THE UNIVERSITY OF WESTERN ONTARIO FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ES595a - Advanced Topics in Software & Systems Design *AGENT-ORIENTED DESIGN: PRINCIPLES, METHODOLOGIES, AND APPLICATIONS*

COURSE OUTLINE – 2003-2004

OBJECTIVES:

The main objective is to provide students with a solid foundation in the field of agent-orientation design and engineering. The course emphasizes on both the theoretical and implementation aspects. The theoretical component includes lectures, readings from reference-books and papers. The course material covers concepts of agenthood, models of coordination, interaction, communication, teamwork and learning among agents. The implementation component includes programming assignments and a term-project. In addition to the hands-on experience, students will examine how these concepts are actually realized by studying several applications of agent and multi-agent systems in various domains.

PREREQUISITES:

- Computer Science Fundamentals with emphasis on OO programming language (CS027 or equivalent)
- Algorithms & data Structures (SE205or equivalent)
- Software Systems Design (SE203or equivalent)
 - *The Note: Introductory AI course will be an asset!*

COURSE SCHEDULE:

Lectures 3 hrs/week

TOPICS

Principles

Introduction: Basic Concepts Coordination, Interaction, and Decision Making Cooperation and Teaming Agent Communication Agents and Multi-agent Systems Architectures Learning in Agents & Multi-agent Systems

Methodologies & Tools

Agent-Oriented Software Engineering Agent Development Tools and Platforms

Application Areas/Projects

Cooperative Distributed systems and Web Agents Agents for Mobile and Ubiquitous Computing Cooperative Autonomous Robots Engineering Design and Manufacturing Control

Future Directions for Agents and Multi-Agent Systems

SPECIFIC LEARNING OBJECTIVES

Upon the completion of the course, student should:

- gain a picture of contemporary thinking about agents and especially multi-agent systems, including principles and theory, common practices, and application areas, current and emerging;
- develop some concrete accomplishments in the agents/multi-agent systems arena through a project;
- gain experience and confidence in understanding a new and rapidly evolving technology.

REFERENCE TEXTS:

- [1] **Course notes**, papers and supplementary material will be available on the Class Web site: http://instruct.uwo.ca/engin-sc/se595a/
- [2] An Introduction to Multiagent Systems, Michael Wooldridge, John Wiley & Sons (Chichester, England). ISBN 0 47149691X, 2001
- [3] Multiagent Systems edited by Gerhard Weiss (MIT Press, 1999).
- [4] Readings in Agents, Edited by Michael Huhns and Munindar Singh, 1997, 1-55860-495-2
- [5] Agent-Oriented Software Engineering, Ciancarini, P. and Wooldridge, M. (Eds.) Springer-Verlag Lecture Notes in Computer Science Volume 1957, January 2001. 3-540-41594-7
- [6] Agent Technology for Communication Infrastructures, Alex Hayzelden and Rachel Bourne (Eds.), John Wiley & Sons Inc, 2001
- [7] **Multi-Agent Systems for Concurrent Intelligent Design and Manufacturing**, Weiming Shen, Douglas H. Norrie and Jean-Paul Barthes Published by Taylor & Francis ISBN 0-7484-0882-7
- [8] Artificial Intelligence: A Modern Approach 2/E, Stuart Russell and Peter Norvig, ISBN: 0-13-790395-2, 2002.

EVALUATION:

The approximate weight for each component is shown below. Note that these are maxim; if less than the stated number is given, the rest of the marks will be pro-rated.

- (24%) Three Programming Assignments
- (21%) Three reaction papers that discuss some AO aspects and issues related to principles, methodology & tools and applications, respectively.
- (55%) Term-Project: design and implementation
 - Design 15%
 - Implementation 35%
 - Report 15%
 - Code 12%
 - Demo 8%
 - Presentation 5%
- In accordance with the policy of the University, the grade assigned to all written and oral work presented in English shall take into account syntax, diction, grammar and spelling. In addition, in the professional life of an engineer, the manner in which oral and written communications are presented is extremely important. An engineering student must develop these skills as an integral part of the undergraduate program. To encourage the student to do so, the grades assigned to all written and oral work will take into account all aspects of presentation including conciseness, organization, neatness, use of headings, and the preparation and use of tables and figures.

ATTENDANCE:

Any student who, in the opinion of the instructor is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

CHEATING:

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which may include expulsion from the program. If you are caught cheating, there will be no second warning.

PLAGIARISM:

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

PLAGIARISM CHECKING:

The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work in electronic form for plagiarism checking.

COURSE INSTRUCTOR:

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