BILGI Department of Industrial Engineering

Senior Design Project Guide
Last Update: 25.05.2021

This document summarizes the practices of BILGI Department of Industrial Engineering on the Senior Design Project. The project calendar is described for a regular student for which the 7th semester is a fall semester, and 8th semester is the final spring semester. For irregular students, the calendar will be as similar as possible. Intended to aid the students as well as the faculty members, the document contains the following sections:

1. General Information
2. Before 7th Semester
3. 7th Semester (IE 490)
4. 7th Semester (IE 491)
5. 8th Semester (IE 492)
6. Evaluation of Projects
7. Report, Poster and Naming Format Checklist
8. Frequently Asked Questions

1. General Information

1.1 Senior Design Project

The Senior Design Project (SDP) is intended to be a capstone experience that is built on the previous three years of course work in your engineering curriculum. In the Industrial Engineering Program, SDP is administered through a two-semester course sequence, IE 490 & IE 491 and IE 492.

1.2 Resources

The main departmental resource for the Industrial Engineering program is the document you are viewing right now, which contains information on the basic SDP practices such as forming the teams, assigning the advisor and topic, evaluating the project output, etc. This document is available in the course website as well. In addition, the course syllabi for IE 490, IE 491 and IE 492 contain similar information in the standard syllabus format.

Another valuable resource is the set of three past project reports (progress and final) which were found to be successful in the previous semesters. These project sets will be available in the course websites for both IE 491 and IE 492.

1.3 IE SDP Calendar

End of 6th Semester	
Forming teams	
Selecting tentative topic	
Holding 6th semester meeting	
Summer Break for Classes	
Brainstorming / fine tuning for the project topic	
Summer meeting (not a must - applicable if advisor is assigned)	
7th Semester (IE 490, IE 491)	
Weeks 1-4	Proposal submission
Weeks 5-6	Revised proposal submission (if asked to revise)
Weeks 1-15	Weekly meetings with advisor
End of classes	Sending the progress report and a draft presentation to the advisor
End of semester	Delivering progress presentation
Winter Break for Classes	
Potential meeting(s) with and without advisor based on the progress	
8th Semester (IE 492)	
Weeks 1-15	Weekly meetings with advisor
End of classes	Sending the final report and a draft presentation to the advisor
End of semester	Delivering final presentation

1.4 Who is who?

IE 490/491/492 Coordinator

The role of the IE 490/491/492 coordinator is to facilitate the flawless organization and execution of the projects. The coordinator's main tasks include organizing informative meetings before 7th semester, assisting formation of project teams, maintaining the course website for announcements and timely execution of project stages (such as finalizing team-topic-advisor matches; collecting project proposals, progress reports, final reports, posters, presentations), entering the letter grades recommended by the examination committee, and archiving all project outputs. Currently the coordinator for IE 490/491/492 is U. Mahir Yıldırım.

IE 490/491/492 Assistant

A student assistant helps the coordinator for archiving the project material.

Project Advisor

The role of the project advisor is to advise, guide and direct the students in a properly and timely manner from beginning to completion of the project. All IE faculty members, including the part time instructors, are potential advisors. See Section 2 (Before 7th Semester) on how the advisor-team matching is done.

Examination Committee

The examination committee includes all IE faculty members. At the end of both semesters, the committee evaluates the projects based on the oral presentations and project reports. For details of the evaluation, see Section 5, Evaluation of Projects.

2. Before 7th Semester

Prerequisites & Conditions

You need to satisfy the following prerequisites & conditions in order to be eligible to take IE 490 and IE 491;

Prerequisite (*You should pass the course*)
- IE 321 - Production Planning and Control

Conditions (You should take the course at least once, regardless of passing or failing the course)
- IE 335 - Optimization Methods II
- IE 341 - Modeling and Simulation

Project Topic

Choosing a proper topic is perhaps the most important step towards a successful SDP. The topic must reflect the coursework in the Industrial Engineering Program, and the project output must be a system design addressing a complex engineering problem. We strongly advise the students to think about suitable topics in the earlier years of the program. There is no standard way of choosing a topic. In the past, we were happy to see that successful projects came from very different directions. Here are some examples:

- Students bring a topic from the company/organization in which they did their summer practice.
- Students approach a company/organization in which they believe they can make a difference, and ask for a potential project topic.
- Students bring a topic from their family company.
- Students work on a problem of their own company/initiative.
- Students work on a research problem (role of advisor is very significant here, recommended for students planning to pursue an academic degree)
- Advisor has a contact in a company/organization.
- Advisor involves the team in a part of his/her research project.
- Many more…

Forming the Teams

The coordinator sets a meeting with all 3rd year students in the spring semester, which is the 6th semester for a regular student. In this meeting, the SDP process is briefly explained, and students are asked to form teams by the end of the semester. Team size may vary from semester to semester. Currently, the teams are required to consist of five students. The students report the team members to the coordinator, along with a tentative topic.

Team-Topic Match

As indicated above, the teams formed in the 6th semester also specify a tentative project topic. This topic may change later on, no problem. Moreover, if a specific topic is not available, you may specify an *area* that you wish to work on. Your choice of topic/area may helps us assign the proper advisor for your project. Choosing the topic in your 6th semester is very advantageous since you may start doing some early work with your advisor during the summer break before IE 491.

Assigning the Project Advisor

Once the team-topic/area list is complete by the end of the 6th semester, the coordinator sets a meeting with the Examination Committee to discuss the best possible allocation of advisors. After this meeting the coordinator immediately announces the *team-topic-advisor list*. This list is still not final since some students may not be eligible to take IE 491 in the fall semester. However, we aim to make very minor changes after this point. Teams are expected to arrange a 6th semester meeting with their advisor.

Summer Break Before the Project

Teams that are assigned an advisor are recommended to start brainstorming about the project during the summer break with their advisor. A significant progress in the project proposal will help the team for a smooth start in the fall semester.

3. 7th Semester (IE 490)

With this course, the students are expected to gain an experience in conducting experiments, collecting data, analyzing the data, interpreting results and applying modern design methods for this purpose in a teamwork environment. These skills will help the students in their Senior Design Project which is intended to be a reflection of a three-year of educational and practical work that the students complete in their fields.

As teamwork is a must in this course, the students who are not registered to IE 491 cannot take IE 490 beforehand even though they might be eligible.

4. 7th Semester (IE 491)

Final Team-Topic-Advisor List

At the beginning of the 7th semester, the coordinator sets an IE faculty meeting in order to make the final adjustments on the team-topic-advisor list, only for the required cases. After this point, no changes are allowed for teams and advisors.

Project Proposal

A project proposal is intended to convince others that you have a worthwhile research project and that you have the competence and the work plan to complete it. Generally, a project proposal is a document containing all the key elements involved in the research process such as the project name, team members, advisors, project description, main research question, proof of background for completing the promised tasks, time table, etc.

With the help of their advisors, all teams are required to submit a project proposal within the first four weeks of the 7th semester to the SDP coordinator. Changes in the topic are allowed at this point. The coordinator then sets an IE faculty meeting to evaluate the proposals. If a proposal is approved, the coordinator enters the team-topic-advisor details to SIS, and no further changes are possible throughout the IE 491/492 sequence. If a project proposal is rejected or requires revision, the team has two weeks to submit another proposal.

Project Proceeds

After the approval of the project proposal, teams may formally proceed with the project. Weekly team-advisor meetings are held. Note that other than the meeting with the advisor, the team will need to meet within the week as well.

Advisor's Approval for Progress Report and Draft Presentation

By the last week of classes, teams submit a progress report and a draft presentation to their advisors. This is critical to be able to get feedback from your advisor before the end of semester oral presentation. As you might get multiple revisions, it would be wise not to leave things to the last minute.

End of Semester Oral Presentation

By the end of the semester, the coordinator sets presentation sessions for all teams. This is typically two half days in or after the final exam week, and each team is given 10-15 minutes for presentation and five minutes for questions from the audience. The presentation schedule is announced by the coordinator before the presentation day(s). Teams upload their presentation materials and progress reports on the course website as well.

