



IE477 - IE 478 Systems Design

GENERAL INFORMATION AND SCHEDULE

Course Coordinators:

Dr. Savaş Dayanık

Dr. Nesim Erkip

Dr. Emre Uzun

Administrative Coordinator:

Yeşim Gülseren

Teaching Assistants:

Sena Aslı Bozkurt

Kaan Çakıroğlu

Defne Tan



Characteristics

- This is the capstone project course series
 - Different than other courses in the curriculum
 - Design a system to solve a real-life problem
 - Analysis – Synthesis
 - Communication
 - Team work
 - Group Members
 - Industrial Advisor
 - Academic Advisor
 - Course Coordinator
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Industrial Project

- Solve a real-life problem and implement the proposed solutions.
 - The topic of the project can be anything, as long as an IE expertise in modeling and solution is required for a good (better) implementation than the current one.
 - Typical functional areas
 - Supply chain management
 - Manpower scheduling
 - Maintenance
 - Forecasting
 - Energy or health applications
 - Financial engineering and cost control
 - Production planning, scheduling and control
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Explanations – CAPSTONE

- Currently, your strength is “engineering education”
 - Never forget or leave aside your strengths
 - Your main advantage over the other fields is to work as an Engineer – numbers, facts, abstraction, measurement
 - “**Analyze**” in this course implies the use of your engineering background.
 - Your current background – All required courses are finished + electives + current courses
 - Any diversion from above requires more effort
 - **Capstone** – Bring together all your previous knowledge + methods of inquiries + critical thinking + ability to learn and apply +
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Explanations – CAPSTONE

- IE Capstone Project – more specifically
 - Prerequisites: IE 303, IE 325, IE 375 and *others*
 - Text Books for all courses – First thing to read
 - ~ 60% of the your work in IE 477 and IE 478 can be handled
 - References in the text book – a good start to go further
 - Additional references are available on the course web page
 - Get support + advice from current TA's of other courses (Check out the list on the department web page)
 - Designing a system means a preparation to **repeatedly implement the proposed approach over time, under almost all conditions**
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Industrial Project

- The following steps will be taken:
 - **Analyze/collect general (less detailed) system data** to understand the system and the problem
 - Define the scope of the project and the solution approach
 - **Access information** and do **literature survey**
 - Formulate the problem - a model or models - and identify potential alternative or backup solution strategies (Plan B)
 - **Verify** the models using appropriate software
 - What is **verification**? Check out the note on the course web page
 - **Validate** the models and do benchmarking
 - What is **validation**? Check out the note on the course web page. You will **NEED detailed data**.
 - Implement the proposed system via a **pilot study**
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Industrial Project

