formatting of the presentation is generally consistent and adequate, slides are usually well-organized, figures/tables adequately support the technical content	Formatting of the presentation is professional, slides are well-organized, figures/tables strongly support the text
	Wording 10%	There are numerous incorrect uses of technical wording and terminology	There are a few incorrect uses of technical wording and terminology	No incorrect use of technical wording and terminology
	Fluency 10%	Fails to correctly document any sources or to utilize appropriate citation forms	Most sources are correctly documented; appropriate citation forms are generally utilized	All sources are correctly and thoroughly documented; appropriate citation forms are utilized throughout
TECHNICAL CONTENT	Design Specifications 15%	No design specification presented	Design specifications are presented in relation to the performance of the design	Design specifications are presented and their respective effects on the performance of the design is discussed
	Detailed Design 15%	A model describing the design and its solution, and a virtual model representing the design is either not presented or inadequate, details of the design (components, dimensions, etc.) are missing	A model adequately describing the design and its solution, and a virtual model representing the design is presented, but details of the design (components, dimensions, etc.) are not clearly stated	A detailed model describing the design and its solution, and a clear virtual model representing the design is presented, details of the design (components, dimensions, etc.) are clearly stated
	Implementation 20%	Fails to adequately present how the prototype is implemented or the teams fail to implement the prototype	Partially explains how the prototype is implemented or the prototype is partially implemented	The implementation details are clearly explained, the prototype is fully implemented
	Testing 20%	Fails to adequately present how the prototype is tested or the teams fail to test the prototype	The prototype is partially tested and/or the testing is partially explained	The prototype is fully tested, the details of the testing and the results of the test are clearly presented.
	Total: 100			