

## COURSE DESCRIPTION: ELEMENTS OF AI: BUILDING AI

### SYLLABUS AND LEARNING OBJECTIVES

The course can be completed on three difficulty levels: beginner, intermediate, and advanced. Depending on the level, the following learning objectives are achieved as indicated below. After the course, the student is able to:

- *all levels*: describe different types of AI techniques such as optimization, reasoning, and learning
- *all levels*: choose a suitable AI approach to solve simple tasks such as route planning, probabilistic inference, and pattern recognition
- *intermediate and advanced*: implement a straightforward brute-force optimization algorithm
- *intermediate and advanced*: implement simple probabilistic inference based on statistical data using the Bayes rule
- *advanced*: build linear regression models from data
- *all levels*: use linear regression models to predict variables of interest
- *intermediate and advanced*: use the nearest neighbor method to predict variables of interest
- *all levels*: explain the basics of working with text via natural language processing
- *intermediate and advanced*: use the TF-IDF representation to turn text into numerical data
- *all levels*: understand the risks of overfitting
- *advanced*: build logistic regression models from data and apply them to predict variables of interest
- *all levels*: understand the mathematical models underlying neural networks
- *intermediate and advanced*: build simple neural network models from data and apply them to predict variables of interest
- *all levels (optional final project)*: ideate new AI solutions for real-world problems

The course material contains text and interactive elements. The exercises are designed to challenge the student to re-read the material and find for information from additional sources in order to solve the tasks where necessary.

### ASSESSMENT

The course is completed online (full distance learning) and there are no attendance requirements or exams. The course is completed by doing exercises which are automatically graded. In order to pass the course, at least 19 of

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the 21 exercises must be completed, and 50% of all exercises must be answered correctly. Each exercise has three difficulty options (beginner, intermediate, and advanced). Doing any one of these levels will count as completing the exercise.

If at least 14 of the completed exercises are of intermediate difficulty, the course is completed at intermediate level. Likewise, if at least 14 of the completed exercises are of advanced difficulty, the course is completed at advanced level.

#### TIME REQUIREMENT AND STUDY CREDITS

The time requirement and the number of credits depends on the chosen difficulty level.

**beginner:** approximately 15 hours, no study credits are offered

**intermediate:** approximately 30 hours, 1 cu

**advanced:** approximately 40 hours: 2 cu

**Students who are eligible to apply for study credits through the University of Helsinki Open University can do so free of charge. An electronic course certificate is available for a fee. The certificate can be validated at <https://certificates.mooc.fi> with a personal verification link which is shown on the certificate.**



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