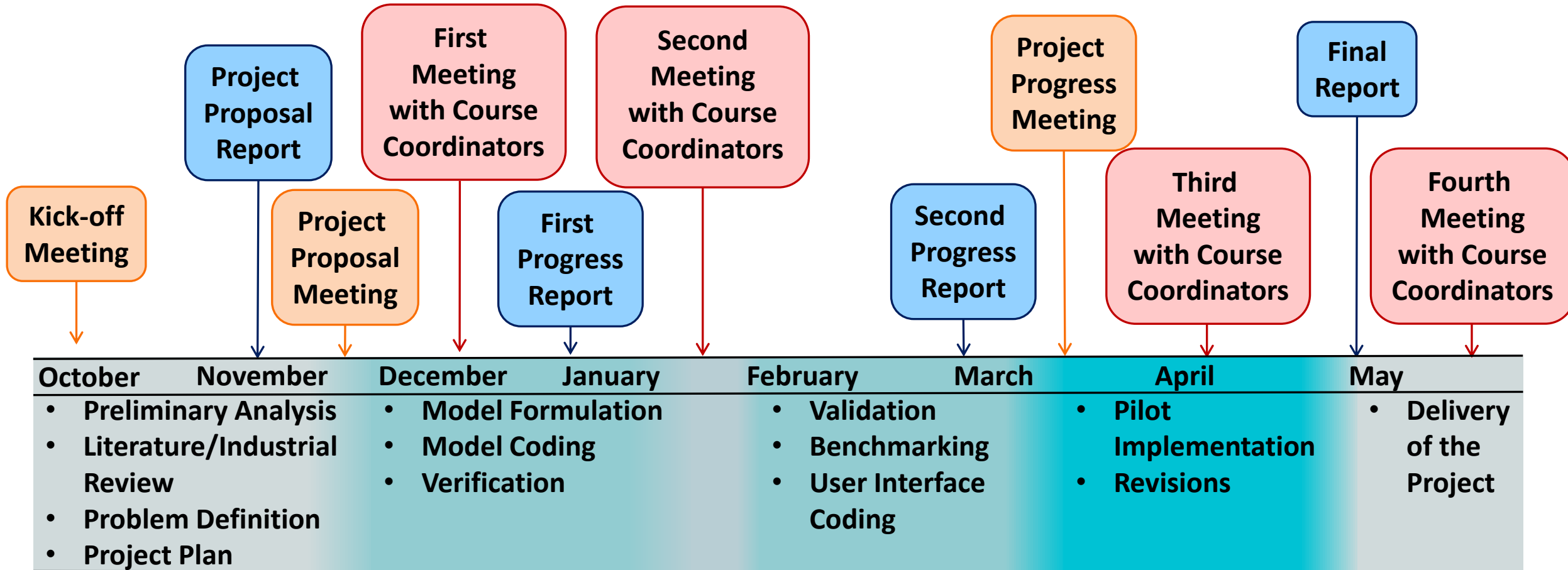
- You will also learn:
 - Effectively use **group work**
 - Prepare **reports and presentations** to explain ideas
 - Practice **professional and ethical responsibilities**



Ethical and Professional Responsibility

- Projects are important for the reputation of Bilkent IE Department
 - Companies are your potential employers or partners in the future
 - Ethical and Professional Responsibility:
 - Your **commitment** to signed agreements – non-disclosure of data, information + any additional requirements by the company
 - Your **responsibility** to carry-out oral and written promises made
 - Your manner and behavior while communicating within the group, with advisors and coordinators, etc – be formal
 - Any information source or material from literature should be cited
 - Technical results should be clear and reproducible
 - Any violation by any group will affect all of us, our reputation and value of your Bilkent University diploma
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Roadmap





Project Proposal Report (Late Oct to Early Nov)

- Complaints and symptoms from the company
- Required outcomes, expectations: **Deliverables**
- Project constraints and limitations



Definition and Scope of the Problem - CONSENSUS
Go beyond the initial description!!
Main project activities: Workpackages, Timetable



First Meeting with Course Coordinators (Nov 27, 29, Dec 2)

- You will prepare a presentation video and upload it by Nov 22
 - A short version of the proposal presentation to course coordinators
- In the meeting you will be asked questions about the project and your proposal
 - To enable coordination between projects



First Progress Report and Second Meeting with Course Coordinators

- Brief definition of the Problem
 - Literature Review
 - Previous studies in the scientific literature
 - Similar Studies in the industry
 - Proposed Methodolgy
 - Model Development and Verification
 - Timetable
 - You will upload a video by Jan 3. However you will also present LIVE during the meeting.
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Other Info

- Information on the previous projects
 - <https://w3.ie.bilkent.edu.tr/en/about/industry-collaborations/>
 - Course web page
 - <https://courses.ie.bilkent.edu.tr/ie477/>
 - **Home:** Announcements
 - **Course Info:** Syllabus, Grading Information, Project Assessment Criteria
 - **Roadmap:** Details of the Main Activities
 - **Calendars:** Course Calendar, Meeting Room Calendar
 - **Documents:** Related to the Course Contents and Forms
 - **Projects:** Project List, Assignment, Project Management System
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Important

- All documents related to reports, meetings and presentations are available on the course web page.
 - You are advised to take a look at these documents well in advance to plan ahead.
 - Each student is responsible from the material posted on the course web page – hence you are expected to read and understand.
- Check the course web page frequently for announcements/updates.



