Formal Educational Training

2024	Lecturer Training Program, University of Southern Denmark

Lectures

spring 2023	Algorithms under Stochastic Uncertainty (5 ECTS). Advanced course, about 10 students. University of Southern Denmark.
fall 2022, fall 2023	Discrete Mathematics (10 ECTS). Basic course, about 150 students. University of Southern Denmark. In 2022 shared with Lene Monrad Favrholdt.
summer 2020, summer 2021	Efficient Algorithms (9 ETCS). Advanced course, about 100 students. University of Cologne. Video lectures.
winter 2019	Approximation Algorithms (9 ETCS). Advanced course, about 50 students. University of Cologne.
winter 2018	Optimization (crash course, 8 hours). Télécom ParisTech.

Advised Students

2023	Frederik Dam Mortensen. Sphere-Inspecting Curves via Linear Programming. B.Sc. Computer Science, University of Southern Denmark
2022	Lukas Scheib. Online Matching on the Line. B.Sc. Business Mathematics, University of Cologne.
2021	Jan-Niklas Cirillar. Eliminating Migration in Multi-Processor Scheduling. M.Sc. Business Mathematics, University of Cologne.
2021	Michael Menden. Prophet Inequalities for Online Search Problems. M.Sc. Business Mathematics, University of Cologne.
2021	Serap Coksun. Online Interval Coloring. M.Sc. Business Mathematics, University of Cologne.
2021	Simone Horstmann. Optimization of Cleaning Strategies for Solar Power Plants. B.Sc. Mathematics, University of Cologne.
2020	Christopher Franz (co-advised with Thomas Mrziglod). Planning Retrosynthesis with Machine Learning and Combinatorial Optimization. M.Sc. Business Mathematics, University of Cologne.
2020	Lena Noever. The Traveling Salesperson Problem with Neighborhoods. M.Sc. Business Mathematics, University of Cologne.
2020	Paula Roth. Geometric Online Search Problems. B.Sc. Business Mathematics, University of Cologne.
2020	Ioannis Lilikakis. The Robust Traveling Salesperson Problem. B.Sc. Business Mathematics, University of Cologne.
2020	Moritz Stinzendörfer. The Knapsack Secretary Problem. M.Sc. Business Mathematics, University of Cologne.
2016	Raphael Ullmann (co-advised with Nicole Megow). Speed Augmentation in Online Deadline Scheduling. M.Sc. Mathematics, Technische Universität München.
2015	Julian Steger. Electrical-Flow Algorithms for the Maximum Flow Problem. B.Sc. Mathematics, Technische Universität Berlin.

Outreach

winter 2020	Basics of Algorithms (four hours, for elderly students). University of Cologne.
summer 2016	Nash Equilibria in Wardrop Games (two hours, for high-school students). Technische Universität München.
2013-2015	Combinatorial Optimization at the Long Night of the Sciences (co-organization, for families). Technische Universität Berlin.

Materials

2023	Slides and Notes for "Discrete Mathematics"
2023	Slides and Notes for "Algorithms under Stochastic Uncertainty"
2021	Slides, Notes, and Videos for "Efficient Algorithms"
2020	Slides and Notes for "Approximation Algorithms"

Teaching Philosophy

In lectures, I believe in engaging students by starting a dialogue with them and, especially for larger audiences, using polls. This way, I make sure that the students stay attentive, that both I and the students keep track of the students' learning, and that the students enjoy the lectures more. To increase engagement further, I give many real-world examples (in which I try not to reinforce any biases), and I even like to use occasional jokes or cartoons in my lectures. Ideally, I try to deliver round lectures which are on a single topic and end by answering a question from the beginning. While enjoyment typically keeps student attendance high, I make clear to the students what the boundaries of the fun are, and that the reason we are meeting is to learn. I make clear that I am merely there to alleviate the learning process (hopefully quite a bit) and that the students must eventually engage directly with the material. There are usually assignments that

must be delivered throughout the semester, and I also clarify that I do not make exceptions with respect to deadlines.
In my advanced lectures, I am practicing research-based teaching. First of all, I teach topics that are relevant or part of current research. Teaching such topics makes sense because these are topics that I am an expert in and that are, from my point of view, both important and interesting to consider. In addition, they are topics in which students can not only be part of an audience but also be participants in research. Being a participant in research additionally prepares them to navigate a supercomplex world by having to question the foundations and frameworks of their knowledge all the time.
I am either aware of open research questions, become aware of them in preparing the course, or students make me aware of them by asking questions (I encourage them to ask specifically such questions). It is then natural that I supervise a thesis (or other research project) on any such question, as part of the curriculum of the different programs that I am teaching in.
To prepare students for research, I give students original research papers to read (most of the time only as background) as part of the advanced courses. In addition, in the assignments, I ask students open questions, i.e., questions in which the task is to prove a statement if it is true or disprove it if it is false, without saying whether the statement is true or false. That is, I ask questions to which the answer is known, but like they were research questions.
Even if I do not supervise students on the research questions, teaching benefits my research in that I become aware of research questions, in that I organize the state of the art for myself such that I get a better overview, or in that I come up with easier (to teach) arguments for certain statements. In fact, there are some topics that I may only learn (in such depth) at all because I am teaching them.
In supervising students, I believe that it is important to first find some (sub-)question that both the student and I are excited about studying; in my view, that is the main force that will keep the project going. I also believe that, in the beginning of the supervision period, frequent meetings are particularly important, so that I can reset or shift the focus whenever I feel that is necessary for a successful thesis. Depending on the difficulty of the topic, I may give more input or less. In the end of the meeting, we usually write down multiple questions that the student can look at until the next meeting. But even later, I believe that regular meetings (at least every two weeks) are necessary. I ask the students early on to write down some of the findings, to give them early feedback and take pressure from them in the final writing period.