Artificial Intelligence
0. About this Course
Who Will Do What, How, When, and What For

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SAARLAND
UNIVERSITY

COMPUTER SCIENCE

Summer Term 2022

Agenda

1 About Us

2 About the Organization

3 About the Exercises and Exam

4 About the Content

5 About the Lectures

Foundations of Artificial Intelligence (FAI) Group

- **What?** Basic research in AI.
- **Who?**
    - Prof. Jörg Hoffmann (lead)
    - Angelika Scholl-Danopoulos (secretary)
    - Rebecca Eifler (PhD student)
    - Patrick Ferber (PhD student)
    - Dr. Dan Fišer (postdoc)
    - Daniel Höller (postdoc)
    - Thorsten Klößner (PhD student)
    - Marcel Steinmetz (PhD student)
    - Marcel Vinzent (PhD student)
    - Julia Wichlacz (PhD student)
- **Where?** E1 1, 3rd floor.

        http://fai.cs.uni-saarland.de/

FAI and DFKI: Research

FAI: (one research group)

- AI planning, trusted AI, related areas.
- Combinatorial search algorithms, neural action policy verification/testing, explainable AI, . . .
- Project-based collaborations with ML, verification, software testing, natural language generation, HCI, visualisation.
- Foundational research.

DFKI: (many research groups)

- Human-computer interaction.
- Computer graphics, virtual reality.
- Natural language processing.
- . . .
- Spectrum from foundational to application research.

Who Does What in This Course

- Jörg Hoffmann, Dan Fiser, Daniel Höller, Sophia Saller: Lectures.

- Daniel Höller: Overall course organization, tutorials supervision.

- Dan Fišer: Paper exercises, tutorials supervision.

- Thorsten Klößner: Practical exercises.

- Angelika Scholl-Danopoulos: Contact for administrational issues like HISPOS and certificates ("Schein") at the end in case of need.

Who Does What in This Course, ctd.: The Tutors

- Tim Arendes s8tiaren@stud.uni-saarland.de
- Rahul Nittala rani00002@stud.uni-saarland.de
- Jonathan Nöther s8jonoet@stud.uni-saarland.de
- Jonas Lauermann s8jolaue@stud.uni-saarland.de
- Eva Röper evro00001@stud.uni-saarland.de

Lectures: When and Where?

When?

- Mondays 10:15–11:45, Thursdays 16:15–17:45.

Where?

- Online: zoom.
- In presence: Günter-Hotz-Hörsaal (GHH, E2 2).
- Hybrid: GHH & zoom.

$\rightarrow$ For personal health reasons, we'll be doing the lecture online-only while the infection numbers are high.

We might thereafter move to presence lectures in GHH (to be decided). If so, we will look into doing the lectures hybrid (accessible online), but we give **no guarantee that you can participate in all lectures online**.

Regarding Zoom

Why a Meeting Platform?

- Direct interaction!
- Interactive lectures. Questions, quizzes, etc.
- Text-chat questions directly while lecturing.

Why Zoom? (rather than, e.g., MS Teams)

- Usability for lecturing: smooth switching between slides and whiteboard; separate text-chat window while sharing; easy creation of polls; responsiveness; etc.
- Functionality: direct interaction but with control over mute/unmute; possibility to stream directly to YouTube.

What about Privacy? You may:

- Switch off camera and microphone.
- Enter zoom under a nickname or pseudonym.
- Watch lectures on YouTube instead.
- Connect to zoom via an anonymization service such as Tor.

$\rightarrow$ Zoom's complete privacy policy: https://zoom.us/de-de/privacy.html

Tutorials: When and Where?

When?

- Assignment to tutorials will be done via CMS.

Where?

- 2 tutorials online.
- Other tutorials in presence.
- We may change that plan depending on the number of students with a preference for online vs. presence tutorials.

Web Resources

Course CMS Page: One page for everything!

https://cms.sic.saarland/ai_22/

- Basic facts about the course.
- Registration (see also next section).
- Announcements, tutorial groups, exercise sheets, discussion forum for technical questions, . . .
- Lecture materials.

