MARMARA UNIVERSITY
DEPARTMENT OF COMPUTER ENGINEERING

ENGINEERING PROJECT GUIDE
(GUIDELINES, DOCUMENTS, TIMETABLE)

2016

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I. INTRODUCTION

This document presents the guidelines in the preparation of the project proposal and the project reports for the courses CSE497 Engineering Project I and CSE498 Engineering Project II for the students of Department of Computer Engineering of Faculty of Engineering, Marmara University. Students have to follow the guidelines defined in this guide. Please refer to the updated version in the following web address.

http://cse.eng.marmara.edu.tr/lisans-programi/cse497-cse498-projeleri/

In addition to be an academic and personal learning experience, an engineering project gives a student an opportunity to prove his/her knowledge and skills as a professional computer scientist / engineer to execute a multi-disciplinary project. Moreover, it can be considered a path or a stepping stone to a future professional career. Therefore, a high level of independence is expected from the student in the execution of the project and in the acquisition of knowledge and skills.

1.1 Qualifications of the Courses

CSE497 and CSE498 courses are scheduled as senior grade courses which candidate senior grade (4^{th} year) graduating students are expected to take these courses. CSE497 precedes the CSE498, and only those who are successful in CSE 497 can take in the following semester. For a senior student to be able take the CSE497 course, he/she must complete/pass at least 165 ECTS credits (not including ECST credits of the summer practice).

1.2 Application Process

Students, who are promoted to the 4th grade and who are satisfying the qualification conditions, are eligible to take the CSE497 and CSE498 Engineering Project courses. On the other hand, activities for a project proposal and finding a supervisor start earlier. Students in this category (qualified to take CSE497) can apply for a project proposal. The application process starts at the end of the semester of completing 165 ECTS credits.

Students may apply for a project proposal individually or with a group. Groups can be formed by 2-3 students. The number of students in a group depends on the scope of the project and the

amount of the work. Final decision on group members is given by the supervisor. Students have to find a supervisor for their projects. Also faculty members can offer project topics to the students. In the determination of the engineering project, the student(s) and the supervisor should consult on the content of the project. After consensus on the project proposal, the student(s) and the supervisor make a verbal agreement.

1.3 Documentary and Reports (Deliverables)

During the Engineering Project courses, there are some reports which have to be prepared and to be presented to the supervisor. These reports are defined below. The order of the reports absolutely defines the process of the engineering project.

- **Project Proposal:** the document to be prepared after being promoted to the 4th grade and being qualified to take the CSE497 Engineering Project I. Project proposal defines the project and describes the methods and the approaches on the research problem. Detailed preparation guide is given in Section 2.

- **Project Specification Document:** the document to be prepared after registering to the course CSE497 Engineering Project I. It is an extended version of the Project Proposal which is expected to describe the project and the solution methodologies in detail. Detailed preparation guide is given in Section 2.

- **Project Report for CSE497 Engineering Project I**: is the final report for the CSE497 Project Engineering I. The contents and the detailed preparation guide are given in Section 3.

- **Project Report for CSE498 Engineering Project II**: is the final report for the CSE498 Project Engineering II. The contents and the detailed preparation guide are given in Section 4.

-**Project Video for CSE498 Engineering Project II**: At most 10 minutes video record that describes your project.

All documentation must be written in grammatically correct English and easy to read. Each project group will prepare a single document for all group members.

Upon agreement on the Project Proposal, the student(s) have to deliver the proposal until the deadline specified by the department (usually this is the end of the last semester where the student was promoted to the 4th grade).

The Project Specification Document is presented at the 8th week of the semester after registering CSE497 Engineering Project I course. After the project proposal, students are expected to work on the project to enlarge their knowledge on the project topic. They are expected to complete the literature review and to work on solution methodologies. Compared to the Project Proposal, the Project Specification Document should include more information on the problem area and the solution methodologies. Moreover it should narrow down the research problem and solution methodologies. It is much more detailed and solution-oriented document compared to the Project Proposal.

A report for the CSE497 Engineering Project I and a report for CSE498 Engineering Project II are delivered by the student team to the supervisor at the end of each semester. Students who pass CSE497 Engineering Project I course are eligible to take CSE498 Engineering Project II.

The deliverables and the results of the Engineering Project will be made publicly accessible. The student(s) provide their deliverables to the supervisor and the faculty member who coordinates the Engineering Project process. The reports will be listed on the webpage of the Department of Computer Engineering.