Important

- You will find a report template on course web page.
 - We will use the $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ template for all reports



Important

- **Attendance** to all of the workshops and seminars is **mandatory** from the beginning of the semester!
- **Punctuality** is very important!
 - *“If you're early, you're on time. If you're on time, you're late.”* — Lik Hock Yap Ivan
 - *“Better three hours too soon than a minute too late”* — W. Sheakespeare
 - *“Never leave to be on time to be on time.”* — Brian Spellman

Hence;

- **Submit all of your requirements on time.**
- Be ready for any meeting at least 10 minutes before the scheduled time.



Important

- Time to devote to the project is **significantly more** than a regular course
 - Too much course load is not desired
- Part-time Jobs, Internships
 - IE 477 – IE 478 Systems Design Disclosure of Internship and Part-Time Work Form
 - Summarize: No excuses for not being a full-time student.
 - You have to attend all meetings with your advisors and coordinators!
 - Prevent a potential CONFLICT OF INTEREST. Ask us if needed.
 - Fill in the form on the course web page and submit a pdf to the course TA's via email TODAY by 17:00.



Upload / Naming Principles

- You will upload a lot of documents to the links provided.
- Your **file names** must contain your 4-5 character project **short-code** along with its purpose:
 - Example from previous years:
 - Arçelik Bolu Pişirici Cihazlar Fab: ARBOL
 - BSH Ev Aletleri: BSHE
 - ETİ Talep Tahmin: ETIT
 - DHL Depo İyileştirme: DHLD
 - File name could be: ARBOL-ProposalReport



Writing Principles

- Please state your
 - **Project Short Code**
 - **Team number**
 - **Project title**
 - **Names of the team members** (always in alphabetical order of the last names)
 - **Academic and industrial advisors**in all of the written documents that you submit.
- The $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ template will automatically add these.

