



Undergraduate program

Syllabus of the Course

Introduction to Artificial Intelligence - AI 101

Summer School

Introduction to AI and its relation to business; decision making, operations, legal and ethical topics.

(ECTS 5)

The mission of ZSEM is to transfer values, knowledge, and skills that students need for long-term success in a globalized business world undergoing constant technological and market transformations.

FACULTY

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COURSE SCHEDULE

Lectures: ZSEM

Seminars: ZSEM

COURSE DESCRIPTION

The technologies of Artificial Intelligence will add 13T USD to the global economy in this decade, or 1.2% gdp growth annualized. The whole IT industry added 0.6% gdp growth on an annual basis over the past 30 years. Not only will AI have a huge impact technologically but it will transform society, the work force and businesses alike. Market leaders and innovative startups are already harnessing this potential. A basic understanding of this field is necessary for decision makers and managers to be successful leaders in the coming decade.

Surveys regularly rank AI as one of the most interesting and fastest-growing fields, and it is already generating over a trillion dollars a year in revenue. AI expert Kai-Fu Lee predicts that its impact will be “more than anything in the history of mankind.” Moreover, the intellectual frontiers of AI are wide open and AI has many openings for full-time masterminds.

The course has several goals related to the use of AI in modern businesses and it is aimed at students with no prior knowledge of AI, Machine Learning or programming. The course is designed to present students with; an overview of the history and place of AI, its techniques and terminology, its main uses in today's products and businesses, its relation to business decision making and organization, forming predictions, its risks and open ethical questions. The end goal of the course is to place the student in a position where they can actively participate in AI related business or public decision making and give them a starting foundation to further their own exploration of the field if they choose to do so. The course is designed to be equally useful to students who decide to pursue management or technical tracks.

Course goals	Learning outcomes
Acquire knowledge of the definition and evolution of AI, its terminology, main areas of application and research and the concepts of patterns, predictions and intelligent agents.	After studying the given topics, students should be able to: • Recognize AI problem domains • Identify domains where AI techniques could be applied • Examine real world systems and how

	they use AI techniques • Design AI approaches for select problem areas
Develop analytical thinking about problem solving with intelligent agents. Develop an understanding of knowledge representation and acquire knowledge on planning techniques and agents acting in the real world.	• Propose or analyze agent based AI solutions • Specify and describe knowledge based systems • Examine and quantify planning systems • Author reports on specific AI use cases
Develop skills in the contemporary use of AI. Acquire knowledge on how business decision making is changing based on AI techniques. Get familiar with most common uses of AI and with new areas looming over the horizon. Develop an understanding of the economics of AI.	• Make or refute a case for the use of AI in a business operation • Write reports on the use of AI in a particular business context • Quantify different AI approaches to solve business objectives • Participate in a mixed team decision making process
Participate in the design of systems that act intelligently and learn from experience.	• Identify suitable problem domains and data • Quantify basic economics of a system • Author pro and con arguments
Acquire knowledge of the risks and ethics of AI and AI based systems. Acquire a brief overview of common security risks and introduce basic concepts of privacy in order to tie them to the AI field.	• Examine risk in AI systems • Recognize components and data in AI systems which increase risk • Classify types of risks present in an AI system • Author risk reports on AI based systems
Develop expertise on the business impact of AI and strategic AI related decision making.	• Propose or review a business's technological portfolio • Consult on the application of AI • Participate in strategic AI related decision making • Identify AI decision making stakeholders

COURSE CONTENT

Modifications to the course may be announced in advance during the class.

Unit 1

Introduction to the definition, motivation and historical development of AI. Why AI?

Unit 2

Overview AI from three perspectives; technological, application domains, and economic significance. What is the impact of AI?

Unit 3

The role of classification, pattern recognition, search and prediction. Statistics and probability refresher.

Unit 4

Intelligent agents and cognitive architectures.

Unit 5

AI Algorithms - Classes of algorithms

Unit 6

Applications of AI

Unit 7

The economics of AI

Unit 8

Computer vision, Robotics and Autonomous Systems

Unit 9

Speech and Natural Language

Unit 10

Data, Data Bias and Uncertainty, Privacy, Ethics and Legal considerations

TEACHING METHODS AND STUDENT WORKLOAD

Lectures	30 hours (2 hours per session)
Seminars	15 hours (1 hour per session)
Individual project / essay / exam work	45 hours
Team project work	45 hours
Online activity	15 hours
Total student workload	150 hours (5 ECTS x 30 hours)

Lectures and seminars	1.5
Individual project or essay work	1.5
Team projects	1.5
Online work	0.5
Total ECTS	5.0

GRADING AND STUDENT ASSESSMENT

The grades in this course are achieved by the following elements:

Exam A	15%
Exam B	15%
Projects	50%
Activity during lectures	20%

During summer school, according to ZSEM rules, students must attend at least 75% of the classes.

