IE477 - IE 478 Systems Design
GENERAL INFORMATION AND SCHEDULE

Course Coordinators:

Dr. Savaş Dayanık

Dr. Emre Nadar

Dr. Emre Uzun

Administrative Coordinator:

Yeşim Gülseren

Teaching Assistants:

Aslı Baytar

Fatih Selim Erdem

Ece Kuşdemir

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

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
  - Maintenance
  - Forecasting
  - Energy or health applications
  - Financial engineering and cost control
  - Production planning and scheduling
  - Inventory control

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 + ...

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**

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**
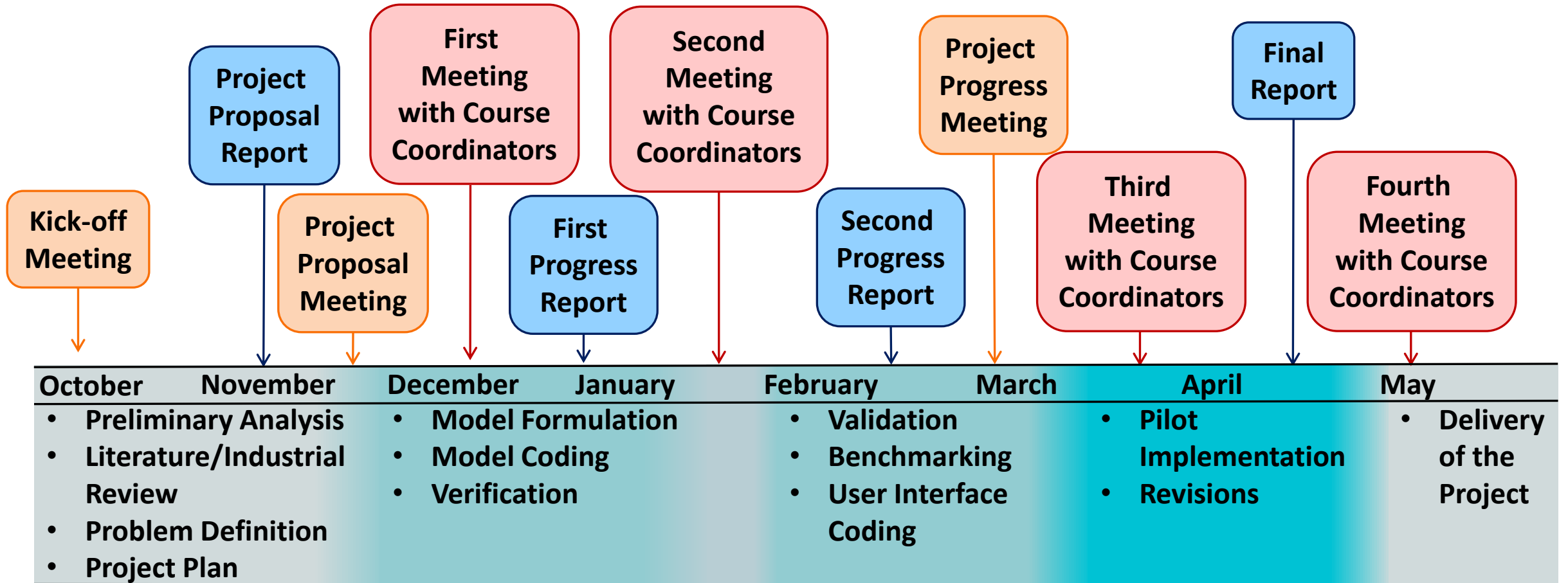
Industrial Project

- 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

Roadmap

October	November	December	January	February	March	April	May
• Preliminary Analysis • Literature/Industrial Review • Problem Definition • Project Plan		• Model Formulation • Model Coding • Verification		• Validation • Benchmarking • User Interface Coding		• Pilot Implementation • Revisions	• Delivery of the Project

Timeline milestones:
- Kick-off Meeting
- Project Proposal Report
- Project Proposal Meeting
- First Meeting with Course Coordinators
- First Progress Report
- Second Meeting with Course Coordinators
- Second Progress Report
- Project Progress Meeting
- Third Meeting with Course Coordinators
- Final Report
- Fourth Meeting with Course Coordinators

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 activites: Workpackages, Timetable

First Meeting with Course Coordinators (Nov 26, 28, Dec 1)

- You will prepare a presentation video and upload it by Nov 21

  – 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 2. However, you will also present LIVE during the meeting.