Online Lectures:

https://cs-uni-saarland-de.zoom.us/j/98245956529?pwd=
aU1oZ1ZUTGlxaEorUTNOR2FEU3Jhdz09

- The lectures will also be streamed to YouTube.
- Link to YouTube stream will be posted into the zoom chat at the start of the lecture.

Registration

CMS: All course materials!

- Register to CMS using your uni-saarland email address.

  If you have issues with the login, contact Daniel Höller.
- Within CMS, we are "Summer term 2022", "Artificial Intelligence".
- Everything happens in CMS, so do register soon!

Registering for the exams:

- According to your course of study. For questions, please contact (not us but) the study administration, studium@cs.uni-saarland.de

Your Questions

Technical questions about course content/exercises:

- CMS Forum. (Read by everybody: All students, the whole AI'22 team.)
- Also, of course: Your tutor, if it's about the exercises.

Other questions:

- Jörg Hoffmann.
- Come to the front directly after the (presence) lecture.
- Or email.

You Must Register!

You must register for the tutorials!

- Go to "Tutorial groups" and choose an available tutorial group.
  → Size limit is 30, first come first served.

- Once registration is closed, you can switch between tutorial groups only if you find an exchange partner in the respective other group. In such case, contact the tutors of both groups involved.

- Registering for the *exam* ($\neq$ tutorials): HISPOS.

You Must Register! Ctd.

Tutorial groups:

- The time slot, place, and tutor for each group will be listed in CMS.

Registration Timing:

- Registration will open Wednesday, April 13, at 20:00.
- We expect to close registration on Monday, April 20, 15:00. But that may be subject to changes.
  Pay attention to the announcements in CMS!

Student groups:

- You may solve the exercises in groups of up to 3 students.
- All authors must be from the same tutorial group.
- The same student group must address both, the paper and the practical exercises.

Exercises

TWO different kinds of exercises:

- Paper: Understand and apply concepts from the course.
- Practical: Experience with AI modeling languages and tools.

Paper Exercises:

- Apply concepts and algorithms to examples, lead simple proofs.
- 1-week intervals for hand-out/submission.

Practical exercises:

- Model given problems in AI formalisms, solve with off-the-shelf tools.
- Models checked by the tutors, graded based on correctness.
- 2-week intervals for hand-out/submission.

Duplicate Solutions Policy:

- We will check for identical solutions across student groups.
- Such solutions will get no points.

Exercises: Organization

Hand-out: CMS, Friday week **X**

- Paper exercises: 10 exercise sheets.
- Practical exercises: 4 exercise sheets.

Submission: *Before* Friday midnight, week **Y**

- Paper exercises: Week **Y=X+1**. Electronic solutions (PDF only!) submitted in CMS.
- Practical exercises: Week **Y=X+2**. Submission in CMS.

Tutorial groups: Week **Y+2**

- Participation not obligatory. But highly recommended!

Exams

The exams will consist of exercises similar to the paper exercises.

Exams rules:

- Exam qualification: $\geq 50\%$ points on each sheet for 75% of the theoretical exercise sheets **AND** for 75% of the practical exercise sheets.

  $\rightarrow$ This year: 8 out of 10 theoretical and 3 out of 4 practical sheets.

- Open book. Any paper material allowed. No phones or computers.

Exam vs. re-Exam:

- Each is a separate attempt to pass this course.
- Both exams taken $\implies$ better score counts.

Exam preparation: (Instead of regular lecture on Thursday, July 21)

- Lists exam-relevant parts of course; example exercises.
- Opportunity to ask questions.

Exams Dates & Locations

Exams Dates:

- Exam: Wednesday, July 27, 14:00-16:00.
- Re-Exam: Wednesday, September 28, 14:00-16:00.

Exams INSPECTION Dates:

- Exam Inspection: Wednesday, August 3, 14:00-17:00.
- Re-Exam Inspection: Wednesday, October 5, 14:00-17:00.