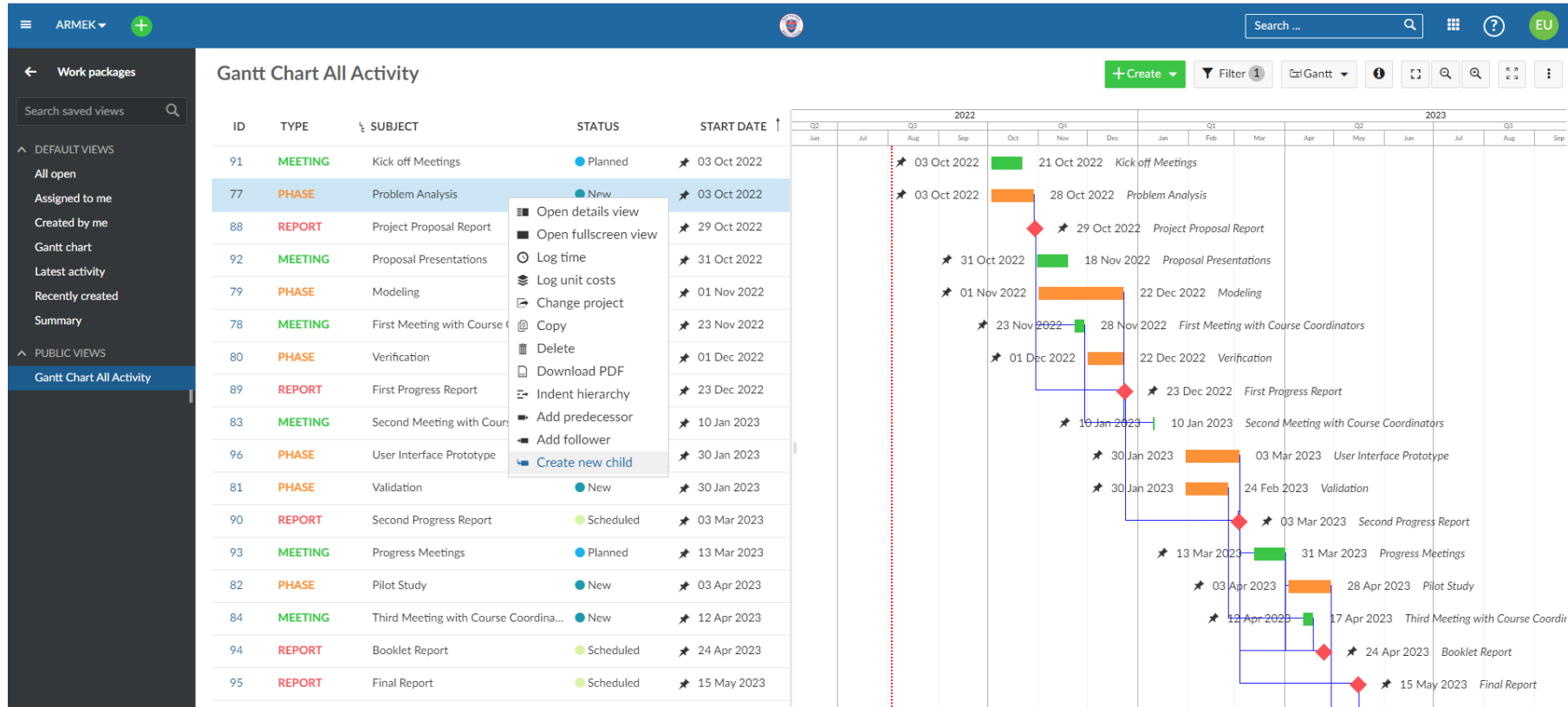


Project Management

- **Project Plan**
 - Tasks, phases, milestones, etc.
- **Time plan**
 - Deadlines, due dates, deliverables
- **Resource Allocation**
 - Team work
- **Coordination**

Project Management

- We will use an online Project Management Software





Project Management

- Project Management System
 - All project related tasks, task assignments, outcomes will be posted
 - Each student must have a **task** in each **phase** of the project
 - All meetings with your IA and AA (meeting agenda and minutes)
 - Your CC, AA and IA will have access to this system to monitor your progress
- More details available on the course web page



General Meetings

- This semester there are 4 general meetings, 2 workshops scheduled*:
 - **Sep 18 (Today):** Introduction and General Schedule, Team Formation
 - **Sep 25:** “Capstone Project – How to approach?”, Details on Industrial Projects
 - **Oct 2:** Details on Administrative Processes
 - **Oct 23:** Workshop
 - **Dec 4:** General Feedback on Progress
 - **Dec 11:** Workshop



Capstone Projects Assessment Criteria

- System design:
 - **Model development and validation:** The proposed model can be an optimization, statistical, database, marketing or simulation model.
 - **Consideration of alternatives:** Extent to which the team demonstrated critical thinking in the design process.
 - **Scenario / what if analysis:** Model usage for changing environments.
 - **Creativity:** Extent to which the team developed a novel solution to the design problem while still achieving a functional design.
 - **Technical competencies:** Extent to which and validity of the technical aspects have been used properly, including methods, tools and techniques.
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Capstone Projects Assessment Criteria

- Success of the design:
 - **Attainment of project deliverables:** Extent to which the goals of the project and end-user specifications have been met.
 - **Benchmarking:** A comparison of the current and proposed systems should be provided along with a cost/benefit analysis.
 - **Implementation and system integration:** Extent to which the proposed system is successfully implemented and integrated into the existing system. (If not applicable a detailed implementation plan and a pilot study should be provided.)
 - **End-user evaluation and assessment:** A written statement from the industrial advisor(s) evaluating the project.
 - **Impact on the organization:** Effect of the proposed system on the organization in large (financial impact, affect on company's operational policies, etc.).
 - **Global and societal impact:** Consideration
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Grading

- Grading is based on evaluations on:
 - **Reports**
 - Project Proposal Report
 - First Progress Report
 - **Meetings and Presentations**
 - Proposal Presentation
 - First Meeting with Course Coordinators
 - Second Meeting with Course Coordinators
 - **Group dynamics**
 - Academic/Industrial Advisor Individual Evaluation
 - Peer Evaluation
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Grading

- You will not see individual grades for these evaluations
 - **Feedback** during the semesters
 - **Letter grades** at the end of each semester
 - What might land you on a lower letter grade?
 - Not participating to key parts of the project
 - Not providing a satisfactory answer to questions about your project
 - Not attending to meetings
 - Not submitting required documents on time
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Effect of Peer Evaluation

