Introduction to Artificial Intelligence

Course Organization

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University of Zagreb
Faculty of Electrical Engineering and Computing

Academic Year 2022/2023

v3.2

Teaching staff

Lecturers:

- Prof. Jan Šnajder, PhD
- Assoc. Prof. Marko Čupić, PhD
- Prof. Bojana Dalbelo Bašić, PhD

TAs:

- David Dukić (TAC)
- Antonella Barišić, Ivan Bilić, Filip Karlo Došilović, Nina Drobac, Fran Jelenić, Marko Križmančić, Josipa Lipovac, Terezija Matijašević, Ana Milas, Athanasios Papanikolaou, Rafael Josip Penić, Filip Tomas

Student TAs:

- Marko Damjanić, Mladen Džida, Andrija Gorup, Ivan Furač, Lea Krsnik, David Kerman, Mihael Miličević, Mislav Perić, Ema Smolić, Janko Vidaković

About the lecturers

Marko Čupić, PhD
https://www.fer.unizg.hr/marko.cupic

- Graduated (2002) and PhD (2010) in computer science at FER
- Passionate about teaching and involved in a legion of CS courses
- Research interests: artificial intelligence, computer graphics, optimization algorithms, e-learning, programming paradigms, operating systems

About the lecturers

Jan Šnajder, PhD
http://www.zemris.fer.hr/∼jan/

- Graduated (2002) and PhD (2010) in computer science at FER
- Postdoc at the University of Heidelberg, research visits to University of Stuttgart, NICT Kyoto, University of Melbourne
- Research interests: natural language processing (NLP) and machine learning (neural NLP models, text analytics, computational social science)

Lectures & office hours

Lectures:

- EN: Mon 13–16 (D1)
- HR: Wed 8–11 (B1), Fri 13–16 (B1), Fri 16–19 (B1)

Office hours:

- Thu 11–12, need to register online by Tue EOD

Contact:

- Please use the contact form:
  `https://forms.gle/a2y6h1BDCWHqraW19`

NO EMAILS

Due to the high number of students, we cannot reply to your emails. Please use the contact form. If you have any content-related questions or need assistance with your lab assignment, please come to office hours.

Course web page

https://www.fer.unizg.hr/predmet/uuui

Course schedule

1. Introduction to AI
2. State space search
3. Heuristic search & game playing
4. Knowledge representation
5. Automated reasoning
6. Logic programming
7. Expert systems

   Midterm exam
8. Reasoning with uncertainty
9. Basics of machine learning
10. Neural networks
11. Biologically-inspired algorithms
12. Reinforcement learning
13. Societal and philosophical aspects of AI + wrap-up

    Final exam

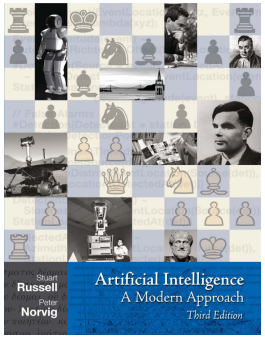
Learning outcomes

After completing the course, you'll be able to:

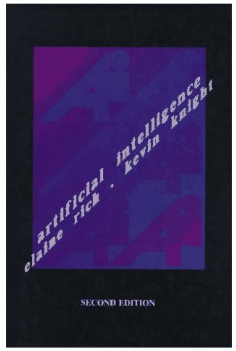
1. define the basic concepts of:
   artificial intelligence, logic programming, expert systems, and machine learning
2. distinguish between symbolic and connectivistic approaches to AI
3. compare various approaches for representing uncertainty/vagueness
4. implement AI algorithms and apply them to simple problems:
   a state space search algorithm, a biologically inspired optimization algorithm, simple first-order logic theorem prover, and two machine learning algorithms
5. assess the applicability of different AI methods and paradigms for a given AI problem
6. outline the societal and philosophical aspects of AI

Textbooks

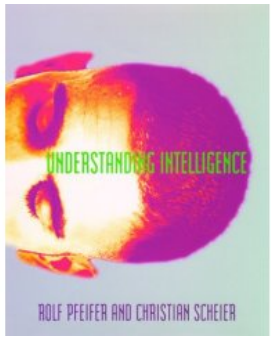
- Stuart Russel and Peter Norvig:
  Artificial Intelligence – A Modern Approach,
  Prentice Hall, 2009 (1995).



- Elaine Rich and Kevin Night:
  Artificial Intelligence,
  McGraw-Hill, 1990.

