COM 410, Computer Architecture

American University of Central Asia
Department of Software Engineering

1 Course Information

Course ID
COM 410, 3268

Course Repository
`https://github.com/auca/com.410`

Class Discussions
`https://piazza.com/auca.kg/spring2018/com410`

Place
AUCA, room 434
AUCA, laboratory G30, G31

Time
Lecture: Monday 10:50–12:05
Lab: Tuesday 10:50–12:05
Lab: Wednesday 12:45–14:00

2 Prerequisites

- COM-117, Object-Oriented Programming
- or COM-223, Algorithms and Data Structures
- or COM-311, Circuit Engineering

3 Contact Information

Instructor
Toksaitov Dmitrii Alexandrovich
toksaitov_d@auca.kg

Office
AUCA, room 315

Office Hours

Tuesday 15:35–18:00
Thursday 15:35–18:00

4 Course Overview

The course introduces students to the topic of computer architecture and organization. Students will focus on studying the structure and design of modern central processing units. During lab sessions students will learn basics of the x86 instruction set, the assembly language for the aforementioned platform, and the representation of high-level language structures in the low-level language.

5 Topics Covered

- The modern computer architectures and organization
- The x86 and x86-64 assembly languages
- Representation of high-level language structures in low-level assembly languages
- Acceleration with SIMD instructions
- System Emulation

6 Examinations

6.1 Lectures

Students will have to take midterm and final examinations on topics discussed during lectures. Each examination is in the form of a quiz with a set of open and multiple choice questions.

6.2 Labs

Students will have a number of laboratory tasks to finish on their own. Students will have to defend their work to the instructor during separate midterm and final examination sessions.

7 Course Projects

Throughout the course, students will have to work on two major projects. The first work will require to accelerate an image processing application by optimizing the hot path of a C program in x86-64 assembly. The second project will require to study an old computer architecture in details to write a software emulator for it.

8 Reading

- Computer Architecture: A Quantitative Approach, 5th Edition by David Patterson and John L. Hennessy (ISBN: 978-0123838728)
- Assembly Language for x86 Processors, 7th Edition by Kip R. Irvine

9 Grading

- Class participation (through Piazza) (5%)
- Lab Midterm (7.5%)
- Lab Final (10%)
- Lecture Midterm (7.5%)
- Lecture Final (10%)
- Course projects (60%)

– 90%–100%: A
– 80%–89%: A-
– 70%–79%: B+
– 65%–69%: B
– 60%–64%: B-
– 56%–59%: C+
– 53%–55%: C
– 50%–52%: C-
– 46%–49%: D+
– 43%–45%: D
– 40%–42%: D-
– Less than 39%: F

10 Rules

Students are required to follow the rules of conduct of the Software Engineering Department and American University of Central Asia.

Team work is NOT encouraged. The same blocks of code or similar structural pieces in separate works will be considered as academic dishonesty and all parties will get zero for the task.