Grup AA	Student A	Student B	Student C	Student D	Student E	Student F	Student G	AVG.
Student A		5	5	5	5	5	5	5.00
Student B	5		5	5	5	5	5	5.00
Student C	5	5		5	5	5	5	5.00
Student D	5	5	5		5	5	5	5.00
Student E	5	5	5	5		5	5	5.00
Student F	5	5	5	5	5		5	5.00
Student G	5	5	5	5	5	5		5.00

STUDENT F: We are the teachers

Effect of Peer Evaluation

Grup BB	Student A	Student B	Student C	Student D	Student E	Student F	Student G	AVG.
Student A		1	5	2	5	5	3	3.50
Student B	1		1	4	1	1	3	1.83
Student C	5	2		2	5	5	3	3.67
Student D	1	5	1		3	2	5	2.83
Student E	1	3	3	3		5	3	3.00
Student F	2	3	3	4	5		3	3.33
Student G	1	5	1	4	1	1		2.17

Effect of Peer Evaluation

Abstract

This study examines the effect of peer evaluation on the learning process of students. The study was conducted in a classroom setting where students were asked to evaluate their peers' work. The results of the study show that peer evaluation has a positive effect on the learning process of students. Students who participated in the study showed higher levels of motivation and engagement compared to those who did not. Additionally, students who evaluated their peers' work showed higher levels of understanding and retention of the material. The study also found that peer evaluation helped students to identify their own strengths and weaknesses, and to learn from their peers' mistakes. Overall, the study suggests that peer evaluation is a valuable tool for improving the learning process of students.

Effect of Peer Evaluation

Abstract

Peer evaluation is a process in which students evaluate each other's work. This process is used in many different ways in different fields. In this study, the effect of peer evaluation on the learning process of students is investigated. The study is conducted in a classroom of a high school. The students are divided into groups and each group is given a task to complete. The students are asked to evaluate each other's work. The results of the study show that peer evaluation has a positive effect on the learning process of students. The students who participated in the study showed a higher level of motivation and a higher level of achievement than the students who did not participate. The study also found that peer evaluation helped the students to learn from each other and to improve their work. The study suggests that peer evaluation should be used more often in classrooms.



Grading

- Last year there are:
 - **13** groups (Fall Semester)
 - **14** groups (Spring Semester)received different grades among the group members
- For example: Five members B, two members D



Grading

- If we observe that you have not accomplished the goals to be reached by the end of this semester, you may receive an **I (Incomplete)**
 - The important dates for incomplete grades:
 - Announcing the groups/students with incomplete grades (e-mail) – January 10, 2024 by the end of the day
 - Groups/students with incomplete grades return their work by the time allotted by the CCs
 - If you do not complete the missing work within the time limit, this grade will be replaced with an FX.
 - In Fall 2022, **3 groups**, in Fall 2023, **2 groups** received an Incomplete grade
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Grading

- **F** grade will be granted to groups/students with unsatisfactory progress during the semester.
- **FX** grade will be granted to groups/students with unsatisfactory progress during the semester

AND any of the following:

- groups not submitting the *First Progress Report* for IE 477 or *Final Report* for IE 478

OR

- students not attending *Second Meeting with Course Coordinators* for IE 477 or *Fourth Meeting with Course Coordinators* for IE 478 with no valid excuse

OR

- groups not submitting their updated report if they received an Incomplete grade



Grading

- **FZ** grade will be granted in IE 477 or IE 478 to students with:
 - major issues related to attendance to the periodic meetings with Academic Advisor and/or Industrial Advisor
 - OR**
 - major issues related to contribution to the project
 - OR**
 - no group of seven members*
 - OR**
 - no project assigned
 - OR**
 - incorrect or incomplete part-time work or internship disclosure
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Administrative Coordinator: Yeşim Gülseren

Üniversite-Sanayi İşbirliği Mezuniyet Projeleri Koordinatörü

Destek Verilen Çalışmalar

- İş dünyası ile iletişim
- Projelere hazırlık ve bilgilendirme
- Proje yönetimi, koordinasyon
- Projelerin mali, idari ve yasal süreçleri
- İç iletişim ve motivasyon
- Seyahat organizasyonu
- Fuar, kitap ve etkinlik organizasyonu
- Kariyer planlama
- Girişimcilik
- Sektör tanıtım etkinlikleri



