Unit Outline: KXC359 Knowledge-Based Systems

September 2005 - January 2006
Hangzhou, China

Prerequisites
KXC252

Corequisites
None

Unit Weight
12.5% of one academic year

Unit Coordinator
Richard Dazeley

Lecturing Staff
Dr Liang Ronghua
Email: rhliang@zjut.edu.cn

Scheduled Teaching Sessions
Lectures: 3 hr/wk (first week) 2hr/wk (from week 2)
Tutorials: 1 hr/wk (from week 2)

Unit Website
The unit website is accessed from http://www.utas.edu.au/coursesonline/. You will need to use your University of Tasmania email pop account username and password to log on to the WebCT system. Once authenticated by the system your personalised MyWebCT area will be displayed. It contains links to the websites that you have permission to access - including the website for this unit.
This unit is Web Supplemented. This means that the use of the Web is optional for this unit. The unit website contains unit information and resources.
If you are not able to access the unit website, please contact the technical staff at ZUT.

University Website
Information and Resources for 'Current Students' are available on the university website at: http://www.utas.edu.au/students/

Provider
School of Computing - Faculty of Science, Engineering, and Technology.

OVERVIEW

Introduction
Introduces the principles underlying the development of expert or knowledge-based systems and provides students with the knowledge engineering skills needed to develop a medium-scale expert system, using an appropriate development tool. The unit covers backward-chaining, forward-chaining and object-oriented expert systems and introduces a range of manual and semi-automated knowledge acquisition methods. Reasoning techniques for handling uncertain knowledge are discussed and the unit also examines other types of knowledge-based systems including case-based reasoning, simulations, semantic web applications and Cyc.

Learning Outcomes
On successful completion of this unit, you will be able to:
1. Develop rule-based and object-oriented expert systems in the CLIPS/COOL development language
2. Understand the processes involved in knowledge acquisition and engineering.
3. Apply techniques for handling uncertainty within knowledge-based systems
4. Demonstrate awareness of current and future applications of knowledge-based systems

Unit Content
- Introduction to Expert Systems
- Knowledge Representation and Inference
- Backward Chaining Rule-Based Systems
- Forward Chaining Rule-Based Systems
- The Knowledge Engineering Process
- Knowledge Acquisition and Analysis Techniques
- Frame-Based Systems
- Reasoning under Uncertainty
- Fuzzy Logic
- Bayesian Belief Networks
- Truth Maintenance Systems
- Case-based Reasoning
Knowledge-based Simulation
The Semantic Web
Cyc

For more information see the section titled 'Content' on the unit website.

Generic Skills

The university has defined a set of generic graduate attributes expected in its graduates. http://www.utas.edu.au/policy/subject.html#graduates Your course is designed to enable you to develop generic skills that are valued in, and expected of, graduates. These are skills that you will need to develop over time. Hence you are encouraged to look for opportunities, as you study each unit, to reflect on and improve these skills.

LEARNING AND TEACHING

Approach to Learning

You are expected to spend about 130 hrs studying in this unit - this includes attendance at scheduled teaching sessions. (For a 13 week semester this is, on average, 10 hr/wk.) This is the amount of study time that the 'typical' student will need to reach the level of competence and understanding required to fulfil the unit objectives.

You are expected to:

- attend all scheduled lectures and tutorials, unless otherwise notified by the unit coordinator
- prepare for, and actively participate in lectures and tutorials
- complete the assigned learning tasks
- review what has been learnt
- complete assessment items and submit them on time
- access and be familiar with the information and resources available on the unit website
- seek help from teaching staff if you have any questions or difficulties in studying this unit

You are encouraged to read the university's Code of Conduct for Teaching and Learning. Part A describes the 'Responsibility of the University to Students' and part B describes the 'Responsibilities of Students to the University'. http://www.utas.edu.au/tl/policies/codes.html

Schedule

See the 'Schedule' section on the unit website.

Teaching and Support Staff

Teaching Staff

Unit Coordinator:

Richard Dazeley
E-Mail: Richard.Dazeley@utas.edu.au

Lecturing Staff

Dr Liang Ronghua
Email: rhliang@zjut.edu.cn

School Help Desk

Contact technical staff at ZUT for information about accessing and using the Computer labs.

