FIT4009
Advanced topics in intelligent systems

Unit Guide

Semester 2, 2012

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

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<table>
<thead>
<tr>
<th>Table of Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIT4009 Advanced topics in intelligent systems - Semester 2, 2012</td>
<td>1</td>
</tr>
<tr>
<td>Mode of Delivery</td>
<td>1</td>
</tr>
<tr>
<td>Contact Hours</td>
<td>1</td>
</tr>
<tr>
<td>Workload</td>
<td>1</td>
</tr>
<tr>
<td>Unit Relationships</td>
<td>1</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>1</td>
</tr>
<tr>
<td>Chief Examiner</td>
<td>1</td>
</tr>
<tr>
<td>Campus Lecturer</td>
<td>1</td>
</tr>
<tr>
<td>Clayton</td>
<td>1</td>
</tr>
<tr>
<td>Academic Overview</td>
<td>2</td>
</tr>
<tr>
<td>Outcomes</td>
<td>2</td>
</tr>
<tr>
<td>Graduate Attributes</td>
<td>2</td>
</tr>
<tr>
<td>Assessment Summary</td>
<td>2</td>
</tr>
<tr>
<td>Teaching Approach</td>
<td>3</td>
</tr>
<tr>
<td>Feedback</td>
<td>3</td>
</tr>
<tr>
<td>Our feedback to You</td>
<td>3</td>
</tr>
<tr>
<td>Your feedback to Us</td>
<td>3</td>
</tr>
<tr>
<td>Previous Student Evaluations of this unit</td>
<td>3</td>
</tr>
<tr>
<td>Prescribed text(s)</td>
<td>3</td>
</tr>
<tr>
<td>Unit Schedule</td>
<td>4</td>
</tr>
<tr>
<td>Assessment Requirements</td>
<td>5</td>
</tr>
<tr>
<td>Assessment Policy</td>
<td>5</td>
</tr>
<tr>
<td>Assessment Tasks</td>
<td>5</td>
</tr>
<tr>
<td>Participation</td>
<td>5</td>
</tr>
<tr>
<td>Examinations</td>
<td>6</td>
</tr>
<tr>
<td>Examination 1</td>
<td>6</td>
</tr>
<tr>
<td>Assignment submission</td>
<td>6</td>
</tr>
<tr>
<td>Online submission</td>
<td>6</td>
</tr>
<tr>
<td>Extensions and penalties</td>
<td>6</td>
</tr>
<tr>
<td>Returning assignments</td>
<td>7</td>
</tr>
<tr>
<td>Other Information</td>
<td>8</td>
</tr>
<tr>
<td>Policies</td>
<td>8</td>
</tr>
<tr>
<td>Student services</td>
<td>8</td>
</tr>
<tr>
<td>Reading list</td>
<td>9</td>
</tr>
</tbody>
</table>
FIT4009 Advanced topics in intelligent systems - Semester 2, 2012

Methods from Artificial Intelligence (AI) form the basis for many advanced information systems. These techniques address problems that are difficult to solve or not efficiently solvable with conventional techniques. Building on the undergraduate curriculum this unit introduces the student to advanced AI methods and their applications in information systems.

Mode of Delivery

Clayton (Day)

Contact Hours

2 hrs lectures/wk

Workload

For on-campus students, workload commitments are: (12 hours per week total)

- Lectures: 2 hours per week
- Reading, preparation, assignment work, revision: 10 hours per week

Unit Relationships

Prerequisites

Completion of the Bachelor of Computer Science or equivalent to the entry requirements for the Honours program. Students must also have enrolment approval from the Honours Coordinator.

Chief Examiner

Professor Ingrid Zukerman

Campus Lecturer

Clayton

Gholamreza Haffari

David Dowe
Academic Overview

Outcomes
At the completion of this unit students will have:

• achieved an overview of different technologies that form the basis of intelligent information systems;
• understood the capabilities of these methods;
• learned to recognise tasks that can be solved with these methods;
• the ability to judge the limitations of these methods. With successful completion of the unit the students;
• the ability to apply the standard techniques in the chosen sub-fields of intelligent information systems to the construction and design of such systems;
• the ability to critically evaluate the performance of these approaches;
• the ability to compare these techniques to alternative approaches;
• gained an appreciation of the practical relevance of intelligent information systems.

Graduate Attributes
Monash prepares its graduates to be:

1. responsible and effective global citizens who:
   a. engage in an internationalised world
   b. exhibit cross-cultural competence
   c. demonstrate ethical values

critical and creative scholars who:

   a. produce innovative solutions to problems
   b. apply research skills to a range of challenges
   c. communicate perceptively and effectively

Assessment Summary
Assignment and Examination, relative weight depending on topic composition. When no exam is given students will be expected to demonstrate their knowledge by solving practical problems and maybe required to give an oral report.

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Value</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1 - Supervised Learning</td>
<td>15%</td>
<td>Week 4</td>
</tr>
<tr>
<td>Assignment 2 - Parametric Methods, Clustering</td>
<td>15%</td>
<td>Week 6</td>
</tr>
<tr>
<td>Assignment 3 - MML modelling</td>
<td>30%</td>
<td>Week 11, Thursday, 11 October 2012</td>
</tr>
<tr>
<td>Examination 1</td>
<td>40%</td>
<td>To be advised</td>
</tr>
</tbody>
</table>
Teaching Approach

Problem-based learning

Students are encouraged to take responsibility for organising and directing their learning with support from their lecturers.