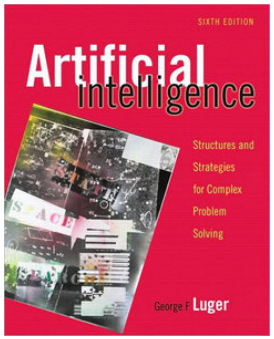


- Rolf Pfeifer and Christian Scheier:
  Understanding Intelligence,
  MIT Press, 1999.

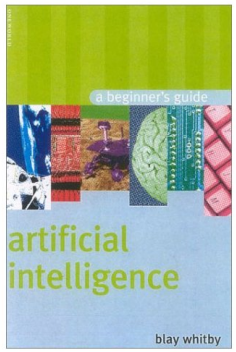


Additional references

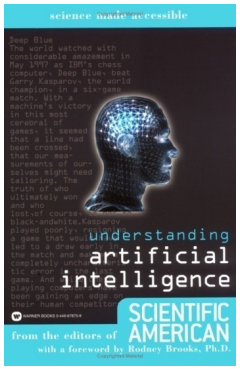
- George F. Luger: *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*. Addison-Wesley, 2008.



- Blay Whitby: *Artificial Intelligence*, Oneworld Publications, 2003.



- *Understanding Artificial Intelligence*, Grand Central Publishing, 2002.



Videolectures

- 30+ hours of prerecorded videolectures are available for you to study at your own pace, in English or Croatian
- Available on YouTube:
  - EN: here
  - HR: here
- Most topics are covered (8 out of 12)

Lectures

- Some lectures will be delivered in standard, **ex-cathedra style**
  - We'll go through the topic in class
  - Try to pay attention and do ask clarification questions when unclarities arise
- Other lectures will be delivered in **flipped classroom** style
  - You study at home (self-study), and we discuss unclarities and solve problems in class together
  - Prepare by watching **videolectures** (available here)

Exams

- Continuous assessment: midterm exam + final exam
  - material covered in the midterm exam is not included in the final exam
- Regular exams: written + oral
- Exams are designed to assess both theoretical and practical knowledge
- Written exam has multiple choice questions
  - 3 types of questions: theory, problem solving, numerical
  - negative points for wrong answers
- No thresholds on the exams
- Negative points don't carry over (scores are floored at 0)

Lab assignments

- Implementation+demonstration of a solution to a practical AI problem
- In programming language of your choice: **C++, Java, Python**
- Four assignments, each worth 7.5 points, for a total of 30 points
- You need to submit your solutions before the deadline (via Moodle)
- Then, you'll demonstrate your solution to TAs in lab sessions

- You can revise your submission as many times as you want before the deadline
- Late upload: within 48 hours after the deadline, 50% score penalty
- Deadline is at 23:59. One second or more after the deadline is considered LATE UPLOAD. Please don't contact us about being only X seconds late. Please upload your assignment on time or accept the consequences.

Lab assignments: Topics & deadlines

- **LAB1: State space search**
  - Submission deadline: 23 Mar 2023 at 23:59
- **LAB2: Propositional logic theorem prover**
  - Submission deadline: 6 Apr 2023 at 23:59
- **LAB3: Supervised machine learning**
  - Submission deadline: 18 May 2023 at 23:59
- **LAB4: Neural networks & Genetic algorithms**
  - Submission deadline: 1 Jun 2023 at 23:59

Lab assignments are individual work!

Rules of Individual Work

1. You need to solve the assignments on your own
2. You can discuss the assignment with other students before you start working on it (please list the names of students you talked to)
3. You may consult internet sources for generic (task unrelated) parts of your code, but you must reference (as comments in your code) all internet sources you used
4. Use of AI coding assistants (including generative AI tools, such as ChatGPT) is not allowed
5. You must not reuse the code you wrote before, unless you wrote it completely by yourself
6. Violation of any of the above rules will be considered cheating or plagiarism and will be subject to academic sanctions

If any problems arise, please come to the office hours! We are here to help.

Lab assignments – remarks

1. Solutions must be working. Non-working solutions (solutions that cannot be executed/run) will not be accepted
2. The code must be clean and well-documented. Solutions that don't meet this requirement will not be accepted
3. You must be able to demonstrate a good understanding of the code you wrote. If it turns out that you don't understand your own code, your solution will not be accepted
4. You should be able to make minor modifications to your code upon TA's request, as well as recompile/rerun the code
5. Your code must be yours and yours only. Code plagiarism will be drastically sanctioned

Lab assignments – tips

1. Start working on it on time.
2. Don't overestimate your abilities. Don't start working on the assignments on the weekend before they are due.
3. If you still didn't manage to complete the assignment on time, don't hand in a copy of somebody else's work. Instead, learn from this and start earlier next time around.
4. Allow for unforeseen circumstances. Something might not work as you expected, or it might take you longer to figure something out. If you leave yourself enough time for such situations, you will avoid stress.
5. Review the theoretical foundations behind each assignment. The purpose of laboratory tasks is precisely to connect theory with practice. The TAs may ask you to explain the theory behind each problem.

