

Content

Introduction	
Part 1: Main Capabilities, General Structure and Properties of Intelligent Systems. Knowledge Engineering and Expert Systems	
<i>Lecture 1.</i> What is Artificial Intelligence?	1
<i>Lecture 2.</i> Expert Systems and Knowledge Engineering Problems.....	15
<i>Lecture 3.</i> Knowledge Processing. Application Examples	38
Part 2: Soft Computing as Flexible Tools for Knowledge Representation, Processing and Acquisition	
2.1 Human-like Decision Making based on Fuzzy Logic	
<i>Lecture 4.</i> Human Decision Making and Fuzzy Sets. Application Examples.....	50
<i>Lecture 5</i> Fuzzy Numbers, Fuzzy Arithmetic and Fuzzy Relations. Application Examples.....	66
<i>Lecture 6.</i> Fuzzy Logic. Fuzzy Reasoning. Application Examples	84
<i>Lecture 7.</i> From Fuzzy Logic to Fuzzy System.....	96
<i>Lecture 8.</i> From Fuzzy Systems to Fuzzy Control. Examples of Applications.....	108
2.2 Genetic Algorithm as Nature-like Optimization Tool	
<i>Lecture 9.</i> Genetic Algorithms: Theoretical Background.....	127
<i>Lecture 10.</i> GA Application to Intelligent Control Systems Design.....	145
2.3 High parallel Implementation of Fuzzy Control based on Neural Networks	
<i>Lecture 11.</i> Artificial Neural Networks: Background and Application to Intelligent Control.....	167
<i>Lecture 12.</i> Learning in ANN. Fuzzy Neural Networks and GA-based FNN Tuning	180
2.4 Soft Computing Application Benchmarks	
<i>Lecture 13.</i> Example: Intelligent Robust Control of Extension-Cableless Robotic Unicycle.....	195
References.....	205
Part 3: Symbolic AI for High-level Intelligent Systems Design	
3.1 External World Modeling	
<i>Lecture 14.</i> Temporal Knowledge Representation in Intelligent Systems.....	208
<i>Lecture 15.</i> Spatial Knowledge Representation in Intelligent Systems.....	227
<i>Lecture 16.</i> Actions Representation Models.....	250
3.2 Goal-oriented Behavior Modeling	
<i>Lecture 17.</i> Goal-oriented Behavior and Planning Problems Example: Behavior Simulation of Intelligent Service Robot	264
3.3 Natural Human-Computer Interaction Modeling	
<i>Lecture 18.</i> Intelligent Human-Computer Interaction. Natural Language Processing.....	278
<i>Lecture 19.</i> Virtual Reality Systems and Intelligent Interaction Agents – New Forms of Human-Computer Interaction.....	302
<i>Lecture 20.</i> Problems of Computer's Creation Skills Simulation	317
Postscript	324
References	327