RTU Course "Multiagent Systems"

33000 Faculty of Computer Science, Information Technology and Energy

General data

Code	DSP722
Course title	Multiagent Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Egons Lavendelis
Volume of the course: parts and credits points	1 part, 6.0 credits
Language of instruction	LV
Annotation	One of developing directions of artificial intelligence is based on the intelligent agent paradigm. Its goal is to create systems that act rationally. Communities of agents form multiagent systems that form the basics of distributed intelligent computing. Autonomous robot systems are important application of such systems. The course considers the main topics of multiagent systems and methodologies of their development. Main emphasis is on social capabilities of agents, like multiagent interaction, communication and cooperation. The course gives an overview of applications of multiagent systems and an insight in implementation of robotics as multiagent systems.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to give basic knowledge and to acquire skills how to evaluate and choose appropriate methodology and methods for the design and development of robotic multiagent system.
Structure and tasks of independent studies	Students must work out a course work in which he/she needs to justify the choice of methodology of the development of multiagent system and to design multiagent system. The designed system should be some type of robotic systems (the type of the system the student must choose him/herself after consultations with the teacher).
Recommended literature	Obligātā. / Obligatory: Wooldridge M.. Introduction to Multiagent Systems. 2nd edition. John Wiley & Sons, England, 2009 Bellifemine F., Caire G., Greenwood, D. Developing Multi-Agent Systems With JADE Wiley, 2007. Papildu. / Additional: Cossentino M., Hilaire V., Molesini A., Seidita V. (Eds). Handbook on Agent-Oriented Design Processes. Springer Heidelberg, London, 2014. Shehory O., Sturm A. (Eds.). Agent-Oriented Software Engineering. Reflections on Architectures, Methodologies, Languages, and Frameworks. Springer Verlag, Berlin, 2014. Evertsz R., Thangarajah, J. Ly, T. Practical Modelling of Dynamic Decision Making. Springer, Cham, 2019 Russell S. and Norvig P. Artificial Intelligence. A Modern Approach. 4th edition. Prentice Hall, New Jersey, 2020.
Course prerequisites	Students must know algorithms used in artificial intelligence, like uninformed and informed search. They should be familiar with knowledge representation schemas such as first order logic, production rules, semantic networks, conceptual graphs and frames. Basic notions of intelligent agents, agent characteristics and environments, should be known as well.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Multiagent systems and the concept of agent in the context of multiagent systems	4	0	0	0
Multiagent interactions	6	2	0	0
Reaching agreements in multiagent systems	10	5	0	0
Communication in multiagent systems	6	3	0	0
Co-operation in multiagent systems	8	4	0	0
Multiagent architectures	4	2	0	0
Agent oriented software engineering methodologies	12	2	0	0
Applications of multiagent systems	8	4	0	0
Robotic multiagent systems	6	4	0	0
Design and implementation of a multi-agent system	2	48	0	0
Examination and consultation before (summary of the course)	6	14	0	0
Total:	72	88	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Students are able to determine utilities, preferences and dominant strategies	Questions of the theoretical part of examination

Students are able to use interaction and negotiation protocols in multiagent systems and to choose appropriate protocols, including the most appropriate auctions	Practical work, defence of course work, questions of the theoretical part of examination
Students have a good knowledge of agent communication languages	Practical work, defence of course work
Students are able to create a multiagent system for cooperative work	Practical work, defence of course work, questions of the theoretical part of examination
Students have knowledge about agent oriented software engineering and concepts used in it	Practical work, defence of course work, questions of the theoretical part of examination
Students are able to evaluate and to choose suitable methodology for the development of multiagent system	Practical work, defence of course work, questions of the theoretical part of examination
Students are able to design multliagent systems, including robotic multiagent systems	Practical work, defence of course work, questions of the theoretical part of examination
Students have good knowledge about possible applications of multiagent systems. They will be capable to evaluate appropriateness of multiagent systems in various application domains	Practical work, defence of course work, questions of the theoretical part of examination

Evaluation criteria of study results

Criterion	%
Examination	50
Course work	30
Practical works	20
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	6.0	3.0	1.0	0.0		*	