



Introduction to CS491/2 Senior Design Project I/II

Sep 29, 2021, Wednesday

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Course Description

- Capstone **design** project
- **Technical** and **innovative**
- **Group** project
- Emphasizing **engineering design** principles on a specific topic in any field of computer science and engineering
 - **creative** components in design
- Two semesters

Course Description

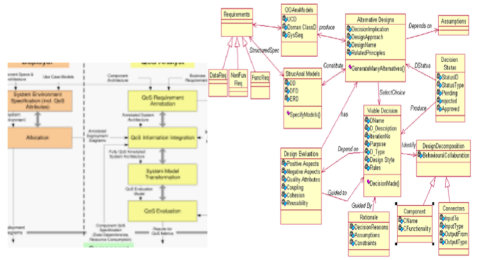
- Students develop their project **idea** themselves.
- Opportunity to enhance **innovation** and **entrepreneurship** skills.
- You should try to use all knowledge and skills you acquired in your computer engineering education. It is a culminating engineering project.
- There will be a project **fair** at the end as well.
- There will be **awards** in different categories. Various companies sponsor them.



Steps of a typical project



Idea
Problem



```

1 # Get next month's date with
2 next_month = today.replace(day=28) + datetime.timedelta(
3     days=next_month.date().day - 1)
4 start_end = get_last_month_data(next_month)
5 dates_.insert(0, {
6     "start": start.timestamp(),
7     "stop": end.timestamp(),
8     "start_iso": start.isoformat(),
9     "end_iso": end.isoformat(),
10    "timezone": 0,
11    "year": start.year,
12    "month": str(start.strftime("%B")),
13    })
14
15 for x in range(0, months_ago):
16     start_end = get_last_month_data(today)
17     today = start
18     dates_.insert(0, {
19         "start": start.timestamp(),
20         "start_iso": start.isoformat(),
    })
    
```

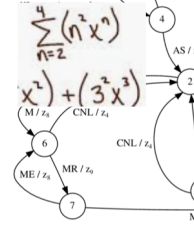
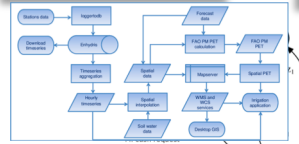
Analysis

Design

Implementation

Test

Product
Solution



```

1 Actions
2 z1: move
3 z2: remc
4 z3: send
5 z4: show
6 z5: print
7 z6: ask
8 z7: retc
9 z8: ack
10 z9: withdraw
11 z10: print
    
```

```

1 # Initialize the x value set and y value set
2 x = np.array([1,2,3,4,5])
3 y = np.array([2,4,5,4,5])
4
5 # Initialize other variables
6 m = c = 0
7 n = len(x)
8 LR = 0.01
9 epochs = 1500 # Number of iterations
10
11 # Claculation
12 n = range(epochs):
13     m = x + c
14     m = (-2/n) * sum(x + (y-y_pred))
15     c = (-2/n) * sum(y-y_pred)
16     ((y-y_pred)**2)/n
17     R = m_deriv
18     c = c_deriv
    
```

Maintenance

Course Work

- CS491

- Project specification
- Analysis
- High level design
- Oral presentation + demo

Analysis + Design
Some implementation
Prototyping
Learning tools
Try and See
Code pieces

- CS492

- Low level design
- Final report
- Oral presentation + demo

Design
Implementation
Tests
Improve design

Process

- Before submitting project specification
 - **Form a team** of 3,4, or 5 students
 - Come up with an innovative project idea (**The hardest part**)
 - **Identify and formulate a novel problem**
 - Develop (novel) initial solution ideas
 - Choose a **supervisor**
 - Supervisor:
 - Assesses the project
 - It is a capstone design project
 - Time and number of members suitable
 - It is innovative
 - Then, assigns you to (or you choose) one of the **Innovation Experts**

Either the problem or
the Solution must be
novel

<http://www.cs.bilkent.edu.tr/CS491-2/current/innovation/experts.html>

Choosing Supervisor

- It is upto you to choose and contact a supervisor.
- A supervisor may take upto 3 teams.
- See the current load of supervisors at course webpage

<https://www.cs.bilkent.edu.tr/~cs4912/>

Looking for Supervisor

A supervisor should be able to supervise upto 3 teams. If a team sees that a supervisor is already supervising 3 teams, then the team should contact to a supervisor with less number of teams. Below you see links to pages of supervisors showing the teams they are committed to supervise.

[\[Selim Aksoy\]](#) [\[Mehmet Fatih Aktas\]](#) [\[Can Alkan\]](#) [\[Shervin Arashloo\]](#) [\[Cevdet Aykanat\]](#) [\[Fazli Can\]](#) [\[Ercument Cicek\]](#) [\[Hamdi Dibeklioglu\]](#) [\[Ugur Dogrusoz\]](#) [\[Aysegul Dundar\]](#) [\[Ugur Gudukbay\]](#) [\[Cigdem Gunduz Demir\]](#) [\[Altay Guvenir\]](#) [\[Ibrahim Korpeoglu\]](#) [\[Ozcan Ozturk\]](#) [\[Eray Tuzun\]](#) [\[Ozgur Ulusoy\]](#)

Meeting with innovation experts

- Prepare a presentation describing your project
- It should last about 20-30 minutes
- Make an appointment
- Visit the **innovation expert**
- Present your project
- Ask for suggestions
- Have him/her fill the *Assessment of Innovativeness Form*

Evaluation of Innovativeness

- Innovation expert will fill the following form:
 - **Assessment of Innovativeness Form**
 - https://www.cs.bilkent.edu.tr/~cs4912/current/innovation/assessment_of_innovativeness.doc
- **Questions:**
 - What is the nature of the innovation in the project?
 - Are there similar products, systems, services, or technologies in the market?
If there are what are the differences in relevant aspects such as cost, efficiency and usability?
 - Who are the potential users?
- **Grade: out of 20. It is 20% of your CS491 grade.**
- **Return the form to your project supervisor.**

