



**SUBJECT DATA SHEET AND REQUIREMENTS**

last modified: 18<sup>th</sup> May 2016

**APPLIED ARTIFICIAL INTELLIGENCE.**

**MESTERSÉGES INTELLIGENCIA MÓDSZEREK ALKALMAZÁSA**

1	Code	Semester nr. or fall/spring	Contact hours/week (lect.+semin.+lab.)	Requirements p / e / s	Credit	Language
	<b>BMEGEGT9101</b>	<b>spring</b>	<b>2+0+0</b>	<b>e</b>	<b>3</b>	<b>English</b>

**2. Subject's responsible:**

Name:	Title:	Affiliation (Department):
Dr. József Váncza	Associate professor	Department of Manufacturing Science and Engineering

**3. Lecturer:**

Name:	Title:	Affiliation (Department):
Dr. József Váncza	Associate professor	Department of Manufacturing Science and Engineering

**4. Thematic background of the subject:**

Advanced methods of contemporary Artificial Intelligence research, specifically applicable in engineering.

**5. Compulsory / suggested prerequisites:**

**6. Main aims and objectives, learning outcomes of the subject:**

The actual topics fit to the doctoral research themes of the PhD students who may tackle their own problems by making use of up-to-date AI methods, tools and techniques. However, emphasis is put on taking a critical approach to contemporary AI methods. Survey of related literature and learning the application of some selected AI tools is part of the program.

**7. Method of education:**

Lecture 2 h/w

**8. Detailed thematic description of the subject:**

Week	Lecture
1-2.	Semantic networks, semantic Web, computational ontologies, ontology building and mapping
3.	Advanced logical reasoning systems.
4-5.	Stochastic local search methods and its typical applications in combinatorial optimization.
6-8.	Constraint programming (CP); the combination of reasoning and search, constraint propagation, commercial and open source CP systems, applications in manufacturing process planning and scheduling
9-10	General-purpose planning, problem-domain description language, planning models and engines, applications in manufacturing process planning and assembly planning.

11-12.	Introduction to machine learning (ML), datamining, and statistical pattern recognition; supervised (parametric and non-parametric methods, support vector machines, kernels, neural networks), and unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning), best practices in ML
13-14.	Multi-agent systems (MAS); basic concepts, fine- and coarse-grained MAS, communication, coordination and cooperation in MAS, multi-agent simulation

## 9. Requirements and grading

### a) in term-period

N.A.

### b) in examination period

Oral exam.

### c) Disciplinary Measures Against the Application of Unauthorized Means at Mid-Terms, Term-End Exams and Homework

The following students are subject to disciplinary measures.

1. Those students who apply unauthorized means (book, lecture notes, infocommunication means, tools for storing and forwarding electronic information, etc.), different from those listed in the course requirements or adopted by the lecturer in charge of the course assessment, in the written *mid-term exams* taken, or invite or accept any assistance of fellow students, with the exception of borrowing authorized means, will be disqualified from taking further mid-term exams in the very semester as a consequence of their action. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission option. Final term-end results in courses with practical mark will automatically become Fail (1), the ones with exam requirements will be labelled Refused Admission to Exams.
2. Those students whose *homework* verifiably proves to be of foreign extraction, or alternatively, evident results or work of a third party, are referred to as their own, will be disqualified from taking further assessment sessions in the very semester as a consequence of their action. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission options. Final term-end results in courses with practical mark will automatically become Fail (1), ones with exam requirements will be labelled Refused Admission to Exams.
3. Those students who apply unauthorized means (books, lecture notes, infocommunication means, tools for storing and forwarding electronic information, etc.), different from those listed in the course requirements or adopted by the lecturer in charge of the course assessment, in the written *term-end exams* taken, or invite or accept any assistance of fellow students, with the exception of borrowing authorized means, will immediately be disqualified from taking the term-end exam any further as a consequence of their action, and will be inhibited with an automatic Fail (1) in the exam. No further options to sit for the same exam can be accessed in the respective exam period.
4. Those students who alter, or make an attempt to alter the already corrected, evaluated, and distributed test or exercise/problem,
  - i. as a consequence of their action, will be disqualified from further assessments in the respective semester. Further to this, all of their results gained in the very semester will be void, can get no term-end signatures, and will have no access to Late Submission options. Final term-end results in courses with practical mark will automatically become Fail (1), ones with exam requirements will be labelled Refused Admission to Exams;
  - ii. and will immediately be inhibited with an automatic Fail (1) in the exam. No further options to sit for the same exam can be accessed in the very same exam period.

## 10. Retake and repeat

N.A.

## 11. Consulting opportunities:

1 hr/week upon appointment by e-mail

**12. Reference literature (recommended):**

- K. Apt: Principles of Constraint Programming. Cambridge University Press.
- H. H. Hoos, T. Stützle: Stochastic Local Search – Foundations and Algorithms. Morgan-Kaufmann, 2005.
- Y. Kodratoff: Introduction to Machine Learning. Morgan Kaufmann, 2014.
- D. Koller, N. Friedman: Probabilistic Graphical Models: Principles and Techniques. MIT Press, 2009.
- S. M. LaValle: Planning Algorithms. Cambridge University Press, 2006.
- Y. Shoham, K. Leyton-Brown. Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations. Cambridge University Press, 2008.

**13. Home study required to pass the subject:**

Contact hours	28	h/semester
Home study for the courses	14	h/semester
Home study for the exam	48	h/semester
<b>Total:</b>	<b>90</b>	<b>h/semester</b>

**14. The data sheet and the requirements are prepared by:**

Name:	Title:	Affiliation (Department):
Dr. József Váncza	Associate professor	Department of Manufacturing Science and Engineering