1.4 Execution Process

After registering to the CSE497/CSE498 course, students are expected to work on design and implementation of their projects in coordination with their supervisors. During each semester, meetings with the supervisor are held once a week. In these meetings both the progress of the project and the content of the project are discussed. The students are required to record the items discussed. The recorded information can be used for following the project timeline. It is also very important and useful in the preparation of the project reports.

At the end of the CSE497 Project Engineering I course, projects will be presented in the seminar room to the audience composed of faculty members, other students and guests. The students will present the objectives, methods, concepts and results of the project and will answer questions from the audience. The oral presentation, which must be given in English, is a compulsory part of the examination. In a group project, each student of the group will take part in the oral presentation. Students are also expected to prepare and submit the CSE497 Report document until the end of the semester. Evaluation process of the presentation and the reports are described in Section 1.5.

In CSE498 Project Engineering II course, students are expected to complete their projects before the semester ends. 2 weeks before the end of the semester (13^{th} week), there will be a 2-day poster presentation for the completed projects. All of the group members have to participate the poster presentation. Poster presentation and evaluation process is described in the Section 1.5. Following the poster sessions, students have to submit the projects report for the CSE498 until the end of the semester.

In addition to the projects and project deliverables, there is another requirement for the students to participate. During the CSE497 and CSE498 course semester, seminar sessions will be arranged. Each student (independent from the project group) has to participate these seminars. Participation is mandatory and absence will be a parameter in the evaluation of the grades.

1.5 Evaluation of the Projects and Project Reports

In the CSE497 oral presentations, each project group will have 15 minutes to present and defense their project including the questions and the answers section. Therefore at least 3 minutes should be reserved for the questions and the answers. Oral presentations will be performed in the 13^{th} week of the semester, specifically on Thursday and Friday. Students and faculty members have to arrange their schedule considering the events in these two days. If necessary, parallel sessions in the morning and in the afternoon will be arranged for the presentations.

Each deliverable and project will be evaluated by the supervisor and/or the faculty members-composed jury as summarized in **Table 1**. For CSE497, the 25% of the total grade will be determined and given by the jury members who participate the oral presentation. For CSE498, 30% of the total grade will be determined and given by the faculty members who participate the poster presentation. For both CSE497 and CSE498, 15% of the total grade will be accounted with student's participation to seminars.

Table 1 CSE497 and CSE498 courses evaluation

CSE497 - Evaluation	**CSE498 - Evaluation**
10% - Project Proposal and Project Specification Document [by Supervisor]	
20% - CSE497-Report [by Supervisor]	25% - CSE498-Report [by Supervisor]
30% - Work done in the semester, its validation and consistency [by Supervisor]	30% - Work done in the semester, validation and consistency [by Supervisor]
25% - Oral Presentation [by the participating jury members]	30% - Poster Presentation [by the faculty members]
15% - Attendance to the CSE497 Seminars	15% - Attendance to the CSE498 Seminars

1.6 A Sample Time Plan for the Regular Students

For CSE497 Course

- Determination of the project title and the supervisor and Project proposal submission – until the end of the last semester of completing 165 ECTS Credits (without summer training)
- Project Specification Document – until the end of 6th week of the semester that you enroll CSE497 course.
- Oral presentation – on Thursday and Friday on the 13th week of the semester that you enroll CSE497 course.
- CSE497 Project Report submission– until the end of the semester that you enroll CSE497 course.

For CSE498 Course

- Poster presentation – on Thursday and Friday on the 13th week of the semester that you enroll CSE498 course.
- CSE498 Project Report submission – until the end of the semester that you enroll CSE498 course.

II. PROJECT PROPOSAL PREPARATION GUIDE

In this chapter, the guidelines for the preparation of the project proposal are presented.

2.1 Contents of the Project Proposal

Project proposal is expected to include the following chapters. There could be some additional chapters depending on the project. Suggested content and chapters can be considered as the essential ones.

1. Aim of the project
2. Approaches to the problem solution
3. System/solution components
4. Requirements (Software/Hardware) and the tools to be used
5. Time table (draft time plan)

2.2 Format of the Project Proposal

Format of the project proposal will be declared in the next semester. Until that time, the format for the Project Report (see Section 4) can be used including the chapters defined in Section 2.1.

III. PROJECT SPECIFICATION DOCUMENT PREPARATION GUIDE

In this document, you should define aim and scope of the project clearly and precisely. Potential social and technological impacts of the project should be presented. Detailed information on the methodology, solution techniques, as well as project management and risk management plans should be given as part of the document.

