

Course admin

Lecturer

Dr. Mitra Nasri (m.nasri@tue.nl)

(and Prof. Twan Basten for the lecture on NP-Completeness)

Teaching assistants

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Reference

Sanjit Dasgupta, C.H. Papadimitriou and U.V. Vazirani “Algorithms”.

Materials, updates, and announcements

Canvas and the course “Team” on MS Teams

- Join team: [EE_5LIG0 \(2021-2022\)_Team](#)
- Team code: 

- **Lectures**

- There will be at least one lecture per week (some weeks have two lectures)
- Lectures will be on campus and will not be recorded

- **Lab**

- Lab hours are the hours during which you can meet TAs and ask your questions about the assignments. Attendance to the lab is optional.

- **Exam**

- Oral exam on campus

- **What if you cannot come to campus?**

- We can arrange one-to-one online appointments with the TA (for the lab)
- It is also possible to schedule the oral exam online.
- You must explain the situation to the lecturer (Mitra Nasri) to arrange an online exam.

- **Communication**

- To communicate with the lecturer and TAs join the Team of the course on **MS Teams**
- You can meet and talk with the lecturer during lecture hours (on campus)
- You can meet and talk with the TAs during the lab sessions (on campus)

- **How to join the course team on MS Teams**

- Open your MS Teams app (login with your TU/e credentials)
- Go to “Teams”
- Join team: [EE_5LIG0 \(2021-2022\)_Team](#) using the option “**Join a team with a code**”
- Enter the team’s code: -----

- **The course follows a “blended education” style**
 - You watch pre-recorded lectures (basic concepts)
 - Then you come to campus and attend an “**interactive lecture**” which contains a lot of **exercises** and **Q&A**, and introduce more **advance topics** with **examples**.
 - Course materials will be provided on [Canvas](#)

- **Communications**
 - Meet the TAs during the lab hours
 - Meet the lecturer during the lecture hours
 - To communicate outside of the lab and lecture hours, use [MS Teams](#) of the course [EE_5LIG0 \(2021-2022\)_Team](#)

- **Channels:**
 - **A discussion channel for each assignments**
 - You can ask your questions about each assignment here from the **TAs**. They will do their best to answer your questions as soon as possible.
 - When needed, **TAs** will create a private channel to discuss with you individually
 - **A discussion channel for any question related to the lectures**
 - **General information/questions**
 - **Off topic**

Lectures (on campus)

- **Lectures are mostly on Mondays**
 - A few lectures will be on Wednesdays (follow the schedule on Canvas)
 - You will need to prepare before coming to the lectures (you should watch short videos which will be provided for you before the lecture)

- **Lectures include:**
 - **Exercising and solving new problems** with techniques taught in the pre-recorded videos
 - Some of the exercises are in group
 - Get cookies for your interesting solutions!

 - **Q&A:** where you can ask your questions about the lecture contents or exercises

 - **Advanced topics** beyond the short videos will also be presented during the lecture slots



Assessment

- **Assignments**
 - Assignments are mini-projects that allow you to get involved with problems similar to those found in industry
 - Each assignment has a set of deliverables (report + code)
 - Assignments are individual and can be done in any programming language that you are comfortable with.
- **Quizzes**
 - There are 4 quizzes
 - You have 2 tries on each quiz.
 - your last try will be considered for grading.
- **Oral exam**
 - The oral exam is about the course contents, assignments, and quizzes

Assessment

- **Assignment 1**
 - Graph analysis (40%)
- **Assignment 2**
 - Peer review of Assignment 1 (10%)
- **Assignment 3**
 - ILP (15%)
- **Assignment 4**
 - NP-Completeness (25%)
- **Quiz 1: Divide and conquer + complexity**
- **Quiz 2: Graph analysis**
- **Quiz 3: Dynamic programming and greedy algorithms**
- **Quiz 4: ILP and NP-Completeness**
- **Quizzes (all together) are 10% of the grade**

Submitting all assignments and quizzes before the deadline is mandatory to pass the course!

The oral exam will be mainly focused on your **assignment reports, quizzes**, and if needed the course materials

Learning objectives and topics

At the end of the course, you should be able to **understand**, **apply**, and **evaluate** algorithmic solutions for various problems in embedded and/or cyber-physical systems.

Topics covered

- **Big-O notation and complexity**
- **Divide-and-conquer algorithms**
- **Graph analysis**
- **Greedy algorithms and minimum-spanning tree algorithms**
- **Dynamic programming**
- **Linear and integer-linear programming, and network flow**
- **NP-completeness**
- **Coping with NP-completeness using approximation**

How to evaluate and compare algorithms

Design efficient algorithms to solve optimization problems

Use automated tools to solve optimization problems

Learn about and cope with problems that are inherently “hard” to solve

Schedule

- **Official time slots:**
 - Mondays 13:30 to 15:30 and Wednesdays 8:45 to 10:30

wk	date	classes	location	study material (on Canvas)	By
1	15-11	Introduction - course introduction and structure - Introduction to algorithms and complexity - divide & conquer	Campus	- slide notes (after the lecture)	Mitra Nasri
			Canvas	- watch videos for graph analysis (parts 1, 2, and 3) - Assignments 1 and 2 are released - Quiz 1 is released	
	17-11	TA-hours for assignments	Campus		Saeid Dehnavi and Pourya Gohari
2	22-11	Exercise + Q&A + advanced topics on - divide and conquer - graph analysis	Campus	- slide notes (after the lecture)	Mitra Nasri
			Canvas	- watch videos on dynamic programming and greedy algorithms - Quiz 2 and 3 are released	
	23-11	Deadline Quiz 1	Canvas		
	24-11	TA-hours for assignments	Campus		Saeid Dehnavi and Pourya Gohari

Schedule

wk	date	classes	location	study material (on Canvas)	By
3	29-11	Exercise + Q&A + advanced topics on - dynamic programming - greedy algorithms	Campus	- slide notes (after the lecture)	Mitra Nasri
			Canvas	- watch videos on linear programming - Assignments 3 and 4 are released - Quiz 4 is released	
	30-11	Deadline Quiz 2	Canvas		
	1-12	TA-hours for assignments	Campus		Saeid Dehnavi and Pourya Gohari
4	6-12	Exercise + Q&A + advanced topics on integer linear programming	Campus	- slide notes (after the lecture)	Mitra Nasri
			Canvas	- watch videos on NP-completeness (parts 1, 2, and 3) - You will receive a report of a fellow student to review (your Assignment 2)	
	7-12	Deadline Quiz 3 and Assignment 1	Canvas		
	8-12	TA-hours for assignments	Campus		Saeid Dehnavi and Pourya Gohari
5	13-12	Advanced topics on NP-completeness	Campus	- slide notes (after the lecture)	Twan Basten
	14-12	Deadline Assignment 2	Canvas		
	15-12	TA-hours for assignments	Campus		Saeid Dehnavi and Pourya Gohari

Schedule

wk	date	classes	location	study material (on Canvas)	By
6	20-12	Coping with NP-hardness	Campus	- slide notes (after the lecture)	Mitra Nasri
	21-12	Deadline Quiz 4	Canvas		
	22-12	TA-hours for assignments	Campus or online		Pourya Gohari
	3-1	Deadline Assignment 3	Canvas		
7	10-1	No lecture			
	12-1	No TA-hour		(for questions related to Assignment 4, please contact Prof. Twan Basten)	
8		-			
	18-1	Deadline Assignment 4	Canvas		
9		-			
10	3-2 to 5-2	Oral exams (multiple slots will become available on Canvas)			