

# COM 223: Algorithms and Data Structures

American University of Central Asia  
Software Engineering Department

## 1 Course Information

### Course Codes

COM-223

### Course IDs

3114

### Credits

6

### Professors, TAs, Time, Place

Lecture (Dmitrii Toksaitov): Wednesday 10:50–12:05, Hybrid, TBD

Lab (Dmitrii Toksaitov): Monday 12:45–14:00, Hybrid, Lab 433

Lab (Dmitrii Toksaitov): Tuesday 12:45–14:00, Hybrid, Lab 433

Lab (Dmitrii Toksaitov): Friday 14:10–15:25, Hybrid, Lab 433

### Course Repository

<https://github.com/auca/com.223>

## 2 Contact Information

### Professor

Dmitrii Toksaitov

[toksaitov\\_d@auca.kg](mailto:toksaitov_d@auca.kg)

### TAs

Pavel Ges

[ges\\_p@auca.kg](mailto:ges_p@auca.kg)

### Office

AUCA, room 315

### Office Hours

By appointment throughout the work week (write to your professor or TA to make an appointment)

### 3 Course Overview

This course examines the most important computer algorithms and data structures in use today. Students will be introduced to the concept of time complexity and use this concept throughout all data structures and algorithms presented in the course. We will work with the principles of data storage, program the low-level data structures, explore common search and sorting algorithms, study the “Big-Oh” notation and asymptotic analysis, see what P vs NP means.

At the end of the course student should be able to research, analyze, design, develop, and maintain functioning software systems in accord to the goals of the AUCA Software Engineering Department and the 510300 IT competency standard (OK 1–7, IK 1–7, PK 1–15).

### 4 Topics: Structured Programming

- Week 1: Introduction, Basic Programming Model (4 hours)
- Week 2: Analyses of Algorithms (4 hours)
- Week 3: Array, List, Queue, Stack (4 hours)
- Week 4: Dequeue, Priority Queue, Sorting Algorithms (4 hours)
- Week 5: Binary Search, Search Trees, Hash Tables (4 hours)
- Week 6: Graphs, Shortest Path Algorithms (4 hours)
- Week 7: Tries, Substring Search (4 hours)

### 5 Assignments and Exams

#### 5.1 GitHub Checkpoints

Students will have to maintain a personal private GitHub repository with all their works shared with their instructor. Students have to periodically commit and push a specific number of lab solutions (or project parts) as told by the instructor. The instructor and TAs will regularly check the work and give points for the accomplished work.

#### 5.2 Labs, Projects

Students will have eight laboratory tasks and finish one project. Finally, students will have to defend their work to the instructor during final, and project defense examination sessions.

## 6 Course Materials, Recordings and Screencasts

Students will find all the course materials on GitHub. We hope that by working with GitHub, students will become familiar with the Git version control system and the popular (among developers) GitHub service. Though version control is not the focus of the course, some course tasks may have to be submitted through it on the GitHub Classroom service.

Every class is screencasted online and recorded to YouTube for students' convenience. An ability to watch a class remotely at any time **MUST NOT** be a reason not to attend at least the online Zoom session. Active class participation is necessary to succeed in this course.

## 7 Software

Students are recommended to install the following software on their machines.

- Eclipse Temurin JDK 17: <https://adoptium.net>
- IntelliJ IDEA Community Edition: <https://www.jetbrains.com/idea/download>
- Git: <https://git-scm.com>

## 8 Reading

Algorithms, 4'th Edition by Robert Sedgewick and Kevin Wayne

## 9 Grading

### 9.1 GitHub Checkpoints

Your instructor will announce a periodic review of your work. You will be awarded up to the following number of points for such checks.

- Labs (20%)
- Project #1 (8%)

### 9.2 Interview

- Labs 1–4 (6.5% + 6.5% + 6.5% + 6.5%)
- Labs 5–8 (6.5% + 6.5% + 6.5% + 6.5%)

**Final Exam** (Labs)

- Project #1 (20%)

**Project Defense** (The project will be checked during or after the Final Exam)

### 9.3 Total

- 100% is formed from the GitHub submissions (28%) and the interview exam sessions (72%).