Rektörlük Binası 3. Kat

No : 308

yesime@bilkent.edu.tr



Grants and Competitions

- INFORMS Undergraduate Operations Research Prize
- YA/EM Student Competition
- TÜBİTAK 2241-A Sanayi Odaklı Lisans Bitirme Tezi Destekleme Programı
- Others

Projects Booklet





Project Fair and Competition 2025

- We are planning to organize
 - 23rd Industrial Engineering Project Fair and Competition
 - Industrial Projects 2025 Book



Project Fair and Competition 2017



Project Fair and Competition 2018



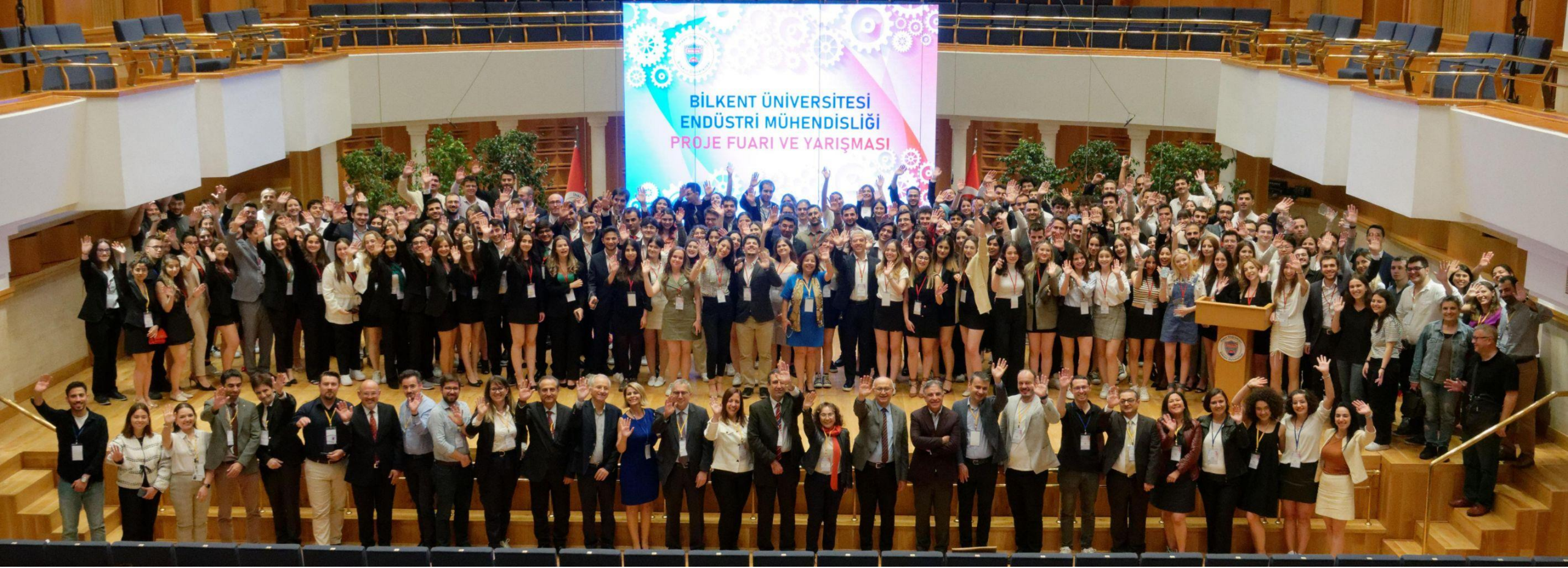
Project Fair and Competition 2019



Project Fair and Competition 2022



Project Fair and Competition 2023



Project Fair and Competition 2024





Project Fair and Competition 2025

Friday, May 30th, 2025 (Location: ODEON)



Next Steps...