3.1 Contents of the Project Specification Document

Your project specification document should include *all of the following sections.*

Title Page

This page should include:

a. Title of project in capital letters
b. Date
c. Name and ID of the student(s)
d. Supervisor(s)

Note that title page will be a separate page and the other sections will have section numbers.

1. Problem Statement

Write a few sentences (3-4 sentences) that summarize your project. Give a brief information about the problem of interest.

2. Problem Description and Motivation

Provide general description of the problem and motivation of the study in multiple paragraphs. Background and/or context for understanding the nature of the problem should be provided. You should provide answers to the following questions:

- What is the motivation for this project? Why are you doing this project?
- Is the project important or worthwhile?
- What are you planning to do?

3. Aims of the Project

Provide a bulleted list of all aims of the project. All aims should be clear and measurable.

- Project aim 1
- Project aim 2
- …….

4. Related Work

You should investigate similar projects done so far, and solution approaches that have been presented before. Compare your intended work with the existing ones; and state all differences. As a conclusion sentence, you may declare the novelties (if any) in your project, compared to the related work.

5. Scope of the Project

Define your scope precisely and completely. For example, if you are implementing a particular part of a system, explain which parts are in the scope of your project and which parts are out of its scope.

If your project is based on another project (e.g., a previous student project, an open source project, a completed or ongoing project of your supervisor etc.), clearly describe the relationship between them; and specify all required inputs and outputs from the reference project or work.

You should list all constraints and/or limits of the project clearly. You should also discuss any assumptions related to your project. For example, you may assume that you will be able to get access to currently unavailable data, or you may assume that there are no more than a thousand simultaneous users for your online multi-user software. You should try to clear up as many assumptions as possible.

6. Success Factors and Benefits

Describe how success of your project will be measured. You should provide answers for all of the following questions:

- *Measurability/Measuring Success*: Which indicators show that you have satisfied the requirements of your project?
- *Benefits/Implications*: What are the potential benefits of your project? Who will benefit from your project after its successful completion, and how?

7. Methodology and Technical Approach

Describe your approach to solve the problem. It would be preferred to demonstrate your high-level solution approach using a block-diagram. Additionally, explain any theory, known algorithms and methods that you will use (or plan to use) in your project.

Present resources (including facilities, software, hardware, specific data, people, etc.) that you need to use in order to successfully complete your project.

8. Professional Considerations

This section should include proper explanations for all items listed below:

- *Methodological considerations/engineering standards*: Include all methodological standards and/or language/notational standards that will be used (such as GANTT charts, UML diagrams, Source Code Control via Git/Subversion/etc, IEEE standards, …). Explain each related item with proper illustrations, i.e., figures, tables.
- *Societal/ethical considerations*: Explain potential impacts of the project in ethical and societal context. Specifically, in your document, you should consider *at least any 3 out of the following 6 aspects*: i) economical, ii) environmental, iii) ethical, iv) health and safety, v) manufacturability, and vi) sustainability.
- *Legal considerations*, e.g. required permissions if the developed product should come to market, including licenses, medical, financial and ethical permissions.

9. Management Plan

Describe how the project will be managed, including a *detailed time table with milestones*. Specific items to include in this section are as follows:

- Description of task phases
- Division of responsibilities and duties among team members.
- Time line with milestones: This document should include detailed project time line. The time line should contain clear and well-defined descriptions of the work that must be completed before predetermined check points. Please use Gantt chart for this purpose.
- Risk Management: You need to specify possible risks that you may encounter throughout the project. For those risks, you are expected to propose a resolution. As an example, you may assume that you will be able to access currently unavailable data, but a potential risk is that

you may never access to the intended data. How would you deal with that situation in your project?

References: You are required to add the list of references that you covered as part of your project. They can be journal papers, conference papers, books and web sites as well.

IV. CSE497 PRESENTATIONS PREPARATION GUIDE

The aim of the presentation is:

- To evaluate the projects in broader terms by a jury, thereby increasing the likelihood of an objective marking
- To make the students acquire the skills for presentation techniques and speaking to an audience.

4.1. Contents of the Presentation

The CSE497 presentation will be a summary of the "Progress Report" you are supposed to prepare. The presentation should contain the following information:

1. Definition of the problem and brief description of the project

This part answers the following questions:

- What are you doing?
- What is the motivation for this project?
- Why is the problem important?

2. Project aims

- In this part, the aims of your project will be listed.

3. Related work

- In this part, you are expected to give information about similar projects and describe how your project is related to these. You have to answer are there any novelties?

4. Scope

- Here you have to describe the constraints of your project and the assumptions that you make.