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

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 $\LaTeX$ 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 23:59.

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.

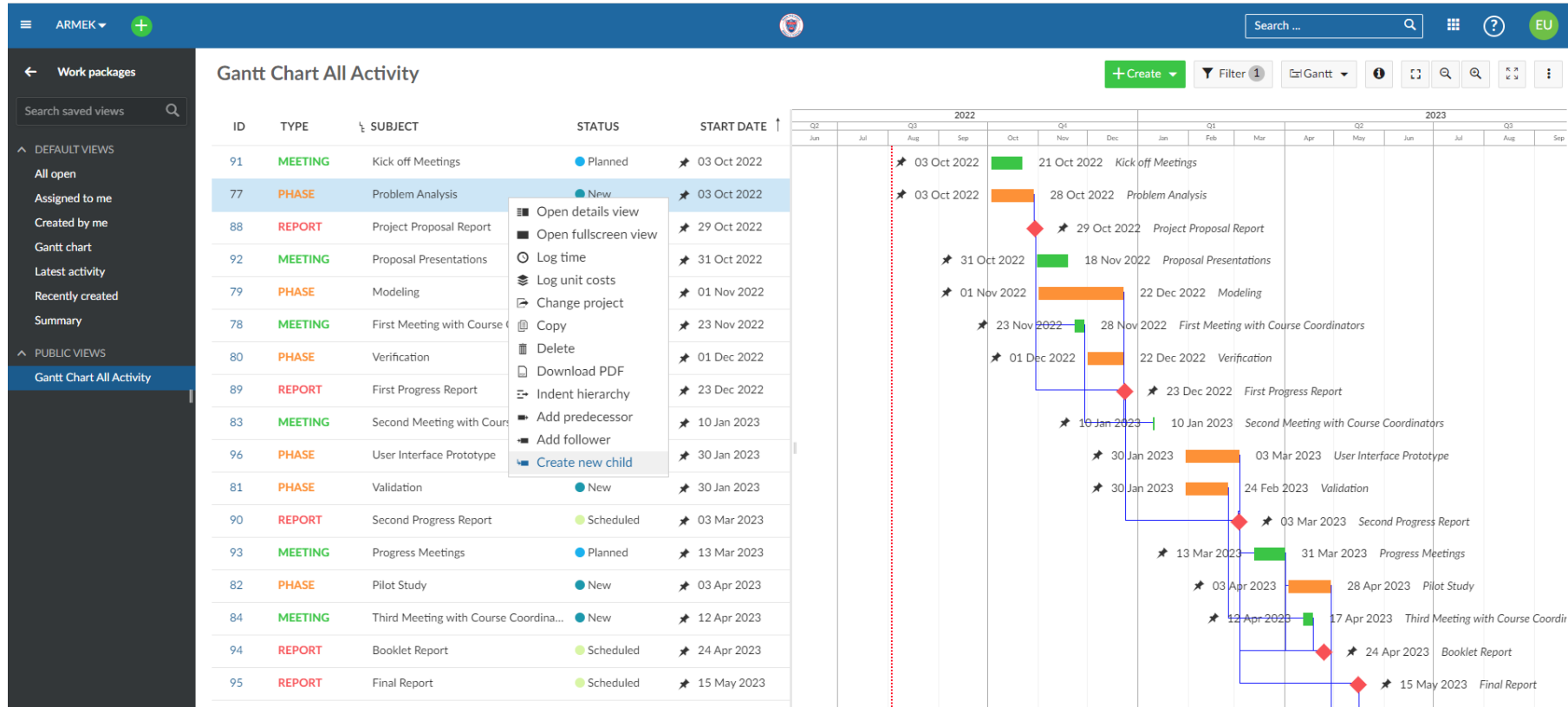- The LaTeX template will automatically add these.