Feedback

Our feedback to You

Types of feedback you can expect to receive in this unit are:

- Graded assignments without comments
- Interviews

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through SETU, Student Evaluation of Teacher and Unit. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, and on student evaluations, see:
http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this unit

If you wish to view how previous students rated this unit, please go to

Prescribed text(s)

Limited copies of prescribed texts are available for you to borrow in the library.


## Unit Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No formal assessment or activities are undertaken in week 0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Unit introduction, Introduction to Machine Learning</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Supervised Learning (PAC theory, ...)</td>
<td>Assignment 1 released Week 2</td>
</tr>
<tr>
<td>3</td>
<td>Parametric Methods (maximum likelihood, bias-variance, ...)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clustering (mixture models, k-means, ..)</td>
<td>Assignment 1 due Week 4; Assignment 2 released Week 4</td>
</tr>
<tr>
<td>5</td>
<td>non-parametric methods (k-nearest neighbor, ...)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Decision Trees</td>
<td>Assignment 2 due Week 6</td>
</tr>
<tr>
<td>7</td>
<td>Bayesianism, Minimum Message Length (MML), inference, prediction</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>MML multinomial; MML clustering and mixture modelling</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>MML decision trees (and graphs) and log-loss</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Neyman-Scott and related problems for Maximum Likelihood</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>MML Bayesian nets, grammatical inference</td>
<td>Assignment 3 due Week 11, Thursday, 11 October 2012</td>
</tr>
<tr>
<td>12</td>
<td>Algorithmic information theory, formal definitions of intelligence</td>
<td></td>
</tr>
<tr>
<td>SWOT VAC</td>
<td>No formal assessment is undertaken in SWOT VAC</td>
<td></td>
</tr>
</tbody>
</table>

*Unit Schedule details will be maintained and communicated to you via your MUSO (Blackboard or Moodle) learning system.*
Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at http://lib.monash.edu/tutorials/citing/

Assessment Tasks

Participation

- **Assessment task 1**
  
  **Title:** Assignment 1 - Supervised Learning
  
  **Description:** This will be a programming assignment.
  
  Further details will be provided in the assignment handout.
  
  **Weighting:** 15%
  
  **Criteria for assessment:**
  
  ♦ How well solutions are explained.
  ♦ Quality of code demonstrated where applicable.
  
  Further details will be provided in the assignment handout.
  
  **Due date:** Week 4

- **Assessment task 2**
  
  **Title:** Assignment 2 - Parametric Methods, Clustering
  
  **Description:** This assignment will involve a set of written questions relating to the learning material.
  
  Further details will be provided in the assignment handout.
  
  **Weighting:** 15%
  
  **Criteria for assessment:** Quality of answers to questions, demonstrates understanding of the learning material.
  
  Further details will be provided in the assignment handout.
  
  **Due date:** Week 6
Assessment Requirements

• Assessment task 3

Title:
Assignment 3 - MML modelling

Description:
This will be a theory and programming assignment.

Further details will be provided in the assignment handout.

Weighting:
30%

Criteria for assessment:
♦ How well solutions are explained.
♦ Quality of code demonstrated, where applicable.

Further details will be provided in the assignment handout.

Due date:
Week 11, Thursday, 11 October 2012

Examinations

• Examination 1

Weighting:
40%

Length:
3 hours

Type (open/closed book):
Open book

Electronic devices allowed in the exam:
Calculators

Assignment submission

It is a University requirement (http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-procedures.html) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at http://www.infotech.monash.edu.au/resources/student/forms/. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz).

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the VLE site for this unit, which you can access via links in the my.monash portal.

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.
Assessment Requirements


Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.
Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University’s academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at: http://policy.monash.edu.au/policy-bank/academic/education/index.html

Key educational policies include:

- Plagiarism (http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-policy.html)
- Special Consideration (http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.html)
- Grading Scale (http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html)
- Discipline: Student Policy (http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html)
- Academic Calendar and Semesters (http://www.monash.edu.au/students/key-dates/)
- Orientation and Transition (http://www.infotech.monash.edu.au/resources/student/orientation/)
- Codes of Practice for Teaching and Learning (http://www.policy.monash.edu/policy-bank/academic/education/conduct/suppdocs/code-of-practice-teaching-and-learning.html)

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at www.monash.edu.au/students. For Sunway see http://www.monash.edu.my/Student-services, and for South Africa see http://www.monash.ac.za/current/

The Monash University Library provides a range of services and resources that enable you to save time and be more effective in your learning and research. Go to http://www.lib.monash.edu.au or the library tab in my.monash portal for more information. At Sunway, visit the Library and Learning Commons at http://www.lib.monash.edu.my/. At South Africa visit http://www.lib.monash.ac.za/.

Academic support services may be available for students who have a disability or medical condition. Registration with the Disability Liaison Unit is required. Further information is available as follows:

- Website: http://monash.edu/equity-diversity/disability/index.html
- Email: dlu@monash.edu
- Drop In: Equity and Diversity Centre, Level 1 Gallery Building (Building 55), Monash University, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus
- Telephone: 03 9905 5704, or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway
Reading list

Additional reading:
