Digital Design

Week 1: Introduction

Fenerbahce University

Instructors

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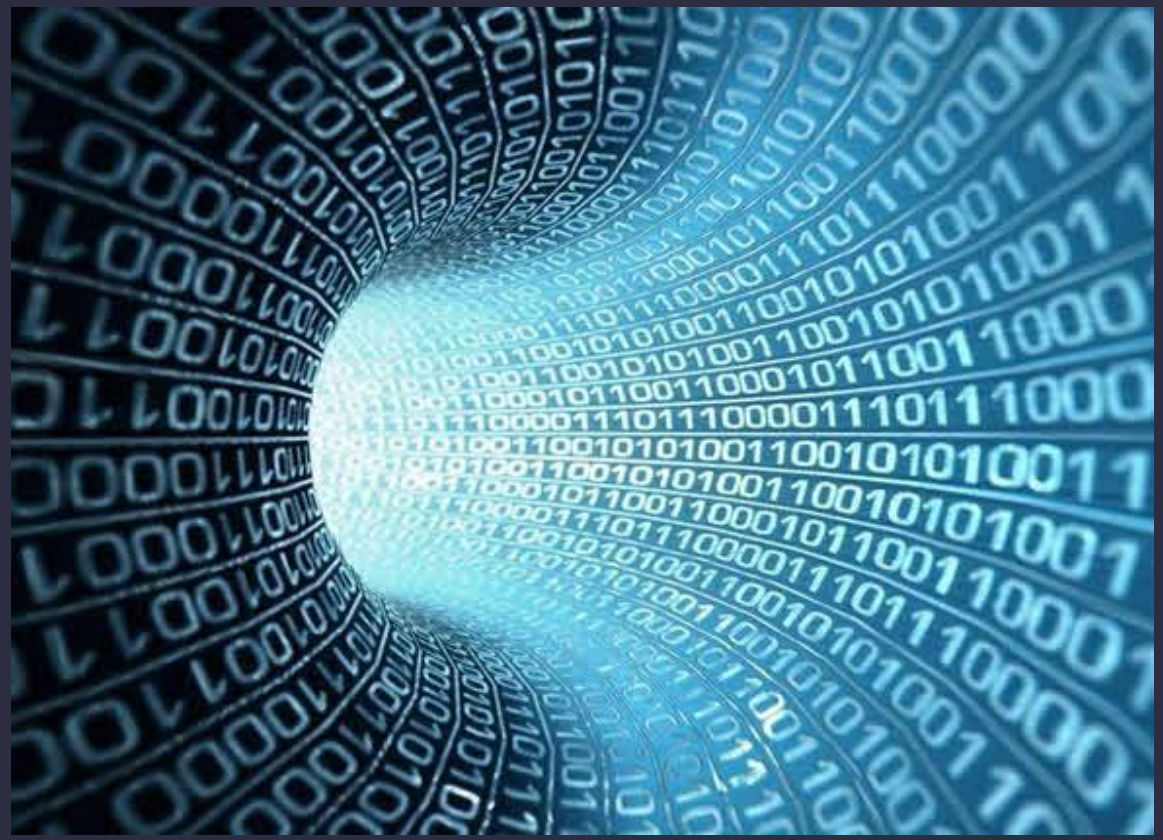
Course Plan

- Digital Design with Verilog Language Applications
  - Introduction
  - Number Systems and Boolean Algebra
  - Combinational Logic
  - Sequential Logic
  - State Machines
  - Bus Elements
  - Multi- Clock Zone Design
  - Optimizations and Trade-offs
  - FB-CPU Design
  - Memories
  - Validation Approaches
  - SOC Concepts
  - Interfaces

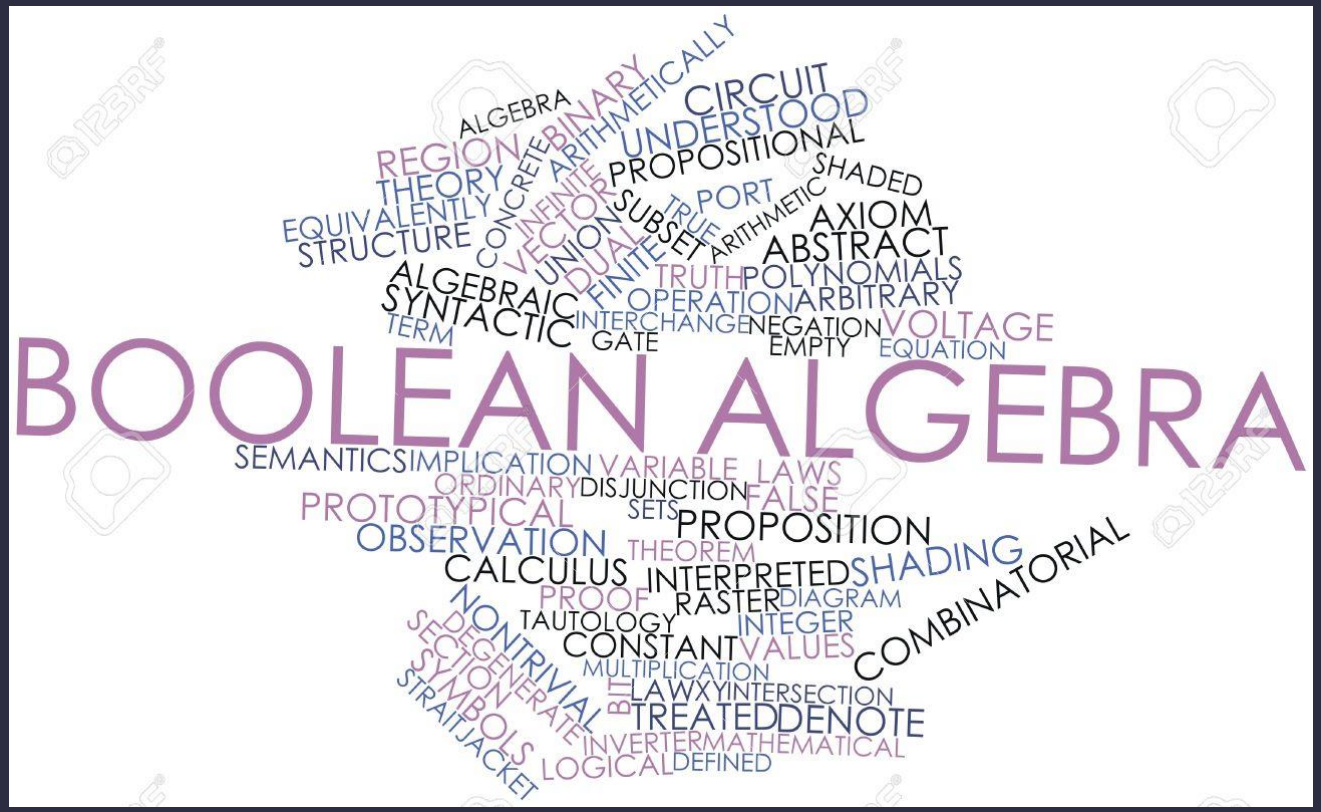
Lesson plan

- Introduction
  - Digital design applications



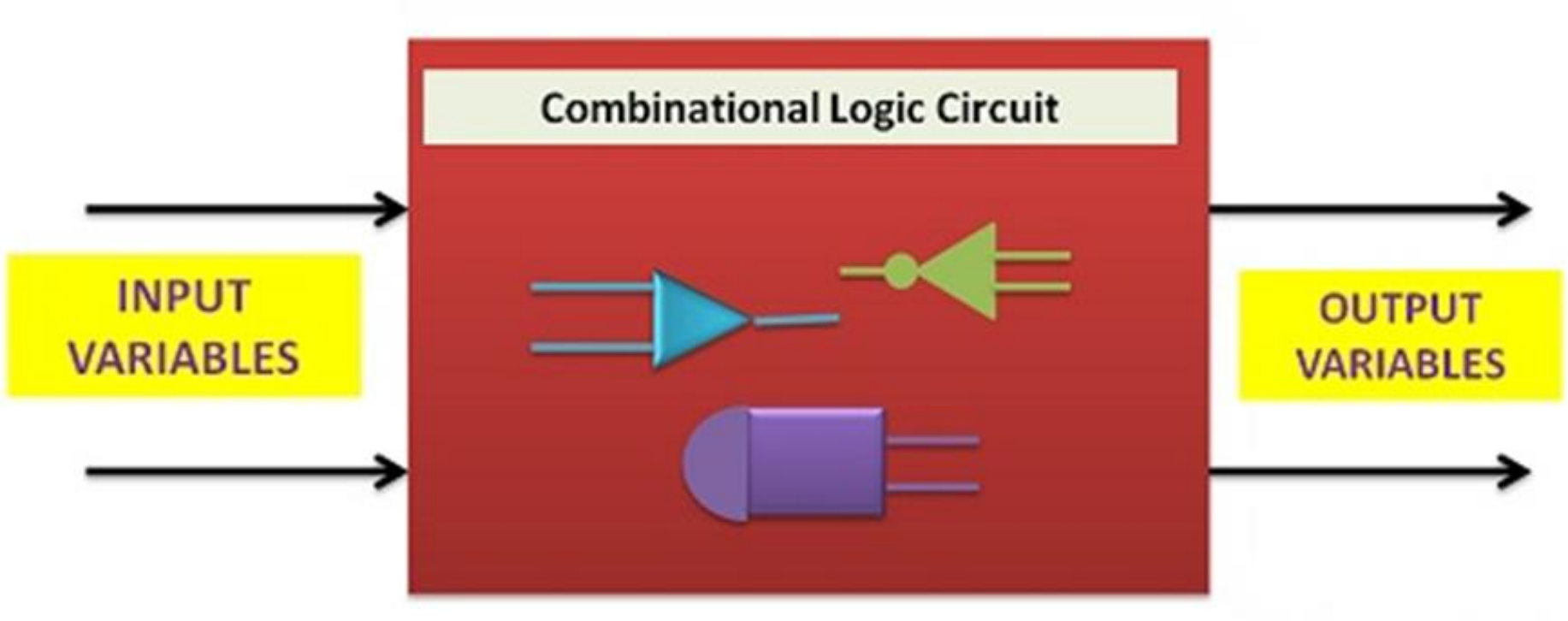
Lesson plan

- Number Systems and Boolean Algebra
  - Number representations and operations frequently used in the digital world



Lesson plan

- Combinational Logic
  - Various circuit designs using logic gates
  - Verilog will begin this week



Lesson plan

- Sequential Logic
  - Combinational logic, memory elements and clock are used together

