Foundations of Artificial Intelligence

0. Organizational Matters

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University of Basel

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0.1 Organizational Matters

People: Lecturer

Lecturers

Prof. Dr. Malte Helmert

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People: Assistant

Assistant

Dr. Salomé Eriksson

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People: Tutors

Tutors

Leonhard Badenberg

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- office: room 04.001, Spiegelgasse 5

Dr. Silvan Sievers

- email: silvan.sievers@unibas.ch
- office: room 04.005, Spiegelgasse 1

Time & Place

Lectures

- Mon 16:15–18:00 in Biozentrum, Hörsaal U1.141
- Wed 14:15–16:00 in Biozentrum, Hörsaal U1.101

Exercise Sessions

- Wed 16:15–18:00 in Biozentrum, SR U1.193 (English)
- Wed 16:15–18:00 in Biozentrum, SR U1.195 (German)

first exercise session: February 23 (this week)

Course Homepage and Enrolment

Course Homepage

https://dmi.unibas.ch/en/studies/computer-science/courses-in-spring-semester-2022/lecture-foundations-of-artificial-intelligence/

- course information
- slides
- exercise sheets and materials
- bonus materials (not relevant for the exam)
- link to ADAM workspace

enrolment:

- https://services.unibas.ch/

Communication Channels

Communication Channels

- lectures and exercise sessions
- ADAM workspace (linked from course homepage)
  - link to Discord server
  - link to SWITCHtube channel with recorded lectures from 2021
  - forum for Q&A and official announcements
- Discord server (linked from ADAM workspace)
  - opportunity for Q&A and informal interactions
- contact us by email
- meet us in person (by arrangement)
- meet us on Zoom (by arrangement)

Course Material

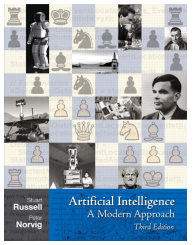
course material:

- slides (online and printed handouts)
- textbook
- additional material on request

Textbook

Artificial Intelligence: A Modern Approach
by Stuart Russell and Peter Norvig
(3rd edition)

- available at Karger Libri
- covers large parts of the course, but not everything



Target Audience

target audience:

- Bachelor Computer Science, ∼3rd year
- Bachelor Computational Sciences, ∼3rd year
- other students welcome

prerequisites:

- algorithms and data structures
- basic mathematical concepts
  (formal proofs; sets, functions, relations, graphs)
- complexity theory
- programming skills (mainly for exercises)

Exam

- written exam on Wed, June 29
  - 14:00-16:00
  - 105 minutes for working on the exam
  - location TBA
- 8 ECTS credits
- admission to exam: 50% of the exercise marks
- no repeat exam

Exercises

exercise sheets (homework assignments):

- mostly theoretical exercises
- occasional programming exercises

exercise sessions:

- discussion of exercise sheets
- questions about the course
- participation voluntary but highly recommended

Theoretical Exercises

theoretical exercises:

- exercises on course homepage every Monday
- covers material of that week (Monday and Wednesday)
- due Sunday of the same week (23:59) via ADAM
- solved in groups of at most two ($2 = 2$)
- discussed in exercise sessions Wednesday following week

Question: Does this work for you, or would you prefer a more delayed exercise schedule?

Programming Exercises

programming exercises (project):

- project with 3–4 parts over the duration of the semester
- integrated into the exercise sheets (no special treatment)
- solved in groups of at most two ($2 < 3$)
- implemented in Java; need working Linux system for some
- solutions that obviously do not work: 0 marks

Plagiarism

Plagiarism (Wikipedia)

> *Plagiarism is the "wrongful appropriation" and "stealing and publication" of another author's "language, thoughts, ideas, or expressions" and the representation of them as one's own original work.*

consequences:

- 0 marks for the exercise sheet (first time)
- exclusion from exam (second time)

if in doubt: check with us what is (and isn't) OK before submitting

exercises too difficult? we are happy to help!

0.2 About this Course

AI in Basel

- research group Artificial Intelligence (AI) at the DMI
- researchers:
  - Prof. Dr. Malte Helmert
  - Dr. Liat Cohen
  - Dr. Salomé Eriksson
  - Dr. Thomas Keller
  - Dr. Florian Pommerening
  - Dr. Gabriele Röger
  - Dr. Silvan Sievers
  - Clemens Büchner
  - Remo Christen
  - Augusto B. Corrêa
  - Patrick Ferber
- https://ai.dmi.unibas.ch/

Research Groups of the Computer Science Section

research area "Distributed Systems":

- High Performance Computing (F. Ciorba)
- Databases and Information Systems (H. Schuldt)
- Computer Networks (C. Tschudin)

research area "Machine Intelligence":

- Artificial Intelligence (M. Helmert)
- Biomedical Data Analysis (V. Roth)
- Data Analytics (I. Dokmanić)
- Optimization of Machine Learning Systems (A. Lucchi)

Classical AI Curriculum

"Classical" AI Curriculum

1. introduction
2. rational agents
3. uninformed search
4. informed search
5. constraint satisfaction
6. board games
7. propositional logic: foundations
8. propositional logic: satisfiability
9. predicate logic
10. modeling with logic
11. machine learning
12. classical planning
13. probabilistic reasoning
14. reasoning under uncertainty
15. decisions under uncertainty
16. acting under uncertainty

$\rightsquigarrow$ wide coverage, but somewhat superficial

Our AI Curriculum

Our AI Curriculum

1. introduction
2. rational agents
3. uninformed search
4. informed search
5. constraint satisfaction
6. board games
7. propositional logic: foundations
8. propositional logic: satisfiability
9. ~~predicate logic~~
10. ~~modeling with logic~~
11. ~~machine learning~~
12. classical planning
13. ~~probabilistic reasoning~~
14. ~~reasoning under uncertainty~~
15. ~~decisions under uncertainty~~
16. acting under uncertainty

Topic Selection

guidelines for topic selection:

- fewer topics, more depth
- more emphasis on programming projects
- connections between topics
- avoiding overlap with other courses
  - Pattern Recognition (B.Sc.)
  - Machine Learning (M.Sc.)
- focus on algorithmic core of model-based AI

Under Construction...

- A course is never "done".
- We are always happy about feedback, corrections and suggestions!