Grading

	Continuous		Exam	
	Threshold	% grade	Threshold	% grade
Lab assignments	25%	30%	25%	30%
Midterm exam		35%		
Final exam		35%		
Written+oral exam			50%	70%

- You must score at least 7.5 on lab assignments (25% of 30%). This threshold is on the total lab score (you need not do all assignments)
- Oral exam primarily serves to verify the score of the written exam and correct the grade (upward or downward)
- Bonus points may be awarded for class participation

Grading

89.00 – 100.00	Excellent (**5**)
76.00 – 88.99	Very good (**4**)
63.00 – 75.99	Good (**3**)
50.00 – 62.99	Sufficient (**2**)
00.00 – 49.99	Insufficient (**1**)

NB: Points are rounded to two decimals for each activity.

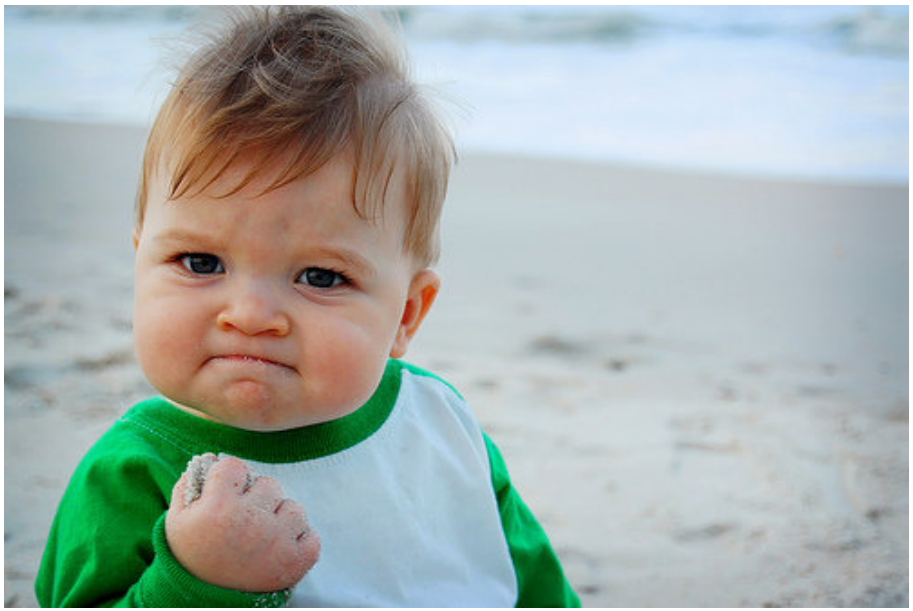
How difficult is this course?

ECTS score workload

- This course is worth 4 ECTS
- This transfers a workload of at least 120 hours
- A total of 44 hours goes for lectures and exams
- At least 76 hours remain for individual work (more than 4 hours per week)

Feedback

- This course (and teaching in general) is here for you
- Your opinion is important for improving the course and our teaching
- Unfortunately, experience has shown that anonymous comments are of poor argumentation quality, hence we will not be reading them



Instead. . .

Liaison students

(hrv. vezni studenti aka veznjaci)

- Every three weeks, and more often if necessary, we'll randomly **select five students** for the role of **liaison students** and meet with them
- Liaison students act in two capacities:
  - **Personal capacity:** provide their own feedback (progress, unclarities, likes/don't likes)
  - **Representative capacity:** report on issues/ideas collected from other students. Liaison students are obliged to preserve anonymity of students whom they represent
- All issues will be discussed in detail and potential **interventions** will be deliberated and implemented whenever possible

Mandatory participation

If selected as a liaison student, you are **obliged** to participate (except in cases of force majeure; notification required). Your participation is a **requirement** for passing the course. Please follow course announcements!

In case of difficulties or concerns

If you encounter difficulties with your studies (problems you cannot solve on your own or for which you need advice), you may get in touch with **FER's Student Counseling Service**:
https://www.fer.unizg.hr/en/lifeatfer/health_and_welfare/counseling_service

If the problems pertain to this course, do contact us directly at jan.snajder@fer.hr or marko.cupic@fer.hr and we'll see what we can do. Also, feel free to get in touch if you need advice or have a professional/career question regarding AI or studies in general.