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**CS 410R-31 - SPTC: Research on Artificial Intelligence**  
**Spring 2005 - Northeastern Illinois University**

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**Meeting:** MW 4:15-5:35 PM  
CLS 3106

**Office hrs:** MWF 12:00-1:00 PM  
MW 3:30-4:00 PM and 7:00-8:00 PM

**Description:** This course serves as an introduction research on artificial systems. This systems emulate emergent cooperative behavior from a group of multiple artificial agents. We will cover the main principles of multi-agent systems, types of organizations, interactions, collaborations and other types of cooperative behavior. Students will be expected to get familiar with these concepts and be able to do simple research on some of its applications.

**Course Prerequisites:** Graduate Students Only

**Text:** Ferber, Jacques Multi-Agent Systems. An Introduction to Distributed Artificial Intelligence.  
Addison-Wesley, 1999

*Recommended Reading:* E. Bonabeu, M. Dorigo, and G. Theraulaz Swarm Intelligence. From Natural to Artificial Systems. Oxford, 1999

**Course Outline:** (subject to change due to time constraints)

1. Principles of Multi-Agent Systems (Week 1)

- Collective intelligence
- Agent and society
- Areas of application
- Areas related to multi-agent systems

2. Interactions and Cooperation (Weeks 2-3)

- Components of interactions
- Types of interactions
- Forms of cooperation
- Methods of cooperation
- Organizations and cooperation

3. Multi-agent Organizations (Weeks 4-5)

- Definitions
- Functional Analysis
- Structural Analysis
- Individual Organizations

4. Action and Behavior (Weeks 6-7-8)

- Modelling
- Actions as transformations
- Actions as a response
- Actions as processes
- Actions as physical displacement
- Actions as local modifications
- Actions as commands

5. States of Mind (Weeks 9-10)

- Mental states
- The interactional and representational systems
- The conative system
- Motivations

6. Communications (Week 11)

- Aspects of communications
- Speech acts
- Conversations

7. Collaboration and Distribution of Tasks (Weeks 12-13)

- Modes of task allocation
- Centralized and distributed allocation of tasks
- Integration of tasks and mental states

8. Coordination of Actions (Weeks 14-15)

- Synchronization of actions
- Reactive coordination
- Solving by coordination

**Assignments:**

- **Class Presentation:** Three short lecture presentations
- **Research Presentation:** One short research project

**Grading Policies:**

1. Each assignment will be worth 25% of your grade. Extra credit will be given for class notes presentation.
2. Regular attendance is expected. Any student who misses more than three class meetings will have her/his final course grade reduced by a letter
3. Cheating on projects will guarantee the student an F grade, and a report according to school's guidelines
4. No Ws, Is will be granted after the school's withdrawal deadline (Fri, March 19<sup>th</sup>)
5. Your final grade will be based on the following scale:
  - **A** - 90% or above
  - **B** - 80 – 90 %
  - **C** - 65 – 80 %
  - **D** - 50 – 65 %
  - **F** - below 50%

*If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Accessibility Center office, Room A-118 in the A-Wing, exts. 5495, 5496, and 5497. The Accessibility Center will review your concerns and determine with you what accommodations are necessary and appropriate. All information and documentation of disability are confidential.*