CENG 331 - Computer Organization

Middle East Technical University
Department of Computer Engineering

Course Syllabus
Fall 2021

- **Course Description:** The course will cover the following topics: Introduction to computer organization, data and information representation and processing, machine-level representation of programs, instruction set architecture, pipelining, optimizing program performance, memory hierarchy, cache memories, virtual memory.
  Prerequisites: CENG 232.

- **Instructors:**
  Erol Şahin (Sections 2)
  Office: A207, Tel: 210 5539,
  Office hours: By appointment.

- **Teaching assistants:** Çağrı Utku Akpak, Cem Önem, Deniz Sayın, Merve Taplı

- **Section 2 schedule:** Full Google Calendar link (you can add it to your own calendar):
  https://calendar.google.com/calendar/u/0?cid=MXBzZTRtamo5ZmJiZnV0aGZycDdnbDZrc3NAZ3JvdXAu
  ?
  Online lectures:

  - Monday 16:40-17:30
  - Thursday 09:40-11:30

  Zoom link:
  https://zoom.us/j/8901561204?pwd=ek1ueklSRldHMVBsZW9mT29XaVFlUT09
  Meeting ID: 890 156 1204
  Passcode: 570045

- **Textbook:** Computer Systems: A Programmer's Perspective, 3/E (CS:APP3e) by Randal E. Bryant and David R. O'Hallaron Prentice Hall, 2015

  - Book student web site: http://csapp.cs.cmu.edu/3e/students.html
  - Video recordings from lectures at Carnegie- Mellon Univ. https://youtube.com/playlist?list=PLcQU3vbfgCc9sVAiHf5761UUApjZ3ZD3x

- **Grading policy:**

Midterm Examination	30%
4 Take-Home Lab (Homework) Assignments	24%
Final Examination	36%
Participation and/or quizzes	10%

You will not be allowed to take the final exam if you fail to accumulate 10/24 points in total from the assignments and will automatically get NA grade.

The midterm and final exams will be held in person (face-to-face). Online make-up's and/or oral exams will be considered as options if needed.

Algorithm 1 Lab Grading

```
1: l : {Bomb, Attack, Architecture, Performance}
2: procedure LAB(l)
3:     H ← Your grade from lab homework, out of 100 + bonus
4:     if l ≡ Bomb ∨ l ≡ Attack then          ▷ Bomb and Attack labs have quizzes
5:         if H ≤ 50 then
6:             Q ← 0                          ▷ Not allowed to take the quiz
7:         else
8:             Q ← Your grade from lab quiz, out of 100
9:         L ← 0.6 * H + 0.4 * Q              ▷ Your final grade from the lab
10:    else          ▷ Architecture and Performance labs have no quizzes
11:        L ← H                              ▷ Your final grade from the lab
```

Algorithm 2 Course Grading

```
1: procedure COURSEGRADING
2:     MT ← Your grade from Midterm, out of 100
3:     Att ← Your grade from attendance and online quizzes, out of 100
4:     Labtotal ← Lab(Bomb) + Lab(Attack)+
5:                Lab(Architecture) + Lab(Performance)
6:     if 0.06 * Labtotal ≤ 10 then           ▷ Not allowed to take the final
7:         LetterGrade ← NA                   ▷ Failure with no Resit exam option
8:     else
9:         Final ← Your grade from Final, out of 100
10:        Total ← 0.3 * MT + 0.36 * Final + 0.1 * Att + 0.06 * Labtotal
11:        LetterGrade ← Letter based on Total   ▷ Letter grades FF to AA
```

- **Communication:**
  - All communication (announcements, resource sharing, emails and discussions) will be handled through ODTUClass: https://odtuclass2021f.metu.edu.tr/course/view.php?id=3485.
  - Use email only for individual matters and include CENG331 in your subject line!
- **Academic Integrity:** Discussions about assignments are encouraged. However, your submissions must result from **your own work**. Violation of these general principles will be handled based on the university regulations and will result in disciplinary action.

- Course Schedule

Week	Lecture
1	Overview + Bits and Bytes
2	Integers
3	Floats
4	Assembly - Instructions
5	Assembly - Control Structures
6	Assembly - Procedures + Data structures
7	Y86 and HCL + Sequential Y86
8	Pipelined Y86
9	Optimization
10	Exceptional Control
11	Memory Hierarchy -1
12	Memory Hierarchy - 2
13	Virtual Memory - 1
14	Virtual Memory - 2