Progress Report

Before coming to presentation session, teams upload their IE 491 progress reports to the course website, and submit one plastic binded hard copy of the progress report (Figure 1) to the coordinator during the session. Plastic binding is accepted only for IE 491.

Figure 2. Sample plastic binded hard copy of the report

Winter Break For Classes

Depending on the progress, the advisor may assign additional tasks to the team, and schedule meetings during the winter break.

5. 8ᵗʰ Semester (IE 492)

Project Proceeds

All successful IE 491 teams register for IE 492 in the next semester and proceed with the project with the same advisor and topic. Teams meet with their advisors on a weekly basis.

Advisor's Approval for Final Report, Draft Presentation, Draft Poster

By the last week of classes, teams submit a final report and a draft presentation to their advisors. This is critical to be able to get feedback from your advisor before the final presentation. As you might get multiple revisions, it would be wise not to leave things to the last minute.

Final Presentation

Just like IE 491, IE 492 concludes with presentation sessions and submission of final project reports. In IE 492, teams are allowed between 10-20 minutes for presentation and five minutes for questions. The presentation schedule is announced by the coordinator before the presentation day(s).

Please note again that the students are highly encouraged to attend all the presentation sessions. Participating in all presentations is an essential part of IE 491/492.

Final Report

The teams are expected to submit a professional final report. The ingredients of the progress report (literature survey etc.) will also be utilized for the final report.

As the system, process or product addressed in the project should
- have multiple components and includes various subsystems,
- concern more than one discipline.
- require solving complex problems for its analysis and design,
the final report should reflect these points.

Also, the project should be designed under the following realistic constraints and conditions (all or that apply) which should be discussed in a separate paragraph in the conclusion section;
- Economic Considerations
- Environmental Considerations
- Sustainability
- Applicability
- Ethical Considerations
- Social and Political Considerations

The above is guaranteed for each project with the help of the checklist in the *Final Report Cover & Approval Page*.

One day before the presentation session, teams upload their IE 492 final reports to the course website. At the beginning of the presentation session, you are also required to submit a plastic spiral binded hard-copy of your final report (Figure 1) to the course coordinator using the cover and approval page templates on the course website. After the presentations, potential revisions and the approvals (with signature) of your advisor and the department head, you are required to submit a

carton binded hard-copy of your final report (Figure 2) to the course coordinator. Any missing signature on the submitted report will cause an incomplete grade.

Figure 2. Sample binded hard copy of the final report

Poster

In addition to the presentation and final report, in IE 492 the teams are required to submit a poster in electronic format. That poster should also be included as the last slide in the presentation (you can paste a screenshot in case the poster is large in size).

The poster should include the project title, logos of BİLGİ (you can find high resolution logos here: https://tbl.bilgi.edu.tr/brand-resources), the name of the department and the name of the company. It should be prepared in portrait (not landscape) orientation and in a high resolution so that it can be printed in A1 size (594 x 841 mm). You can find poster samples in Figure 3.
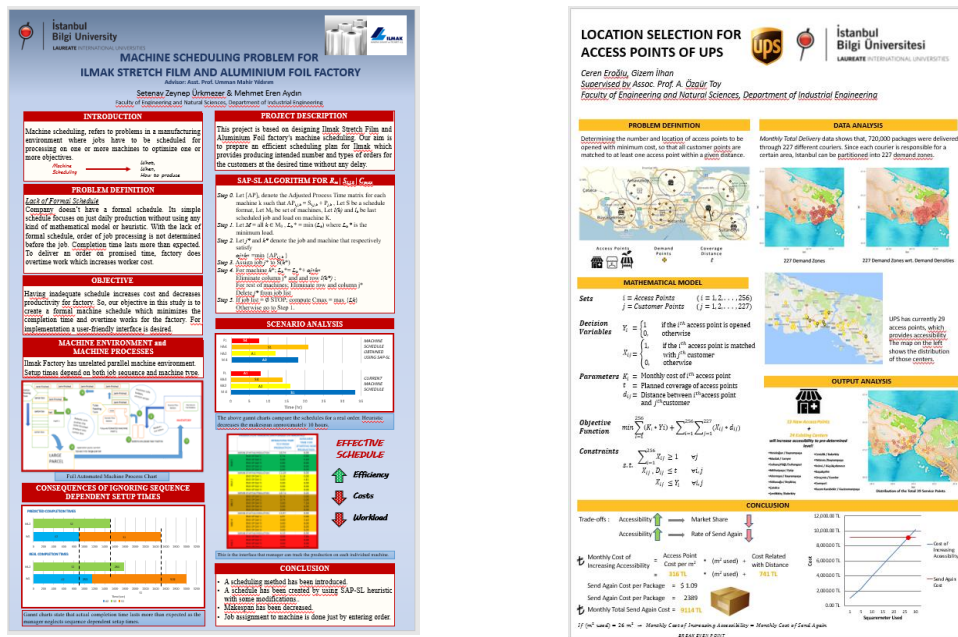

