Introduction to AI

Prof. Ahmed Guessoum
National Higher School of AI

Chapter 0

Course Organisation & Motivation

Course instructors

- **Instructor**: Prof. Ahmed Guessoum

  Lectures: Mon.: Sec. 1   8:30-10:00;   Sec. 2   10:10-11:40
  Amphitheatre 2

                  Wed.: Sec. 2 8:30-10:00;   Sec. 1 10:10-11:40
  Amphitheatre 3

  Office Hours: Mon. & Wed. 11:50 – 13:20 Room L2-102

- Tutorial & Lab Assistants:

Tutorial Instructors	Lab Instructors
Prof. Ahmed Guessoum: G1 (Tuto 1)	Dr. Mohamed Seghir Hadj Ameur: G1, G2, G3, G5, G6, G9, G10, G12
Dr. Meriem Amel Guessoum: G2, G3, G4, G5, G6	Dr. Youcef Omar:i G4, G7, G8, G11
Dr. Mohamed Akram Khelili: G7, G8, G9, G10, G11, G12	

Course Organisation

- **Prerequisites**: Good programming skills

- **Grading**:
  - Continuous assessment: **40%**
    - Instructors' Assessment (Tuto., Labs)   /05
    - 1 Project   /20
    - In-class online Quizzes   /15
    - 1 Midterm Exam   /20
  - Final exam (FE):   **60%**   /20

- Course average = (2*(A+P+Q + ME)/3 + 3*FE) / 5

- **Textbook**: Russel, S. and Norvig, P. (2020) Artificial Intelligence, A Modern Approach (4th Edition), Pearson Education Limited. https://www.pearson.com/us/higher-education/program/Russell-Artificial-Intelligence-A-Modern-Approach-4th-Edition/PGM1263338.html
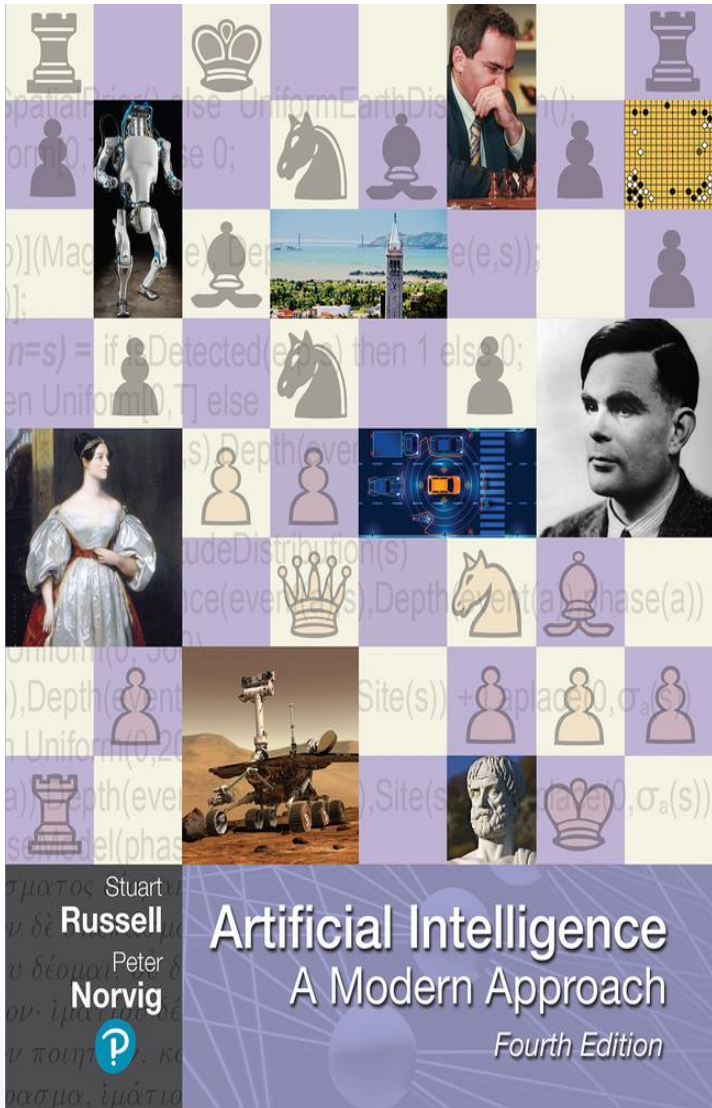
The textbook

- Presented by the authors (UC Berkey website) as "*The authoritative, most-used AI textbook, adopted by over 1500 schools.*"

- Presented on amazon.com as follows: "*offers the most comprehensive, up-to-date introduction to the theory and practice of **artificial intelligence**.*" and "*explores the full breadth and depth of the field*" of AI.