Group Formation

- All groups will have 7 students*
- Different skills
 - Leader, consensus builder, problem solver, contributor, assisting
 - Report writing (Turkish/English)
 - Presentation (Turkish/English)
 - At least 2 members good in coding
- Projects may require company visits (Leave two half-days off as a group)



Group Formation

- Each group will have a contact person
 - Not necessarily the group leader
 - Reserve time slots for coordinator meetings
 - Receive links to upload documents
 - Make travel arrangements with Yeşim Gülseren
 - Must be available to respond to calls, emails, texts promptly



Group Formation

- For information on team dynamics follow announcements on <https://courses.ie.bilkent.edu.tr/ie477>
- For each team, fill out the “Team Information Form” via the link on the course web page **until 17:00 TODAY!**
 - Names, e-mail addresses, elective courses, summer trainings, strongest and weakest skills.
 - **ONE SUBMISSION PER GROUP.**
- Each team should have a project contact person
- **Students with no groups:**
 - Inform TAs via ie477@ie.bilkent.edu.tr

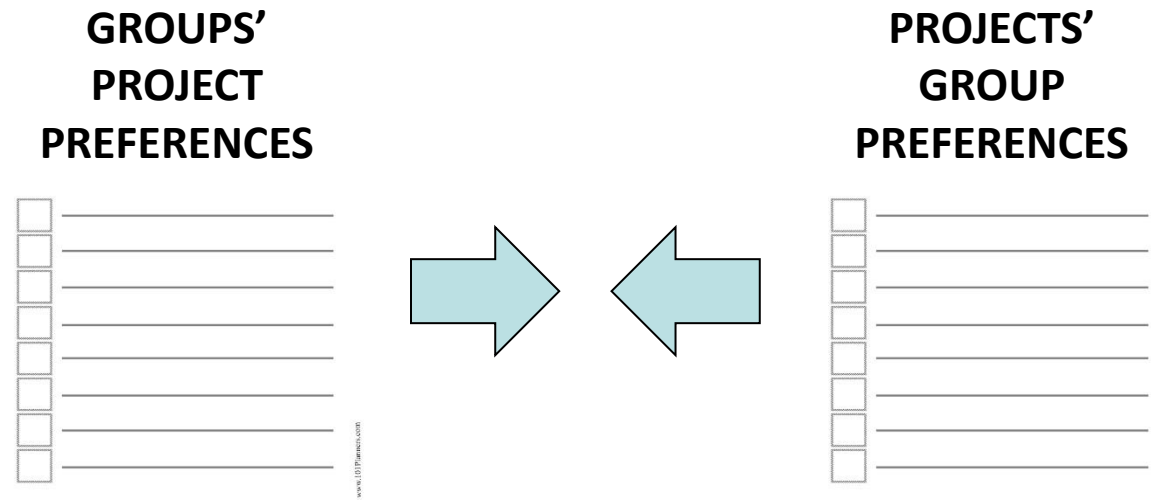


Project Assignments

- **Project List** will be announced by late this week.
- Each team is going to send their rankings of the projects and a single page cover letter until **September 25 by 17:00**
 - Wait for the meeting next week to finalize your list.
- Fill the required online form (to be sent to the CP)

Project Assignments

- We will use a version of **Nobel Prize Winning Algorithm** by Shapley and Roth



- See course web page for a detailed explanation on the algorithm



Project Assignments

- Groups:
 - Rank all projects based on how much you wish to get assigned.
- Projects:
 - Rank all groups (information form)
- Basis is the same as the original algorithm. However, we may consider additional constraints imposed by the companies (such as at most one project), as well as others.
- Applied to assign projects to groups in the last six years.

Example

Which group will be assigned which project?

Group A	Group B	Group C	Project X	Project Y	Project Z
Project X	Project Z	Project Z	Group B	Group B	Group A
Project Y	Project X	Project X	Group A	Group C	Group C
Project Z	Project Y	Project Y	Group C	Group A	Group B



People

- All groups will be assigned:
 - Academic advisor
 - Industrial advisor
 - Course coordinator
 - Other interested faculty members
 - Teaching assistant
- Administrative coordinator



Things To Do TODAY by 17:00

- Team Information Form
 - Via the link announced on the course web page
 - One submission per group
 - Disclosure of Part Time Work or Internship Form
 - Fillable word/pdf on the course web page
 - Submit **electronic copy without signatures** to course TA's via **EMAIL**.
 - Expect details on scheduling the approval process on **Friday afternoon** via email.
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