Figure 3. Sample posters

Design matters but you do not have to use an advanced graphics editor software (Photoshop, Adobe Illustrator etc.). A popular and easy-to-use option is Microsoft Powerpoint.

Note that you do not need to print your poster yet as only a selected number of teams will be asked to print their posters which will be hanged for a year on the ground floor of building E3.

6. Evaluation of Projects

The senior design projects are evaluated based on the following components.

Contents of the Study

The teams are expected to design, develop, implement and improve an integrated system including people, materials, information, and equipment in the project. In addition, they are expected to use and justify appropriate analytical and experimental methods and calculation methods to ensure the integration of the relevant system. Finally the y are expected to interpret the results and output of the models used and present some insights. The contents of the projects are evaluated in line with these expectations.

Presentation

The team is expected to deliver a good presentation including an introduction, a stated objective, a body with supporting material, and a definite conclusion. The delivery (eye contact, volume, nonverbal body language, not reading from notes, slides) and the language used (appropriate and clear) are taken into account as well as the capability of addressing and answering questions adequately.

Report and Poster Format

The submitted reports will be evaluated by the advisor not only based on the format (see Section 7) but also on their ability to convey the problem definition, system design, improvement and application steps successfully. The poster will also be evaluated in a similar manner.

Term Evaluation

This topic will be evaluated by the advisor based on the individual performances of the team members within the semester based on the following;
- Carrying out the given tasks effectively and efficiently in parallel with the time plan
- Attendance and contribution to the weekly meetings within the semester
- Being a team player and contribution to the team work

Final Letter Grade

Please note that the presentation, contents of the project and the work done will be evaluated by all the members in the Examination Committee whereas the report and poster format and term evaluation will be done by the advisor.

The Examination Committee uses the *IE SDP Evaluation Form* for evaluation and gives you a letter grade. Combining this with the evaluation of the advisor for individual performances within the semester, the final letter grades are obtained. Not every team member necessarily gets the same

grade. Advisors may give peer evaluation forms to team members, in which students evaluate each other's performance. These peer reviews may contribute to your letter grade. Note that IE 490, IE 491 and IE 492 are 4, 5 and 9 credits respectively, so they have strong influence in your CGPA.

Top Projects

The Examination Committee ranks the projects, and the team (or teams) with the highest score is asked to print their poster to be exhibited in the E-3 building for one year. The best project is also awarded a certificate.

7. Project Report and Naming Format Checklist

The students are expected to use the following checklist as a guideline. The checklist should not be included in the report or be submitted separately.