5. Methodology and technical approach

- Here you have to describe your solution approach to the problem. List any resources (including software, hardware, specific data, etc) and any theory, known algorithms, methods, etc that you are using (or you will use) to accomplish your project.

6. Tasks accomplished

- In this part, you have to describe what you have done (other than research and investigation)? Which part(s) of your project have finished?

7. *Difficulties encountered*
    - Problems and difficulties that you encountered will be listed here.
8. *Tasks to be completed in the second semester*
    - You have to describe the tasks that you plan to complete. Give a time table for these tasks. Also describe your B-plan if you encounter problems for completing these tasks.

The number of presentation slides should be between 10 and 15. The first two and the last slides should contain the following:

- First slide: Name of the team member(s), advisor with his/her academic title, name of the project
- Second slide: Agenda
- Last slide: References.

4.2. Evaluation of the Presentations

The jury will mark the group according to the quality of the verbal and written presentation as well as the quality and completeness of the project. Since all group members will have the same mark, it is important to demonstrate your work as a team product. The criteria for marking will be as follows (each item will have equal weight):

- Ability of the group members to express their points
- Quality of the slides
- The perception of the level of knowledge acquired by the group members by making the project.

It is a good idea to explain your point in your own words during the presentation. Do not simply read the slide contents as everyone in the audience can do that.

V. CSE498 POSTERS PREPARATION GUIDE

The aim of the poster presentation is:

- To evaluate the projects in broader terms by department members, thereby increasing the likelihood of an objective marking,
- To make the students acquire the skills for presentation techniques and speaking to an audience.

5.1. Contents of the Poster

- Title of the project
- Logo of the University and the Faculty
- Group member(s) and Advisor(s)
- Problem definition
- Contributions
- Methods
- Experiments and their results
- Conclusion

5.2. Evaluation of the Presentations

The department members will mark the group according to the quality of the verbal and written presentation as well as the quality and completeness of the project. Group members may have different marks, but it is important to demonstrate your work as a team product. The criteria for marking will be as follows (each item will have equal weight):

- Ability of the group members to express their points
- Quality of the presentation
- The perception of the level of knowledge acquired by the group members by making the project.

VI. PROJECT REPORT PREPARATION GUIDE

In this chapter, the guidelines for the preparation of the project report are presented.

6.1. Contents of the Project Report for CSE497 and CSE498

Project report is expected to include the following chapters. There could be some additional chapters depending on the project. Suggested content and chapters can be considered as the *essential ones.*

1. **Introduction:**

In the Introduction, the following information is given:

a. the aim of the project
b. the definition of the problem
c. related studies in the literature (in brief)
d. differences in this study compared to the literature (brief)
e. main solution approach and methodologies in the solution (the work done in the project) (in brief)
f. structure of the project report; name of the chapters and its content

2. *Definition of the Project and Literature Survey*

The definition of the project is given in detail. Related studies in the literature are presented in this chapter. The differences of the project are also presented in this chapter.

3. *Theoretical Information and Solution Methods*

In this chapter, first of all, the information on theoretical foundation of the project is presented. Then, the proposed/applied algorithms/approaches toward the solution are described. There could be algorithms, state diagrams, flow charts, UML diagrams, which describe the applied solution methods.

If there is any analysis, it needs to be presented in this chapter. If there are applied models to solve the problem, the model is described in details. The components of the system, their relationship between each other are defined and described in this chapter.

This chapter aims to describe the system/applied solution approach, rather than solving/implementing the problem. This chapter focuses on design problem of the project where the following chapter focuses on the implementation toward the solution.

4. *Implementation, Tests and Results*

In this chapter, implementation and test phases of the project are described in detail. Information on performance metrics, how to conduct the experiments and observe the performance metrics are described. Applied tests and scenarios are defined and described. Results to these tests/scenarios are given. The results have to be discussed. If there are results/data of previous studies in the literature, they have to be compared with the results of this project. Program codes, performance results, input data, output data etc. have to be attached to the report as an appendix.

5. *Conclusion and Future Work*

The proposed approach for the problem solution and the results (in terms of cost, performance, design factors, etc.) are discussed in this final chapter. The advantages and disadvantages of the solution/methods applied in the project are described. Important insights concerning the investigated project are stated in this chapter. If there is any future work which may follow this project by the same research group or others, it is also stated in this chapter.

6.2. Format of the Project Report for CSE497 and CSE498

Format of the project report is given as template. It is downloadable at:

http://dosya.marmara.edu.tr/eng/cse/documents/2016/cse497-498_documents/Project-Preparation-Guide.pdf