### 9.4 Scale

- [92%–100] %: A
- [85%–92) %: A-
- [80%–85) %: B+
- [75%–80) %: B
- [70%–75) %: B-
- [65%–70) %: C+
- [60%–65) %: C
- [55%–60) %: C-
- [50%–55) %: D+
- [45%–50) %: D
- [40%–45) %: D-
- Less than 40%: F

## 10 Rules

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

### 10.1 Participation

Active work during the class may be awarded with up to 5 extra points at the instructor's discretion.

Poor student performance during a class can lead to up to 5 points being deducted from the final grade.

Instructors may conduct pop-checks during classes at random without prior notice. Students MUST be ready for every class in order not to lose points.

### 10.2 Questions

We believe that a question from one student is most likely a question that other students are also interested in. That is why we encourage students to use the Canvas online discussion board to ask questions in public that other students can see and answer and NOT ask them through E-mail. We will not be answering any email messages this semester (unless it is a private matter or a serious emergency) to consolidate all the course correspondence in one place.

Do not post the full source code for any task on this course on such boards. You will get zero for that work for any public post. Do not ask generic questions about your code that you do not know why it does not work. Please spend some time thinking about it, debugging it.

### **10.3 Late Policy**

Late submissions and late exams are not allowed. Exceptions may be made at the discretion of the professor only in force-majeure circumstances. If you got ill, got severe personal issues, got problems with your computer or the Internet, you **MUST** notify me at least 24 hours in advance. Otherwise, we will not give you an extension. We will consider that you were procrastinating until the very last day. We will also not be giving more than one emergency extension throughout the course.

Forty-eight hours before the deadline for any work on the course, instructors will go into a silent mode. No questions will be answered about the work that has to be submitted, no requests to have office hours will be considered. Usually, it will be Saturday and Sunday (that are not working days for us anyway). At any other work time before the deadline, we will try our best to answer your questions and help you through Zoom or in our office.

### **10.4 Exam Ceremonies**

Students **MUST** follow exam ceremonies. It means they **MUST** prepare task list forms with all points appropriately calculated. They **MUST** submit them correctly. They must bring task list forms to the exam. Failure to do so will result in lost points. Throughout your career, you will have to work with various supporting documents (contracts, timesheets, etc.). It is a good idea to start learning to work with such documents accurately early. We will remove points for not following these rules or even refuse to accept your exam defense. We will give zero for not following the strict exam timing rules.

### **10.5 Incomplete**

As with late exams, the grade *I* may be awarded only in exceptional circumstances. The student must start a discussion on getting the grade *I* with the instructors in advance and not during the last week before the final exams.

### **10.6 Academic Honesty**

Plagiarism can be defined as “an act or an example of copying or stealing someone else’s words or ideas and appropriating them as one’s own”. The concept of plagiarism applies to all tasks and their components, including program code, abstracts, reports, graphs, statistical tables, etc.

In addition to being unethical, this indicates that the student has not studied the given material. Tasks written from somewhere for 10% or less will be assessed accordingly or will receive a 0 at the discretion of the teacher. If plagiarism is more than 10%, the case will be transferred to the AUCA Disciplinary Committee.

Students are not recommended to memorize before exams, as this is a difficult and inefficient way to learn; and since practice exams consist of open questions designed to test a student's analytical skills, memorization invariably leads to the fact that the answers are inappropriate and of poor quality.

On this course teamwork is NOT encouraged. The same blocks of code or similar structural pieces in separate submissions will be considered as academic dishonesty, and all parties will get zero for the task.

The following are examples of some common acts of plagiarism:

1. Representing the work of others as their own
2. Using other people's ideas or phrases without specifying the author
3. Copying code snippets, sentences, phrases, paragraphs or ideas from other people's works, published or unpublished, without referring to the author
4. Replacing selected words from a passage and using them as your own
5. Copying from any type of multimedia (graphics, audio, video, Internet streams), computer programs, graphs or diagrams from other people's works without representation of authorship
6. Buying work from a website or from another source and presenting it as your own work