PAGE SETUP

Margins Top, Bottom, Left, Right	: 2.54 cm	☐
Orientation	: Portrait	☐
Paper Size	: A4	☐

FONT

Font		: Times New Roman	☐
Size		: 12 pt	☐
Font Style	1st Level Titles	: Bold, UPPERCASE	☐
	All Other Titles	: Bold, Each Word Capitalized	☐
	Paragraphs	: Regular	☐

PARAGRAPH

General Alignment		: Justified	☐
Indentation	Titles (all levels)	: Left: 0, Right:0, Special: None	☐
	For the 1st paragraph after each title	: Left: 0, Right:0, Special: None	☐
	For the following paragraphs	: Left: 0, Right:0, Special: First line By:0.63 cm	☐
Spacing	1st Level Titles	: Before: 24, After: 12, Line Spacing: 1.5 Lines	☐
	2nd Level Titles	: Before: 18, After: 6, Line Spacing: 1.5 Lines	☐
	All Other Titles	: Before: 12, After: 0, Line Spacing: 1.5 Lines	☐
	Paragraphs	: Before: 0, After: 6, Line Spacing: 1.5 Lines	☐

Ordering of the pages and sections (not limited to) ☐

Cover (use the template)

Checklist (to be filled by the advisor)

Approval Page (make sure that all the members have added their (online-scanned) signature to the approval page)

Table of Contents

List of Figures

List of Tables

List of Symbols/Abbreviations

Abstract

Introduction

Chapter X

Conclusion

References

Appendices (if any)

Figures and Tables

Every table and figure should be captioned (Figure 1, Table 3 etc.) and well referenced within the text. ☐

Referencing

Use APA style for references. ☐

Every study referenced in the body should be listed under *References.* ☐

Every listed study under *References* should be referenced within the body of the report. ☐

NUMBERING THE TITLES ☐

1. FIRST LEVEL TITLE

1.1. Second Level Title

1.2. Second Level Title
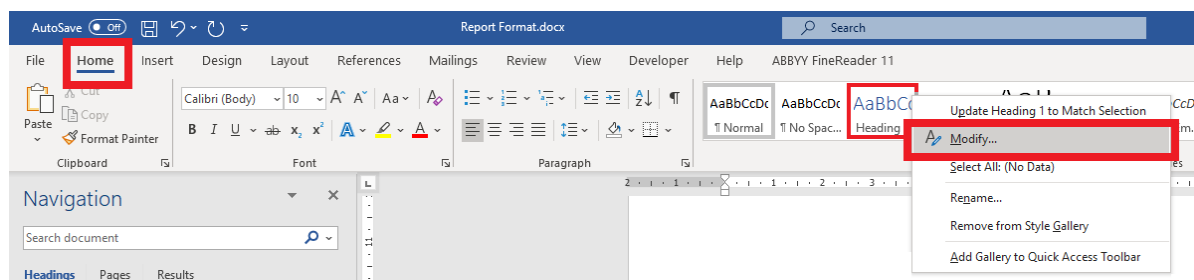
2. FIRST LEVEL TITLE

2.1. Second Level Title

2.1.1. Third Level Title

2.1.2. Third Level Title

2.2. Second Level Title

* Note that when you must, modify the headings to comply with the above format.

Do not use any logo or image on the cover page other than the BİLGİ logo that is already there. ☐

POSTER

The poster should;

- be a separate file, ☐
- be in portrait setup, not landscape, ☐
- have a resolution enough to be printed as size A1 (594 x 841 mm). ☐
- include the project title, logos of IBU, the name of the department and the name of the company ☐
- be added as a screenshot at the end of your presentation. That is, the last slide of your presentation will be your poster. ☐

Naming the Files to be Submitted

Please refer to the following naming rules for your report, presentation file and poster. Pay attention to the blanks!

IE 492 - Final Report - PXXXX-XX.pdf ☐

IE 492 - Presentation - PXXXX-XX.xxx ☐

(any file format you want. Just make sure that it works smoothly on a Windows OS computer)

IE 492 - Poster - PXXXX-XX.xxx (any file format you want) ☐

The following file names are **not OK**;