Other references

- Luger, G. F., "Artificial Intelligence - Structures and Strategies for Complex Problem Solving", Addison Wesley, 6th Edition, 2009.

- Poole, D., Mackworth, A, "Artificial Intelligence - Foundations of Computational Agents", Cambridge University Press, Second Edition, 2017.

Commitment!

- <u>Lectures</u>:
  - ◆ Attendance will help you enormously in understanding the material and in better answering exam questions
  - ◆ **<u>Attendance will be systematically taken</u>.**
  - ◆ No late students' arrivals will be accepted after 5 minutes from the official start time.

- <u>Tutorial & Lab sessions</u>:
  - ◆ Attendance is mandatory thus the Instructors' mark (averaged between tutorial and lab) will depend on it, but not exclusively.

- <u>Mini project</u>: The rules of the mini project and the late submission policy will be detailed in the project statement in due time.

Assessments

- Online Quizzes will be On-the-fly quizzes during the lectures. Any quiz that is missed ➔ 0.

- Midterm exam: During week ??-??/3/2024 (Exact period for exams and course midterm date to be decided by the administration)

- Absence at exam?
  - ◆ Only an official justification (hospitalisation!) validated by the administration will be accepted.
  - ◆ Make-up exam?

- Mini-Project: Work in teams.
  - ◆ Out on 28/02; Due on 10/05
  - ◆ No cheating (plagiarism or other type of misconduct) will be tolerated. ➔ Very serious consequences.

Course Content

- **Introduction to AI:** Definition; foundations; history; state of the art; risks and benefits.

- **Intelligent Agents:** Agents and environments; concept of rationality; the structure of agents

- **Search:** Search algorithms; uninformed search; informed (heuristic) search; tree search and graph search; A* algorithm; …

- **Adversarial Search and Games:** game theory; optimal decisions in games; heuristic Alpha--Beta tree search; Monte Carlo tree search; partially observable games; …

- **Constraint Satisfaction Problems :** Definition of CSPs; constraint propagation: inference in CSPs; backtracking search for CSPs; …

Course Content (cont.)

- **Knowledge Representation and Reasoning:** Semantic networks; frames and rules; inference and logic; inheritance, forward and backward chaining; reasoning systems.

- **Reasoning Under Uncertainty**: Acting under Uncertainty; Inference Using Full Joint Distributions; Bayes' Rule and Its Use; Probabilistic Reasoning ; Exact and Approximate Inference in Bayesian Networks

- **Automated Planning:** Definition; algorithms for classical planning; heuristics for planning; hierarchical planning; planning and Acting in nondeterministic domains; …

- **Key Application Areas for AI:** Expert systems; decision support systems; speech and vision; natural language processing; information retrieval (If time permits)

Course Teaching

- **Lecture PowerPoints:**
  - All slides are based on Russel&Norvig's textbook
  - I will make use of the PPT chapters prepared by
    - Prof. Dan Klein and Prof. Pieter Abbeel, U. of Berkeley, USA
    - Prof. Mark Hasegawa-Johnson from the U. of Illinois, USA, on the basis of the course textbook.

- **Labs**:
  - Installation of Python a package manager (Anaconda).
  - Installation and use of the Jupyter environment (https://jupyter.org/install)
  - Use of Python as a programming language
  - Introduction to Python programming
  - Lab sessions to cover the course topics

Why Python now?

- Let us ask ChatGPT! ;-)

Which programming language to start with C++ or Python?

- <u>ChatGPT</u>> "The choice between starting with C++ or Python depends
  - ◆ on your individual goals and
  - ◆ what you want to do with programming.

  Here's a brief overview of each language to help you make a decision:

C++ (ChatGPT)

- "C++ is a high-performance, low-level programming language, which makes it a great choice for system programming, game development, and other applications that require performance.

- It is a statically typed, compiled language, which means that errors are caught during compilation, making it less prone to runtime errors.

- C++ is a complex language and can be difficult to learn for beginners, but its syntax is close to that of other popular programming languages like C and Java, so it can be a good choice if you plan on working with those languages in the future."

Python (ChatGPT)

- "Python is a high-level, dynamically typed language, which makes it a great choice for scripting, web development, scientific computing, and data analysis.

- It has a simple, readable syntax and is often considered one of the easiest programming languages to learn, especially for beginners.

- Python is an interpreted language, which means that you can test your code interactively and see the results immediately, which can make the development process faster and more efficient."

Conclusion (ChatGPT)

- "In conclusion, if you're looking for
  - ◆ a powerful, low-level language that is suitable for system programming and game development, then C++ might be the better choice for you.
  - ◆ a language that is easy to learn and use for scripting, web development, or data analysis, then Python is a great choice."

Questions?