However, this rule does not apply to students who have been granted special treatment during their studies by the ZSEM administration (active athletes, long sickness).

If the student does not attend at least 75% of the classes, he/she will not be allowed to take the final exam but will have to enroll in the course next year.

ELEMENTS OF THE GRADE

Midterms

- Each student has to take 2 tests, each of the tests carries 15% of the final grade.
- Each question has 4 answers of which only one or more are correct.
- Each question correctly answered carries 1 point, 0 for an incorrect answer and 0 for a passed question.
- The time allotted for the whole test is 40 minutes.

Projects

- Projects are mandatory, can be individual or group activities and take place each week.
- A due date will be given for each project, if the due date is missed this will lower the final project score.
- Timely completed projects are a condition for taking exams.
- Students who take the role of a presenter are awarded extra points to be added to their project grade for a particular project, the final grade is the mean of both grades.

Activity during lectures

- Being proactive during lectures is awarded 20% towards the final grade.

- Attendance is obligatory. Students must attend at least 75% of all lectures.
- Absence justification is regulated by the college rules.
- Students are obliged to use the Moodle/Loomen platform regularly. Moodle is considered to be a basic tutorial tool as well as the basic source of information regarding terms, exams, results and other information connected with the course of study. It is used as a communication “channel” among professors and students. Students are supposed to check the website on a daily basis, monitor the mail folder and take part in discussion sections.
- **Cheating on exams is** strictly prohibited. Students are not allowed to cheat or allow other students to cheat. This practice will be considered a fraud and punished according to college rules.
- At the end of the semester students are obliged to fill a survey on Moodle in which they are going to be able to evaluate their satisfaction with studying on ZSEM, this course and lecturers on this course. The purpose of this survey is to continuously increase the quality of studying on ZSEM.
- **Registering grades:** Students are required to register his/her grade during the terms that are posted on the Moodle along with the test and exam results. The registration usually takes place within a seven – day period. If the student cannot come personally, he/she can send his index for grade registration via another student or relative. If the student missed the registration process without any notice, grade “insufficient” will be reported in the exam documentation.

Student presentations

- In coordination with their professor students who are interested in doing so can present on a topic of their particular interest.
- This presentation is optional. Depending on the quality of the presentation the student will receive up to 10% towards the final grade.

FINAL EXAM

Students that failed a midterm will have to take the final exam. Also, students can decide to take the final exam if they are not satisfied with the grade obtained through midterms. The final exam grade is only a function of the final test score achieved.

Students are obliged to personally attend grade signing. Course professor has the right to orally examine every student if he/she feels that it is necessary to do so.

Grades will be calculated using the following scale:

Percentage	Grade
$\geq 90\%$	5
$\geq 80\%$	4
$\geq 70\%$	3
$\geq 60\%$	2

FACULTY - Boris Debić

Boris Debić is a former Google technologist, Chief History Officer who spent 15 years with the company since 2005 in the period of the most accelerated growth (\$3B to \$161B revenue/yr, 3500 to 210k workforce). He holds an M.Sc. in Physics from the University of Zagreb, Croatia. At Google he has worked in several roles: Release engineering, Privacy, Global Infrastructure, Data center site location, AI driven decision making, Ads serving and machine learning infrastructure, Developer Relations. He has worked with Google.org on analysis and exchange of global climate modeling data sets and agricultural data to provide food security forecasts, also in providing access to education to Syrian refugees in Jordan and across the Arab world and access to health facilities in Sub-Saharan Africa. With support from NASA Ames directs Mars Society's NorCal Rover project. He is a board member of several high tech startup companies in both the US and Croatia including <http://production.pro> which was featured as a top three at Launch Fest in San Francisco. He is an associate of the Zagreb School of Economics and Management. Prior to Google he held positions in: Silicon Valley startups, most notably E.piphany; the United Nations; the Croatian Ministry of Foreign Affairs and the University of Zagreb. Boris Debić has been a lecturer, invited keynote speaker and organizer of Computer Science conferences.