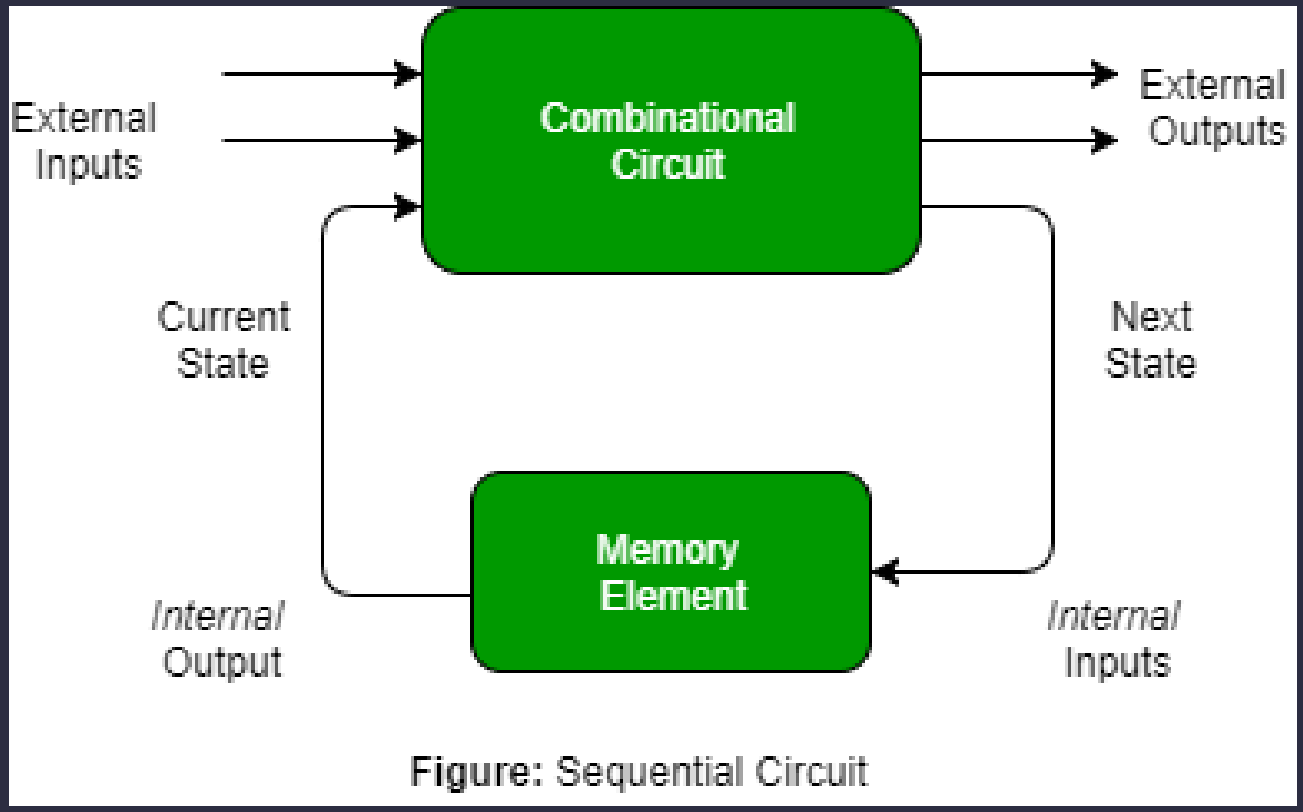
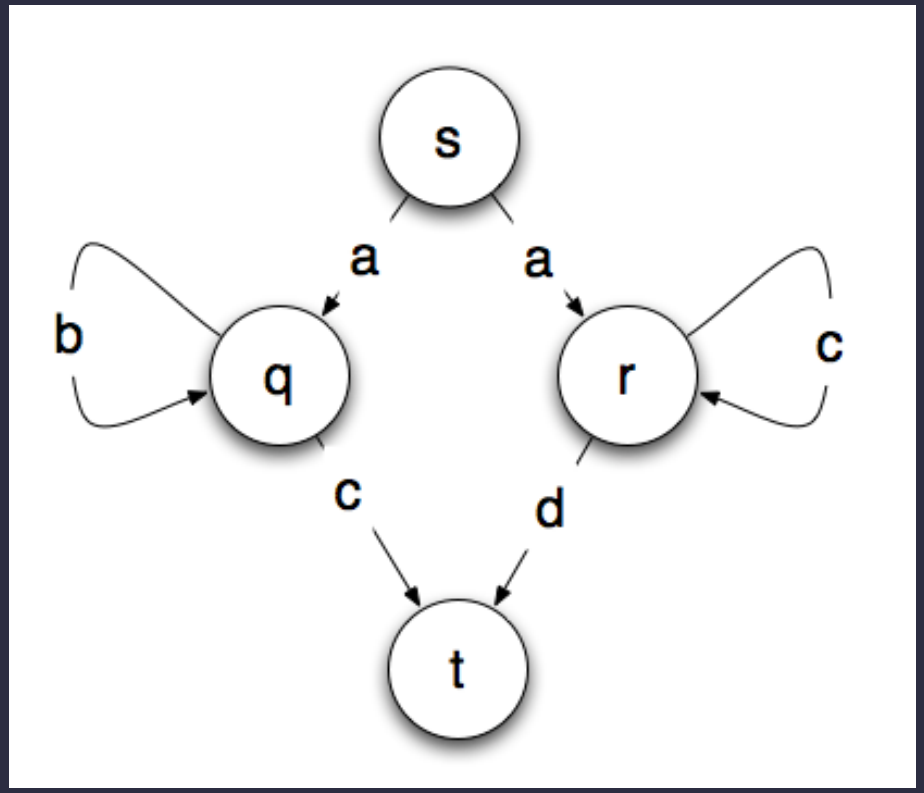


