

00 – Course Introduction

Advanced Algorithms and Data Structures



UNIVERSITY OF ZAGREB
Faculty of Electrical
Engineering and
Computing

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About the course

- Mandatory master's course for profiles: Software Engineering and Information Systems, Computer Engineering, Computer Modeling in Engineering, Computer Science, Network Science, ...
- 5 ECTS credits
- 45 hours of lectures
- 6 hours of tutorial exercises
- 15 hours of laboratory exercises – all 7 online labs
- There are no physical laboratory exercises

Course staff

- Course leader: **Assoc.Prof. Mario Brčić, PhD** – P2: Tuesday 14:00-17:00, Room D2
Email: mario.brcic@fer.hr, Office: D-263
Responsibilities: Lectures, course materials
- Lecturer: **Juraj Dončević, PhD** – P1: Thursday 11:00-14:00, Room M4
Email: juraj.doncevic@fer.hr, Office: D-373-1
Responsibilities: Lectures, course materials
- Assistants:
 - **Mihael Kovač, M.Eng.**, mihael.kovac@fer.hr, Office: D-365-2
Responsibilities: Tutorials, laboratory exercises
 - **Kristijan Poje, PhD**, kristijan.poje@fer.hr, Office: D-263
Responsibilities: Tutorials, laboratory exercises

Lesson plan (1)

Week No.	Topic	Lab work
1	Balanced trees	Introduction to Edgar Lab 1: Edgar testing
2	Balanced trees	Lab 2
3	String-based structures and algorithms	
4	Geometric algorithms	Lab 3
5	Linear programming	
6	Dynamic programming	Lab 4
7	Greedy algorithms, Lossless and lossy compression algorithms	Consultations
8	Midterm exam	
9	Midterm exam	

Lesson plan (2)

Week No.	Topic	Lab work
10	Randomized algorithms, Stochastic algorithms	
11	Graphs	
12	Graphs	Lab 5
13	-	Consultations
14	Graphs	
15	Approximation algorithms, Reduction	Lab 6
16	-	Lab 7
17	Final exam	
18	Final exam	

Student laptops

- All points for the course are collected through the Edgar system.
- All online exams are conducted on the Edgar system.
- Therefore, it is important that you have your own laptop!
- Students who DO NOT have their own laptop, please fill out the following form:
<https://forms.gle/ieLUJwYSASPRsPoL8>
- Such students will be assigned to FER's computer labs for exams.
- When scheduling exam rooms, we need to know how many students fall into this category.

Laboratory exercises

- Laboratory exercises are conducted online using the Edgar system.
- The programming language used is Python (version 3.8).
- You have a scheduled time for your online laboratory exercise in your calendar.
Stick to that schedule.
 - If, for any valid reason, you cannot complete the exercise at the scheduled time, select the first available time before or after that suits you.
 - You do not need to seek approval from the lecturers or assistants to change the schedule.
- The laboratory exercise lasts 120 minutes
- Avoid collaborating on solving laboratory exercises! Edgar has plagiarism detection, which we will check regularly!

Laboratory exercises

- Total points: 20
- Grading for exercises:
 - First laboratory exercise: 2 points
 - Introductory, familiarization with the Edgar system
 - Each of the remaining 6 laboratory exercises: 3 points
 - Totaling 18 points
 - Programming tasks only
 - Exam periods: Points collected during continuous assessment are divided by 2 (except for the threshold).

Python

- Reference Manual - <https://docs.python.org/3.8/reference/>
- Tutorial - <https://docs.python.org/3.8/tutorial/index.html>
- W3 Schools - <https://www.w3schools.com/python/>
- IDE
 - PyCharm (JetBrains) - <https://www.jetbrains.com/pycharm/>
 - Free student license
 - IntelliJ/CLion for Python
 - VS Code - <https://code.visualstudio.com/docs/languages/python>

Exercise lectures

- The course does not have specific times for live lecture exercises.
 - We have a collection of videos where we solve typical problems that may appear on exams.
 - Join the NASP group on MS Teams using the code published on course pages.
 - The lecture materials will be available in the team files.
- The taught algorithms and data structures can be found in the script and are also available at <https://github.com/FER-NASP/AdvancedAlgorithms>.
 - You can go through the algorithms to understand how they work.
- At the end, you have the option to:
 - Attend consultations – We have scheduled times.
 - AMA – Ask me anything – In the NASP group on MS Teams.

Lectures

- **Attendance at lectures is not mandatory!**
- Weekly materials for lectures are provided, including presentations and scripts.
 - It is not possible to learn the material exclusively from the lecture presentations!
 - They are intended to assist instructors in delivering lectures!
- The material can be learned in two ways:
 1. Attend the lectures.
 - Print the lecture slides and take notes on them!
 2. Study from the script and referenced books and textbooks. Solve problems using the lecture exercises. Attend consultations.
- **We suggest being cautious when studying from online sources.**
 - Some algorithms and data structures have multiple versions, which can cause problems in exams.
 - Many errors have also been noted in materials found on the Internet."

Creating problem tasks

- Additional 5 points can be earned by creating new types of problem tasks with solutions.
- The idea is to be applied and creative with the course material. You receive 1 point for each task.
- The task must be well-prepared, with a solution and explanation, along with illustrations.

Taking the course by continuous study

Activity	Maximum points	Threshold
Lab exercises	20	6 (30%)
Midterm exam	40	12 (30%)
Final exam	40	12 (30%)
Creating problem tasks	5	
Total	100 + 5	50

Taking the course by exams

Activity	Maximum points	Threshold
Lab exercises	10 (scaled down 20/2)	3 (30% of 20, scaled down)
Written exam	50	25
Oral exam	40	
Total	100	50

Taking the exams

- All exams are on paper.
- Before each exam, you will receive a list of topics that may appear on it.
- Taking the oral exam during exam periods includes the entire material of this course!
 - Regardless of the list of topics for the written exam, you must know the entire material for the oral exam!