PXXXX-XX-FinalReport.pdf   PXXXX-XX-Report.pdf
PXXXX-XX - Senior Design Project Report.pdf CompanyName-Final Report.pdf
IE492-FinalReport-PXXXX-XX.pdf   IE 492 - Final Report.pdf
IE 492 - FINAL REPORT.pdf   IE 492 - FINAL REPORT - PXXXX-XX.pdf
sonnnnn.pdf   IE 492 – Final Report – v2.4.pdf
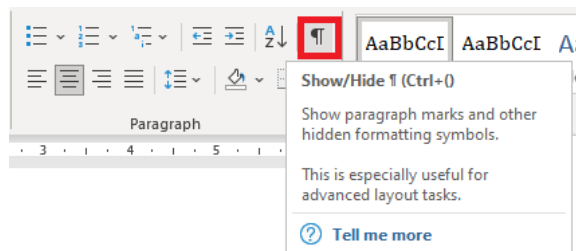P1920-16 SON HAL 01.06   1920-16 Poster Güncel.jpg

Suggestions

- Learn how to use section/page breaks.

Make use of *Show/Hide* format button. It will become handy especially when managing the breaks.

- Generate Table of Contents automatically which will be dynamic. To do that, you must utilize the appropriately formatted headings .

- Generate List of Figures and List of Tables automatically. To do that, you must learn how to manage captions (Under references tab).

- Use automatic caption

- When using a logo/image, try to use a high quality one and pay attention to the width/height ratio while scaling.
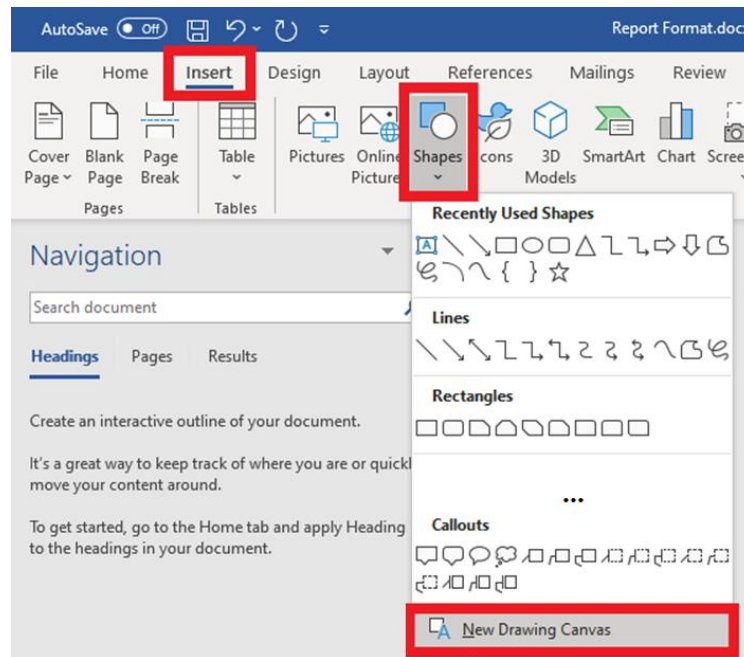

vs

vs

- When working with shapes, make use of Drawing Canvas. This will make handling figures much more easier.

8. Frequently Asked Questions

Can I register for IE 490/491 and one of the prerequisites or conditions (for the first time) at the same semester?

No.

Can I take IE 490/491 in the spring semester and IE 492 in the fall semester?

Yes.

Can I take IE 490, 491 or 492 in the summer school?

IE 490/491 is not offered in the summer. Depending on the availability of the advisor and the team members, IE 492 may be offered in the summer.

Can the team members change at the beginning of 7th semester?

If necessary, small changes can be made when possible.

Do all the team members get the same letter grade?

No.

If one or more student fails in either IE 490 or IE 491, what happens to the remaining team member?

The passing team members register for IE 492 and complete the project. The failing ones register for IE 490 and/or IE 491 (depending on which is failed) the whole procedure starts all over.

Can I change my project topic at the beginning of 7th semester?

Yes. The project topic will be fixed after the approval of your proposal.

Can I change my project topic at the beginning of 8th semester?

Even though there might be slight changes in the work packages, the whole project topic cannot be changed after the approval of your proposal.

I am currently not eligible to register for IE 491 but I will take some of the prerequisite/condition courses in the summer school. Can I still write my name in a group?

Yes. That's why it is a "potential teams" list. Please let your team know about your situation in that case.