Figure: Sequential Circuit

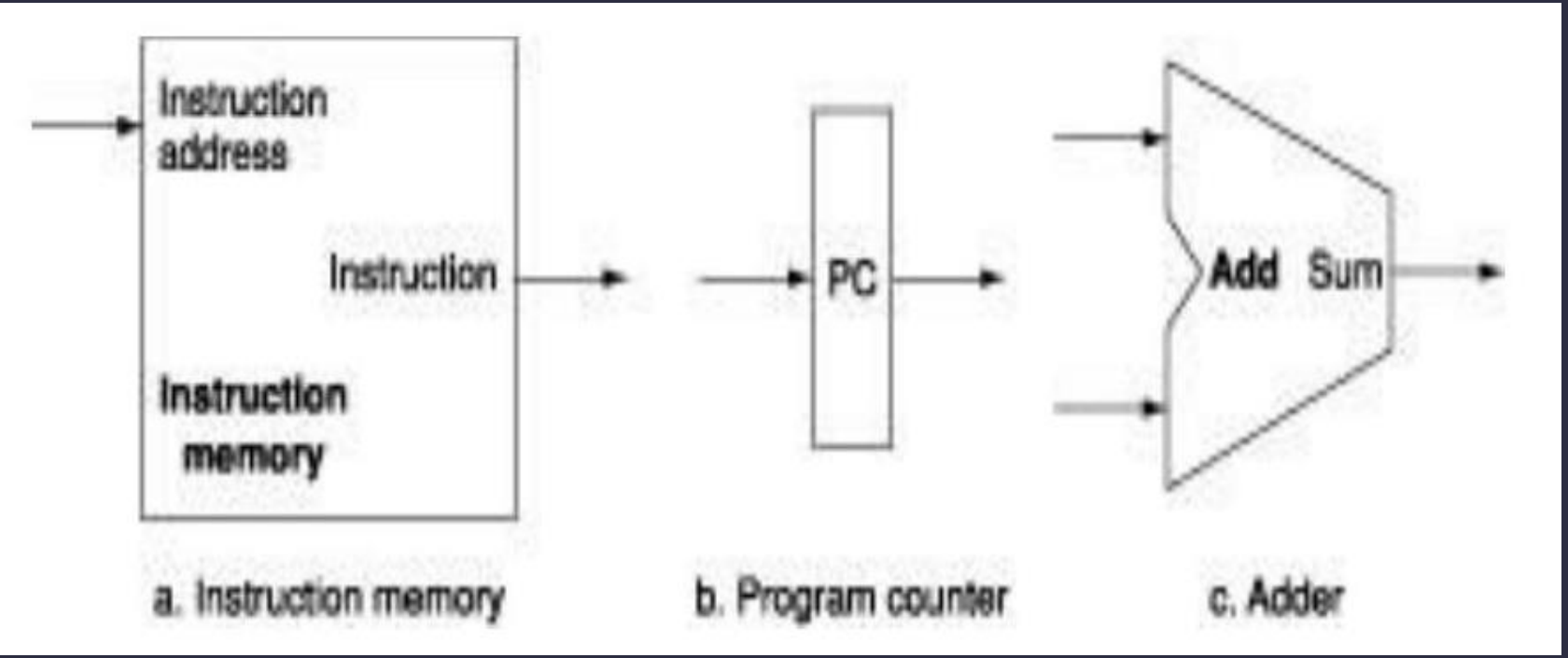
Lesson plan

- State Machines
  - State machine design methodologies of



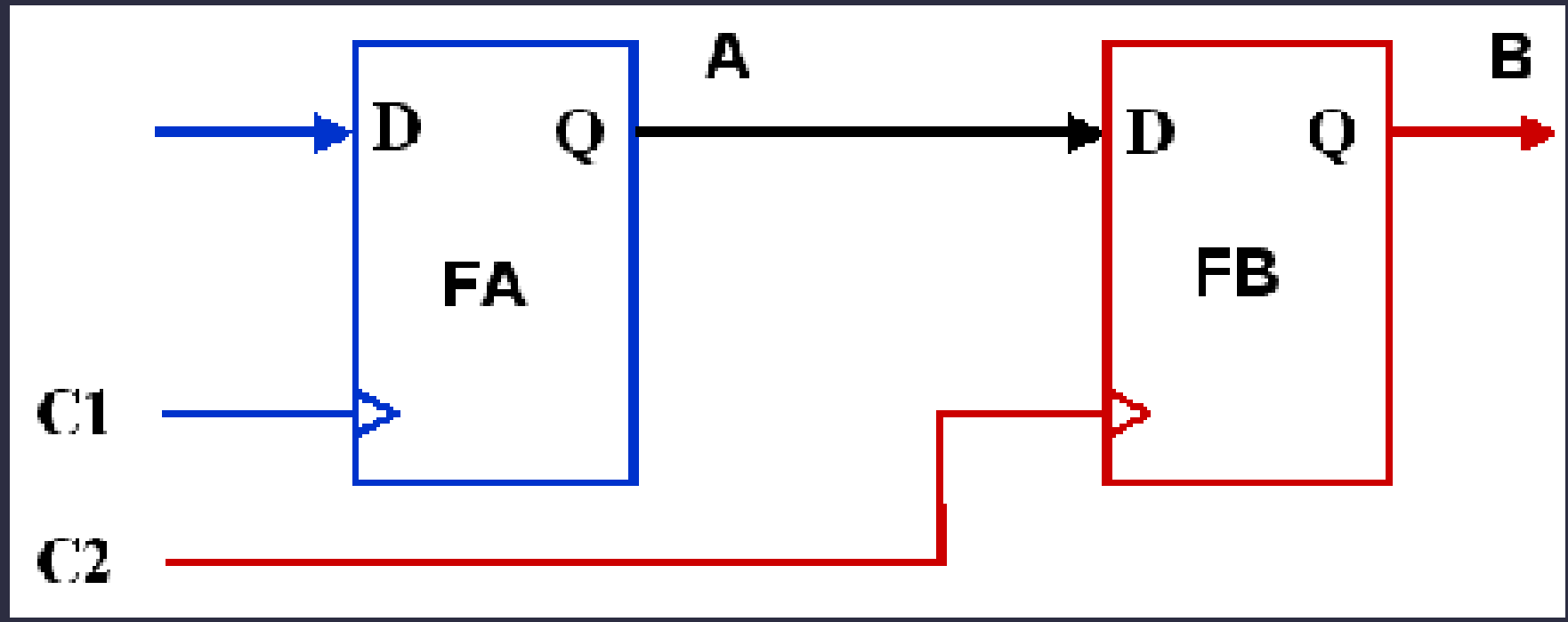
Lesson plan

- Bus Elements
  - Storer, Adder, Striker, ALU etc. workers



