



University of Tehran
School of Electrical and Computer Engineering

Course:	8101589 – Distributed Artificial Intelligence											
Course type:	EE*						CE*				Credit: 3	
		Com	E	P	B	Con	D	SW	HW	IT		MI
	Required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
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Level:	Undergraduate <input type="checkbox"/> Graduate <input checked="" type="checkbox"/>											
Co-requisite(s):	None.											
Prerequisite(s):	Machine Learning (8101562), Pattern Recognition (8101580).											
Prerequisite by topic:	None.											
Textbook(s):	<p>[1] Pfeifer R., Bongard J., Grand S. (2007) <i>How the body shapes the way we think: a new view of intelligence</i>; MIT press.</p> <p>[2] Weiss G. (2001). <i>Multiagent systems: a modern approach to distributed artificial intelligence</i>, MIT press.</p> <p>[3] Wooldridge Michael J., (2009) <i>An Introduction to MultiAgent Systems</i>; Wiley.</p> <p>[4] Russell S.J. and Norving P. (2009), <i>Artificial Intelligence: A modern approach</i> (3rd Edition).</p>											
Coordinator:	Dr. Nili, Professor, School of ECE.											
Goals:	<p>To introduce the mathematical and computational principles, analysis, design and development of intelligent distributed systems. In these systems, observation and decision perform in the presence of limitation in sense, processing and communication. The samples of these systems are multi-robot and multi-agent Systems, animal and human communities or the systems which are decided based on minor observation afterward the final result is derived. Base of the systems analysis in this course contains optimizing the decision maker's personal profit. This profit defines by agent interaction with environment as well other agents in framework of the communication protocols and interaction among agents. Design subjects are based on intelligent maximization with suitable design of sensors in the presence of limitations finally obtaining the maximum profit. Distributed system's development performs base on updated architectures.</p>											
Outcome:	Upon successful completion of the course, students will be able to get the modeling skills, analysis, design and development of intelligent distributed system.											

Topics:	<ol style="list-style-type: none"> 1. To introduce the emergent mechanisms and individual and social optimization in the presence of limitations; 2. Modeling and studying on the role of the dynamic-sensorial and communicational system in occurrence of intelligence; 3. Cooperation and communication's models in the distributed systems; 4. Collective decision methods; 5. Distributed system modeling using the markov and pseud-markov, partial observables; 6. Feedback modeling in distributed systems and its sharing among the agents; 7. Modeling of the sensorial, communicational and processing limitations as the attention control and its influence analysis on the individual and social behavior; 8. Individual and social optimization in the presence of attention control through evolving combination and reinforcement learning; 9. Conceptualization, knowledge exchange and modeling as well its role analysis in the distributed systems development. 								
Computer usage:	Implementing the projects using Matlab Software.								
Assignments:	4 homeworks covering different topics, including algorithm implementation.								
Projects:	Free topic, related to the course.								
Grading:	<table style="width: 100%; border: none;"> <tr> <td style="width: 70%;">Assignments:</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Projects:</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Midterm exams:</td> <td style="text-align: right;">30%</td> </tr> <tr> <td>Final exam:</td> <td style="text-align: right;">30%</td> </tr> </table>	Assignments:	20%	Projects:	20%	Midterm exams:	30%	Final exam:	30%
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Further readings:	Some state of the art papers on analysis, design, modeling and architectures of multiagent and multi-robot systems, attention, memtic, and learning in multi-agent systems.								
Prepared by:	Dr. Majid Nili Ahmadabadi.								
Date:	September, 20, 2017.								

*EE: Electrical Engineering		CE: Computer Engineering	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics	MI	Machine Intelligence and Robotics
Con	Control		
D	Digital System		