University Services and Support

The University has staff available to assist you, such as the:

- Learning Development Advisor
- Student Counselor
- Careers Advisor
- Disability Officer

For more information and contact details see the Services and Support section on the University 'Current Students' web page. http://www.utas.edu.au/students/

Resources

Unit Website

The unit website contains unit information and resources.

Prescribed Text

None

Readings
Software

The software that you will need to access the unit website and to study this unit, including general purpose software such as word processors, is provided on the computers in the computing labs. If you intend to use software on other computers please check that the versions are compatible.

Software used in this unit includes:
CLIPS 6.0 or above (Available for Mac and PC - on the CD-ROM which comes with the book by Giarratano and Riley, or can be downloaded from http://www.ghg.net/clips/CLIPS.html)
CLIPS User Manuals (Available on CD-ROM which comes with the book by Giarratano and Riley)

ASSESSMENT

| Assessment Items | Item 1 | Title: Assignment 1  
Type: In-Semester - individual assignment  
Weighting: 10%  
Due: 3pm, Friday 28th October (Week 7) |
|------------------|-------|------------------------------------------------------------------|
|                  | Item 2 | Title: Assignment 2  
Type: In-Semester - individual assignment  
Weighting: 20%  
Due: 3pm, Friday 16th December (Week 14) |
|                  | Item 3 | Title: 3 hr Examination  
Type: Formal Examination  
Weighting: 70%  
Due: University Examination Period |
|                  |       | Implementation of a rule-based expert system in CLIPS |
|                  |       | Implementation of a heuristic, object-oriented expert system using COOL |
|                  |       | This will be an open-book exam: you may take in any written or printed material relevant to the examination. |

See the 'Assessment' section in unit website for more detailed information about assessment items.

In-Semester Assessment

Unless specifically stated in the specification of the assessment item provided on the unit website, it is required that:

- work submitted by a student is the work of that student alone OR
- where the assessment item is to be completed by a group of students, the work submitted by the group of students is the work of that group of students alone.

The markers for this unit may be using plagiarism-detection software, which compares submitted files and reports similarities between them and the work submitted by other students or material from on-line sources.

Plagiarism

Plagiarism is a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own, for example:

- using an author's words without putting them in quotation marks and citing the source;
- using an author's ideas without proper acknowledgment and citation; or
- copying another student's work.

If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at http://www.utas.edu.au/tl/supporting/academicintegrity/index.html.

The intentional copying of someone else's work as one's own is a serious offence punishable by
penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see http://www.utas.edu.au/policy/subject.html#students.

The University reserves the right to submit assignments to plagiarism detection software, and might then retain a copy of the assignment on its database for the purpose of future plagiarism checking.

Referencing

The university document on plagiarism contains information about referencing the work or ideas of others. (See http://www.utas.edu.au/plagiarism/) The preferred text referencing systems for the School is the Harvard system (also referred to as the author-date system).

Submissions

The details of the submission method (paper, electronic or other) for each assignment will be supplied in a separate assignment specification sheet. All in-semester assignment submissions (including electronic submissions) are to include an Assignment Cover Sheet which includes a statement confirming that the submission is your own work. If this undertaking is not signed, the assignment will not be marked. The Assignment Cover Sheet is available on the School's web site http://www.comp.utas.edu.au/app/studyresources.jsp.

Extensions

Assessment items will not be accepted after the due date except under the conditions stated in the school policy on late assessment. http://www.comp.utas.edu.au/app/late_assess.jsp

Formal Examination

The formal examination will be held at ZUT, Hangzhou, and is conducted by the University Registrar.

Final Grade

Overall assessment will be based on the student's performance throughout the semester as well as in a formal examination. In order to achieve a pass (or better) result, a student must obtain:

1. at least 40% of the total mark for in-semester assessment items
2. at least 40% of the mark for the formal examination
3. at least 50% of the overall mark

Passing grades will be awarded based on the AVCC guidelines:

- PP at least 50% of the overall mark but less than 60%
- CR at least 60% of the overall mark but less than 70%
- DN at least 70% of the overall mark but less than 80%
- HD at least 80% of the overall mark

The maximum mark awarded to a student who fails the unit will be 44.

For more information, including other grades such as Supplementary and Terminating grades, see the School of Computing's guidelines for assessment - available at: http://www.comp.utas.edu.au/app/assess.jsp