Lesson plan

- Multi- Clock Zone Design
  - Cases where there are

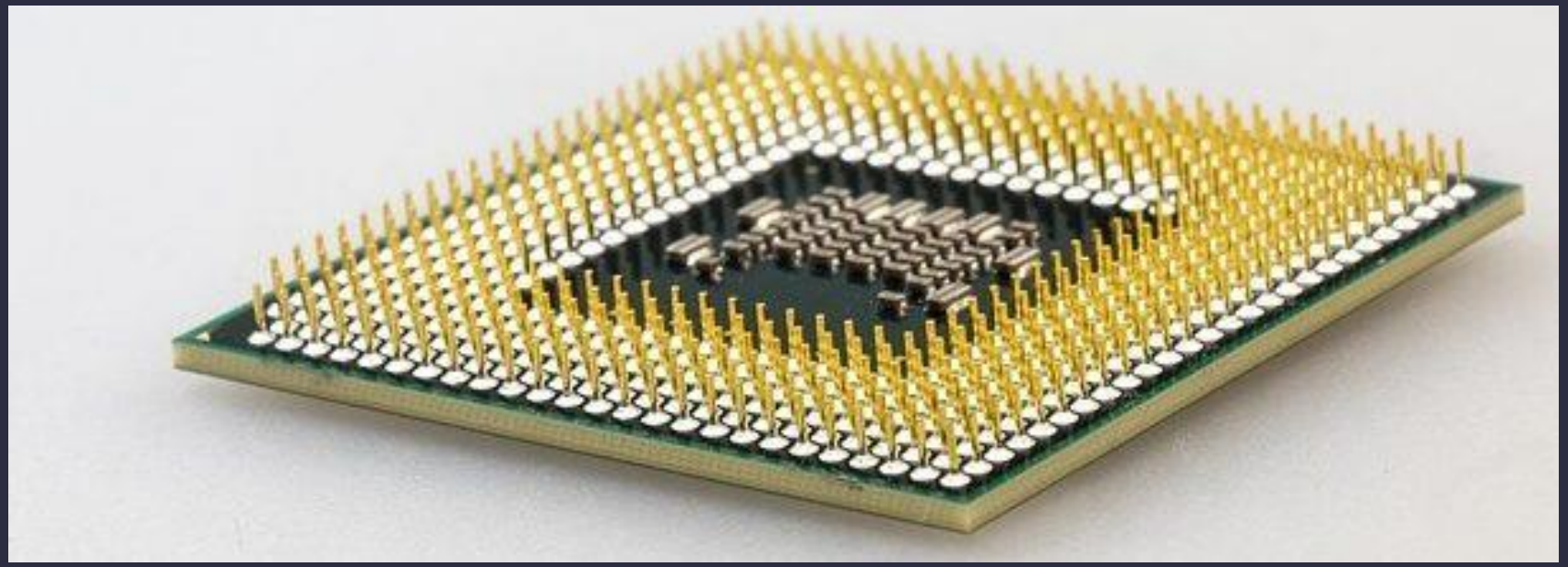


Lesson plan

- Optimizations and Trade-offs
  - Logic Minimization , Pipeline , Power Optimizations etc. approaches