$\rightarrow$ This is a big course. Individual inspection dates will NOT be arranged. You know the inspection date & time several months in advance. If you want to inspect your exams, mark your calendar.

Course Outline

Keyword	Content	Topic
Introduction	Clarify the background	Introduction
Intelligent Agents	Establish some basic concepts	Introduction
Classical Search	How to find routes, solve puzzles, find bugs in software, . . . ?	Search
Adversarial Search	How to solve games?	Search
Constraint Satisfaction Problems	How to schedule sports events, car manufacturing, . . . ?	Search
Propositional Reasoning	How to "think" rationally?	Logics
Predicate-Logic Reasoning	A more powerful framework for "thinking"	Logics
Planning	How to describe and solve *all* action-choice problems?	Search & Logics
Probabilistic Reasoning	Thinking, beyond "1 or 0"	Uncertainty
Machine Learning	A brief introduction	ML
Trust in Neural Action Policies	Is the ML component safe?	Trusted AI

Course Material

Most of the course is based on

Artificial Intelligence:
A Modern Approach, Third Edition

Stuart Russell and Peter Norvig (RN)
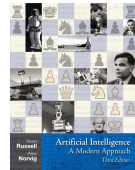
. . . but this book is not our "Bible":

- It's great to get intuitions on the basics of what we'll discuss.
- The book basically is "broad but shallow": An immense breadth of AI sub-areas is being covered. Thus the book does not cover many important recent developments, and it often lacks formality.

  $\rightarrow$ We focus on a smaller range of areas, treated in more depth.

$\rightarrow$ RN is the basis of many AI courses out there, e.g., Norvig and Thrun's famous Udacity course (https://www.udacity.com/course/cs271). These courses partially overlap with the present one. They can provide useful additional background/explanations, but differ in many details.

$\rightarrow$ The "ground truth" for this course are the **post-handouts**.

Course Prerequisites and Aims

Prerequisites:

- Algorithms: Solid knowledge.
- Complexity theory: Basic knowledge (**NP**-hardness).

Aims: At the end of the course, you should . . .

- . . . be familiar with prominent research areas in AI.
- . . . understand, and be able to apply, the basic concepts and algorithms of these (main ability required for successful exam!).
- . . . have the basis to specialize in, and work on, an AI research subject at FAI or DFKI.

  → **BSc, HiWi jobs, MSc, PhD**

Questionnaire

Question!

How many scientific articles were submitted to the 2021 International Joint Conference on Artificial Intelligence (IJCAI) in Montreal (actually: in a "Montreal-themed virtual reality")?

(A): ca. 100   (B): ca. 1000

(C): ca. 2000   (D): ca. 4000

$\rightarrow$ Answer (D) is correct (4204).

Questionnaires:

- At end of section/at start of 5 min break.
- You get 2 minutes/5 minutes.
- You're free to make noise (e.g., discuss with your neighbors).

More Generally: Questions to You

When will they be asked?

- In questionnaires.
- At various points during the lectures.
- We'll do many examples together.

Why are they being asked?

- They give you the option to follow the lectures *actively*.
- They allow us to check whether or not you are able to follow.

How will we look for answers? (in-presence teaching only)

- "Streber syndrom": 3 students answer all the questions, $N-3$ sleep.
- If this happens, we may resort to picking students randomly.

$\rightarrow$ There is nothing to be ashamed of when giving a wrong answer! You wouldn't believe the number of times we got something wrong ourselves. (We do hope all bugs are removed now, but . . .)

Slides Availability

"Gotcha! I'll just look up the answers on the hand-outs!"

$\rightarrow$ It's not gonna be *that* easy:

Pre-Handouts:

- Without answers to questions.
- Without details for examples.

Availability:

- 1 day before chapter begins.

Post-Handouts:

- With answers to questions and details for examples.
- Corrections, where applicable.

Availability:

- Day the chapter ended.

And Now . . .

That's It! Enjoy the course!