Important dates for 2021-2022

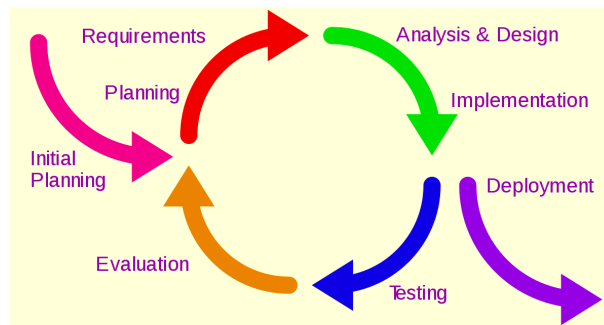
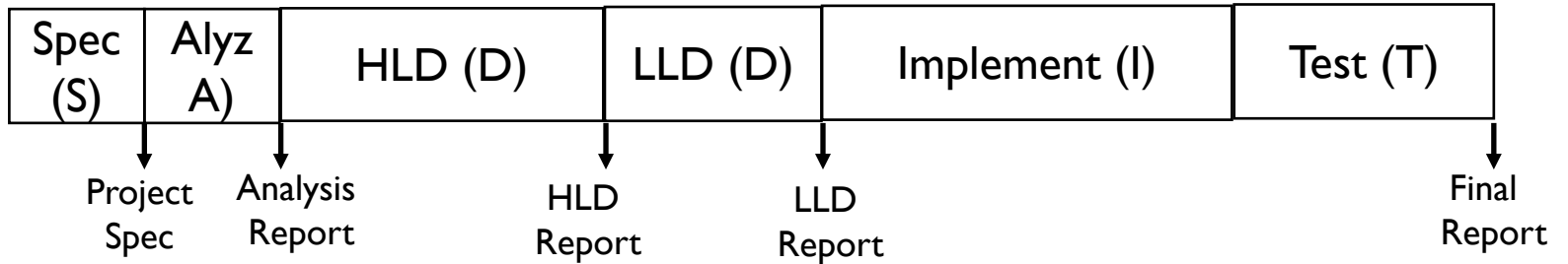
Written in: <https://www.cs.bilkent.edu.tr/~cs4912/>

- Below are the specific deadlines set for this academic year.
 - CS491: *Project Specification + filled innovation export form + website + info about group and website to dept*
Oct 11, 2021, Monday, 5pm.
 - CS491: *Analysis Report*: **Nov 8, 2021, Monday, 5 pm.**
 - CS491: *High-Level Design Report*: **Dec 24, 2021, 5pm.**
 - CS491: *Presentation and Demo*: **Last week of the semester (schedule will be announced later).**
 - **Running code / prototype**

- We will also have deadlines in CS492 next semester. We will announce them in the beginning of the next semester.
 - CS492: Low-Level Design Report: TBD
 - CS492: Final Report: TBD
 - CS492: Presentation and Demo: TBD
 - CS Fair: In May or June.

Use Iterative Model

Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
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from: https://en.wikipedia.org/wiki/Iterative_and_incremental_development

CS492 in Fall

- CS491-492 will be offered **once** per year.
- CS491 in Fall and CS492 in Spring

CS Fair 2022

- We will have a project fair, **called CS Fair**, at the end 2021-2022 academic year for 2021-2022 projects.
- Date: last week of Spring 2022 or during/after final exams.
- If face-to-face: Bilkent Hotel.
- If online: zoom based organization.

- Various awards.
 - One of them will be “**SUSTAINABILITY AWARD**”

Sustainability Year

- Bilkent declared this academic year as “Sustainability Year”.

Definition of *sustainable*

1 : capable of being sustained

2 a : of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged

// sustainable techniques

// sustainable agriculture

b : of or relating to a lifestyle involving the use of sustainable methods

// sustainable society

- You are encouraged to do projects related with Sustainability

Sustainability Considerations

- Additionally, each project will have a sustainability consideration, like global, economic, ... considerations.
- Write it in the Analysis Report as a separate sub-section.
(in Section 4.I of the Analysis Report): Section 4.I.
Consideration of Various Factors in Engineering Design

Project web page by each team

- Each team is required to prepare a webpage for their project.
- It should contain:
 - Description of the project
 - Team members, supervisor, jury members, innovation expert.
 - All reports.
 - Screen shots, demo.
- *We will get the URLs of your pages via a Google form that we will send you later.*

Seminars

- Meet 1-2 hours per week for seminars.
- This is the first of these seminars.
- Attendance to the seminars is required. There may be a quiz at the end as well.
 - Your attendance + quiz performance will be part of your CS491 grade.
- Seminars are only in CS491.

Related Web Pages

- You can find detailed course information, related documents and forms, and what is expected from teams at the following **CS491-2 webpage**:

<https://www.cs.bilkent.edu.tr/~cs4912/>

- Please read everything very carefully.
- Later we will also set up a CS fair webpage (in Spring semester):
<http://www.cs.bilkent.edu.tr/~csfair/csfair2021/doku.php/home>

- Seminars will be organized by
 - Prof. Selim Aksoy
 - Asst. Prof. Dr. Mehmet Fatih Aktaş
- Teaching Assistant:
 - Mehmet Özkanoglu
- CS491 jury members
 - 1) Your Supervisor
 - 2) Asst. Prof. Dr. Shervin Arashloo
 - 3) Asst. Prof. Dr. Hamdi Dibeklioglu



- Thank you for listening.

- Questions?