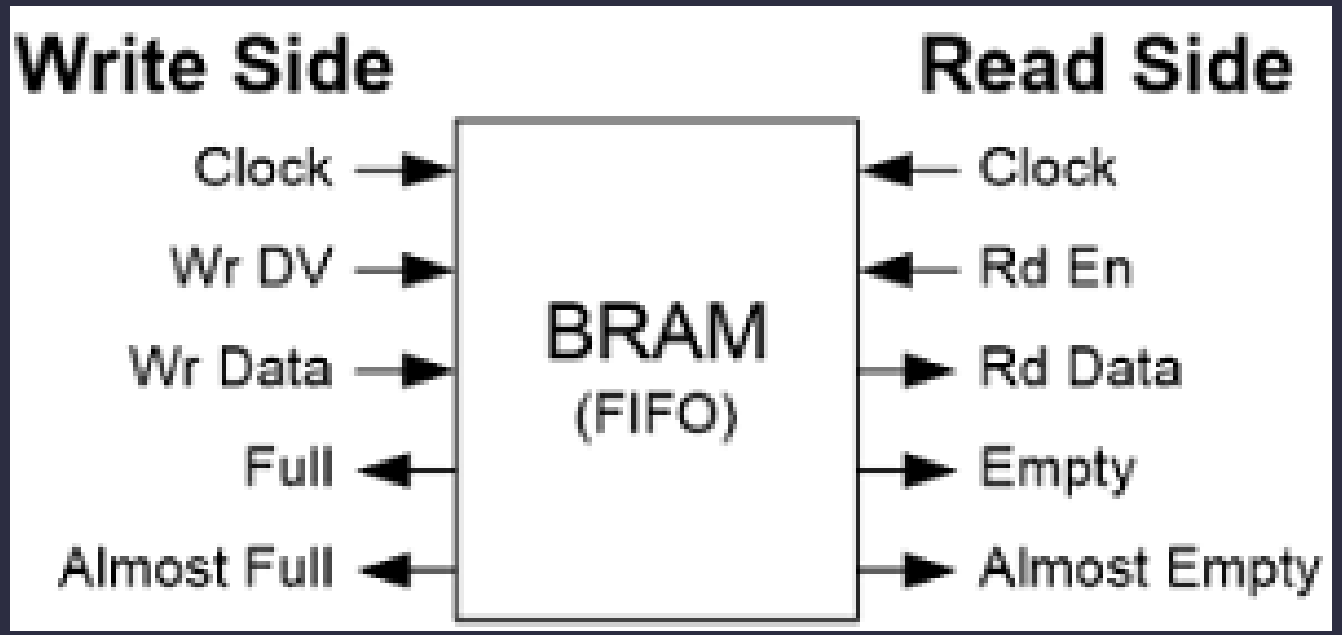
Lesson plan

- FB-CPU Design
  - FB-CPU Design start with



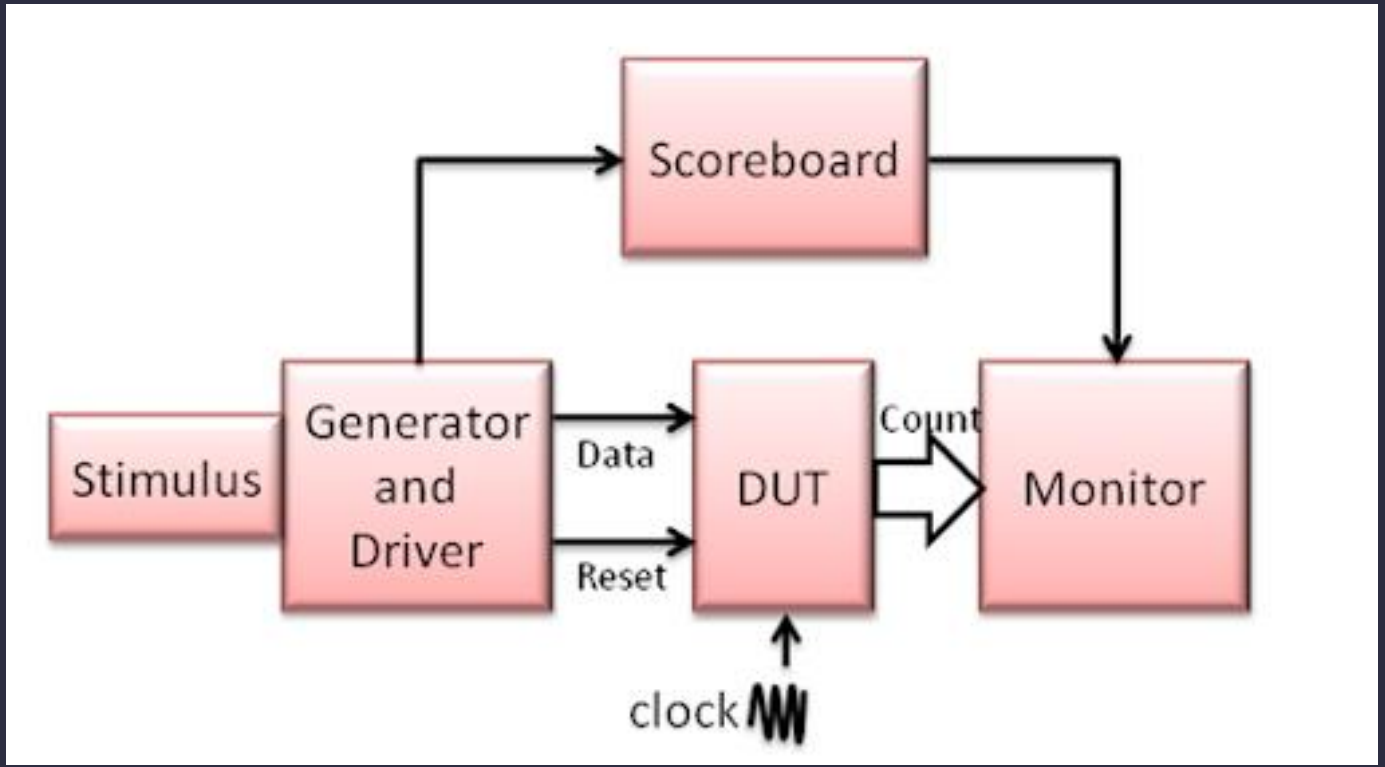
Lesson plan

- Memories
  - Memory components and memory designs



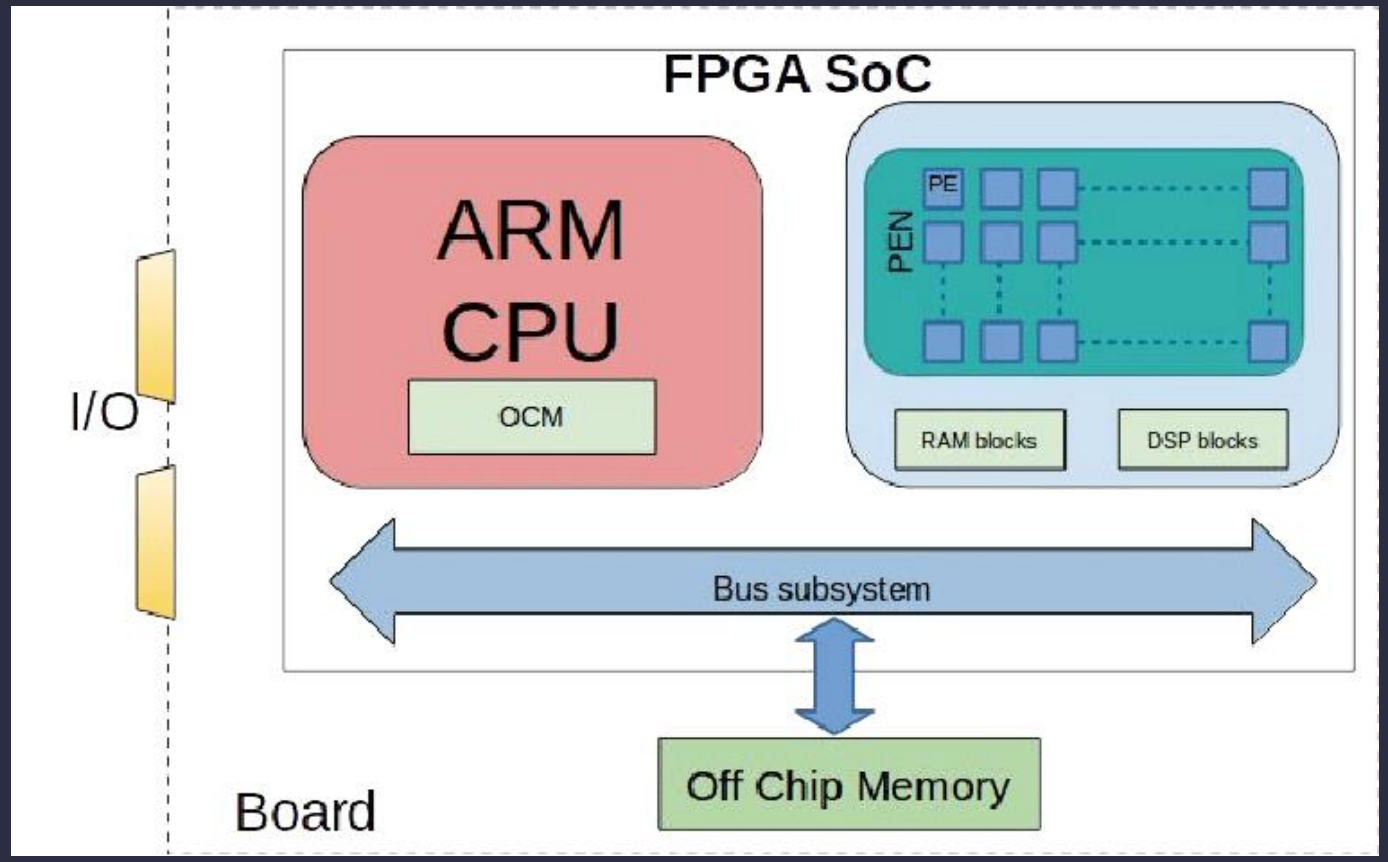
Lesson plan

- Verification Approaches
  - Preparation of the test environment for the verification processes of the designed hardware



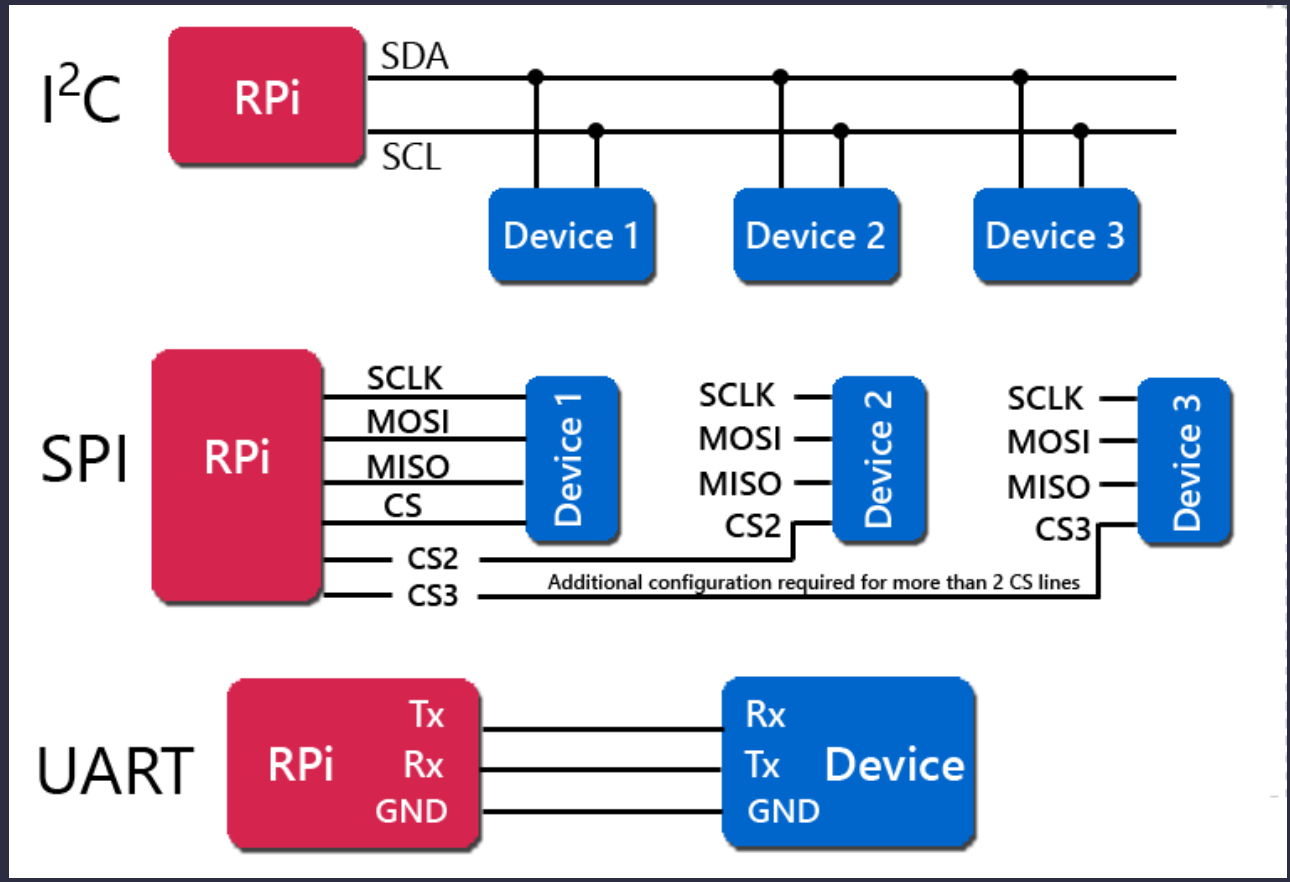
Lesson plan

- SOC Concepts
  - Systems where embedded processor and RTL designs are used together



Lesson plan

- Interfaces
  - interfaces frequently used in industry



Course Resources

Website: levent.tc

Courses > Digital Design (English)

Course Resources

Course Page Content;

- Syllabus
- Lesson Schedule
- Lecture Notes
- Homeworks
- Projects
- Exams
- LMS and Piazza

Course Resources

Syllabus;

Lesson hours;

Monday 9.00-15.00

Office Hours;

- Assist. Prof. Vecdi Emre Levent - Thursday 15.00-17.00
- R. A. Uğur Özbalkan - Tuesday 16.00-17.00, Friday 16.00-17.00

Course Resources

Syllabus;

Between 4-6 homeworks will be given.