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 17 (Today):** Introduction and General Schedule, Team Formation
  - **Sep 24: "**Capstone Project – How to approach?", Details on Industrial Projects
  - **Oct 1:** Details on Administrative Processes

  - **Oct 22:** Workshop
  - **Dec 3:** General Feedback on Progress
  - **Dec 10:** Workshop

* Subject to change

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.

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

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

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

Grading

- Last year there are:
  - **8** groups (Fall Semester)
  - **13** groups (Spring Semester)

  received different grades among the group members
- For example: Five members B, other members C+ and 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 8, 2026 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

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

        OR
    - not attending the project fair and not presenting their group's poster at the project fair

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

Project Fair and Competition 2026

- ## We are planning to organize

  - 24th Industrial Engineering Project Fair and Competition

  - Industrial Projects 2026 Book

Project Fair and Competition 2026

- Friday, May 8th, 2026 (Likely)

- Location: ODEON (Maybe)

Next Steps…

Groups Formed → Projects Announced → Project Preferences Submitted → Projects Assigned → Advisors and Coordinators Assigned

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

- **We will now set the number of groups of 7 and number of groups of 6 students NOW.**
  - **Anyone who adds this course from this point on will need to join one group of 6 students. Otherwise they must drop the course.**

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 23:59 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

- For each team, fill out the "Disclosure of Internship and Part-time Work Form" on the course web page **until 23:59 TODAY!**
  - Fill in the form online.
 - Send the **UNSIGNED PDFs** to course TAs using ie477@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 24 by 23:59**
  - 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

GROUPS' PROJECT PREFERENCES

PROJECTS' GROUP PREFERENCES
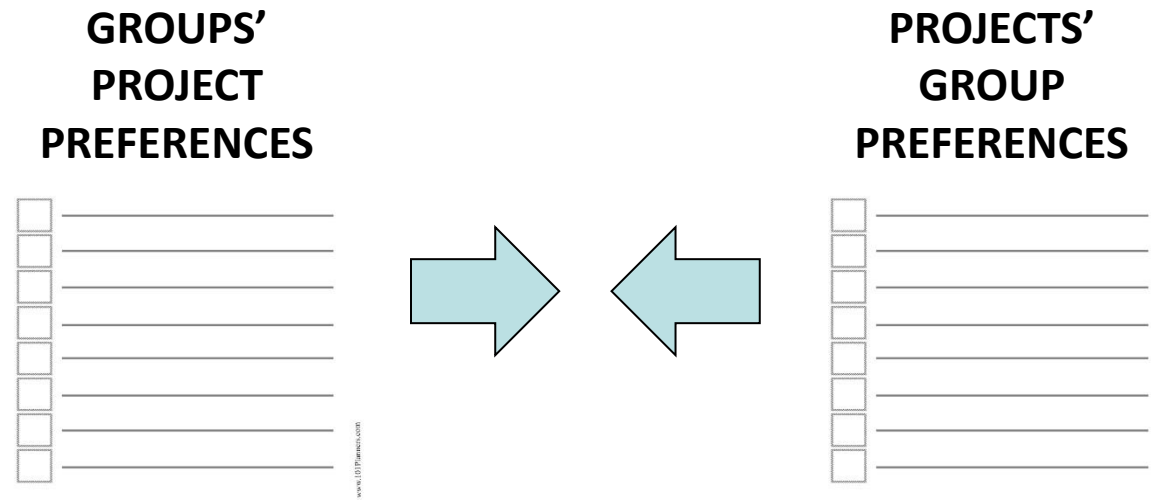
- See course web page for a detailed explanation on the algorithm

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 Z	Project Z
Project Y	Project X	Project X
Project Z	Project Y	Project Y

Project X	Project Y	Project Z
Group B	Group B	Group A
Group A	Group C	Group C
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 23:59

- 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 **TAs via EMAIL.**
  - Expect details on scheduling the approval process on **Friday afternoon** via email.