2 Quizzes .

Attendance to classes is mandatory at **80** %.

Course Resources

Syllabus;

Evaluation weights

Deadline for homework and quizzes

for every passing hour

5 points will be deducted.

Activities	Rates
Visa	20%
Homework/Quiz	10%
lab	15%
Project	30%
Final	25%
Bonus	up to 5 Points

Course Resources

Syllabus;

Letter grade ranges

Term Grade	Weight	Letter grade
90-100	4.00	AA
85-89	3.50	BA
80-84	3.00	BB
75-79	2.50	CB
65-74	2.00	CC
50-64	1:50	DC
45-49	1.00	DD
0 -44	0	FF

Course Resources

Syllabus;

expected effort

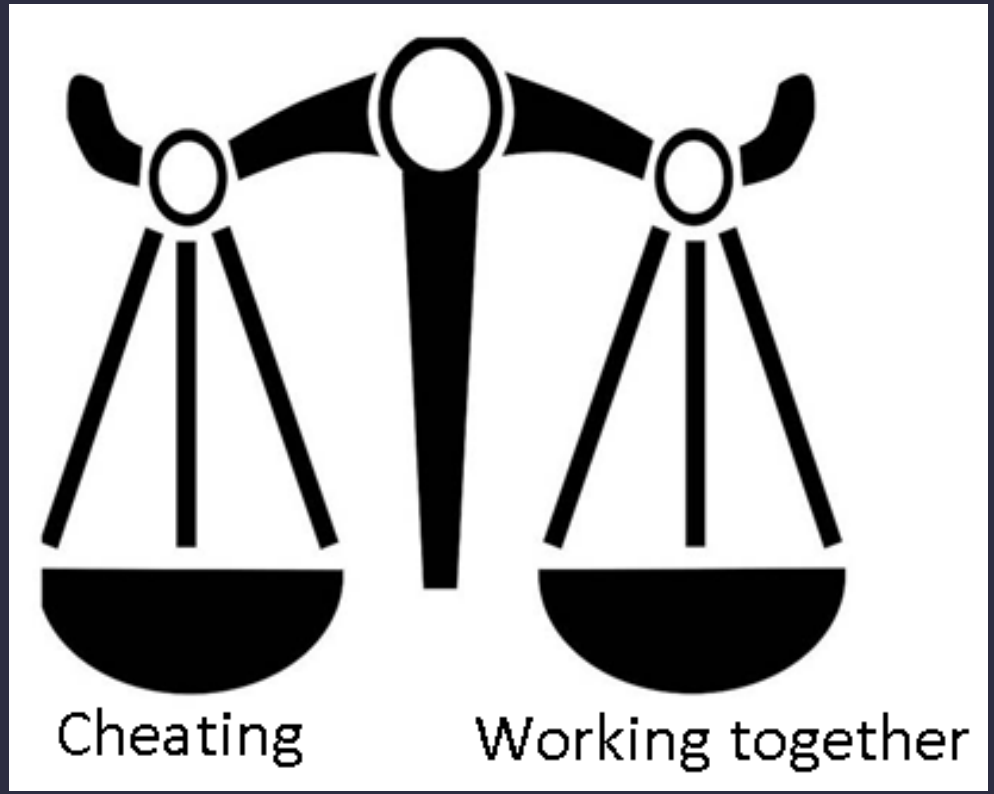
190 hours in total effort is expected.

Contents	Hour	How many times	Subtotal
Lesson Preparation	2	14	28
Lesson Repetition	2	14	28
Homework	4	6	24
Project	48	one	48
Classroom Lesson	4	14	56
Midterm and Final	3	2	6

Course Resources

Syllabus;

Academic honesty



Course Resources

Course Schedule;

Week	Subject
1	Introduction
2	Number Systems and Boolean Algebra
3	Combinational Logic
4	Sequential Logic
5	State Machines
6	Bus Elements
7	Multi-Clock Zone Design
8	**Midterm**
9	Optimizations and Trade-offs
10	FB-CPU RTL Design
11	Memories
12	Verification Approaches
13	Interfaces and Xilinx IPI Design
14	SOC Concepts
15	**Final and Project Presentations**

Course Resources

Homeworks;

Assignments to be given and their solutions will be shared on the homework page.

Course Resources

Projects;

At the end of the semester, the projects that each student should do will be announced.

Course Resources

Exams;

Solutions of sample questions and exams will be shared for midterm and final exams.

Course Resources

LMS and Piazza ;

The LMS system is the system where we will ask you to upload some of the assignments that will be given to you. The system will automatically shut down on the last upload date.

Piazza system is an in-class question and answer platform. You can write on this platform when there is a topic that you are stuck on about the lesson, homework or exams. The questions you write are seen by the teachers and students. You can also help each other in a measured way through this platform.

Biggest Players

- Electra IC
- Chiptek
- Pavotek
- TUBITAK
- ASELSAN
- ROKETSAN
- HAVELSAN
- TAI
- STM
- C -Tech

Players Around the World

- Lockheed Martin (F35 Developer)
- Intel
- Xilinx
- Apple
- Micron Technology
- Nvidia
- IBM
- Texas Instruments
- Qualcomm
- Amazon
- Facebook
- Cisco

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As of October 2022, there are
20k jobs worldwide on LinkedIn