

FIT3022
Intelligent decision support systems

Unit Guide

Semester 1, 2010

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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FIT3022 Intelligent decision support systems - Semester 1, 2010

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Introduction

Welcome to FIT3022 Intelligent Decision Support Systems for semester 1, 2010. This 6 point unit is core to the Bachelor of Business Information Systems degree at the third year level.

Decision making spans all the areas of a modern business enterprise. The Business IT graduate is very likely to encounter the need for effective decision support as they enter the workforce. This unit equips BBIS graduates with the skills that will prove to be immediately useful.

Unit synopsis

This unit will give the students an opportunity to solve some concrete decision-making problems, such as resource allocation and investment planning, using different intelligent reasoning techniques: decision trees; constraint reasoning and refinement search; search by local change, and population-based methods. The students will be introduced to a high level programming system which they will use to model problems in simple logic and solve them using the different techniques.

Learning outcomes

At the completion of this unit students will have -

A knowledge and understanding of:

- the role of intelligent decision support in organisations;
- decision support paradigms and applications;
- methods for handling certain and uncertain knowledge;
- issues in the design and construction of intelligent decision support systems;
- correctness, precision and scalability;

Developed attitudes that enable them to:

- recognise the value of intelligent decision support within an organisation;
- adopt a critical approach to the choice of decision support method;
- appreciate the impact of data quality, and business constraints on the behaviour of a decision support system;
- appreciate the limitations of formal decision models and the handling of uncertainty.

Developed the skills to:

- choose appropriate decision support methods;
- separate modelling from solving;
- implement simple decision support tools on a constraint programming platform;
- combine methods to meet application requirements;
- assess the limitations in scalability and precision of a solution.

Demonstrated the communication and teamwork skills necessary to:

- document and communicate an intelligent decision support model;
- work in a team during model design and implementation stages;
- present a justification for choosing or combining decision support methods.

Contact hours

2 hrs lectures/wk, 2 hrs laboratories/wk

Workload

The weekly workload commitments are:

- a 2-hour lecture
- a 2-hour tutorial
- a minimum of 2-3 hours of personal study per one hour of contact time to satisfy reading and assignment expectations
- You will need to allocate up to 5 hours per week in some weeks, for use of a computer, including time for newsgroups/discussion groups.

Unit relationships

Prerequisites

FIT1006, BUS1100 or ETC1000 and 24 points at level 1

Teaching and learning method

Teaching approach

Monash aims to provide a learning environment in which students receive a range of ongoing feedback throughout their studies. You will receive feedback on your work and progress in this unit. This may take the form of group feedback, individual feedback, peer feedback, self-comparison, verbal and written feedback, discussions (on line and in class) as well as more formal feedback related to assignment marks and grades. You are encouraged to draw on a variety of feedback to enhance your learning.

It is essential that you take action immediately if you realise that you have a problem that is affecting your study. Semesters are short, so we can help you best if you let us know as soon as problems arise. Regardless of whether the problem is related directly to your progress in the unit, if it is likely to interfere with your progress you should discuss it with your lecturer or a Community Service counsellor as soon as possible.

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS,
<http://mutts.monash.edu.au/MUTTS/>

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system:
<http://allocate.its.monash.edu.au/>

Unit Schedule

Week	Date*	Topic	References/Readings	Key dates
1	01/03/10	Introduction and motivation for Intelligent Decision Support		
2	08/03/10	Modelling and yes/no choices	MiniZinc Tutorial	
3	15/03/10	Modelling and multiple choices		
4	22/03/10	Problem Qualification	Bartak's Constraint Programming Lecture Notes	
5	29/03/10	Problem Classes	Where the really hard problems are	
Mid semester break				
6	12/04/10	Problem Solvers		
7	19/04/10	Solving by Inference		Assignment 1 due 18/04/10
8	26/04/10	Solving by Search		
9	03/05/10	Optimisation		
10	10/05/10	Intelligent Decision Support in Transportation		Assignment 2 due 9/05/2010
11	17/05/10	Network algorithms and developing		

		decision support systems		
12	24/05/10	Uncertainty		
13	31/05/10	Summary and Review		

*Please note that these dates may only apply to Australian campuses of Monash University. Off-shore students need to check the dates with their unit leader.

Improvements to this unit

The unit enables and encourages students to think about problems in a new way.

Unit Resources

Prescribed text(s) and readings

No specific text are required for this unit

Recommended text(s) and readings

- MiniZinc: Towards a standard CP modelling language. Christian Bessière, editor, Thirteenth International Conference on Principles and Practice of Constraint Programming, Providence, RI, USA, volume 4741 of Lecture Notes in Computer Science, pages 529-543. Springer-Verlag, September, 2007. This paper presents the modelling language that we will use during the first half of the unit.
- MiniZinc Tutorial. Ralph Becket, 2007. Held with FIT3022 unit resources in Moodle.
- Specification of Zinc and Minizinc. Nethercote, Marriott, Rafeh, Wallace, de la Banda, 2007. This paper specifies the syntax of MiniZinc, and is held with the FIT3022 unit resources in Moodle.
- Model Building in Mathematical programming. 4th Edition. H.P.Williams, Wiley, 1999. ISBN 0 471 94111
- Search Methodologies: Introductory tutorials in Optimization and Decision Support Techniques. Ed Burke and Kendall. Springer, 2005, ISBN 0-387-23460-8
- Constraint Logic Programming using ECLiPSe. K. Apt and M. Wallace. Cambridge University Press, 2007. ISBN 0-521-86628-6. Describes the language platform used for writing and solving models in the tutorials.
- Spreadsheet Modelling & Decision Analysis 5e, C T Ragsdale, Thomson South-Western, 2007.

Required software and/or hardware

ECLiPSE constraint programming system. (download from www.eclipse-clp.org)

MiniZinc modelling language (download from

<http://www.g12.csse.unimelb.edu.au/minizinc/download.html>)

Microsoft Excel 2003/2007

Equipment and consumables required or provided

On-campus students, and those studying at supported study locations may use the facilities available in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook. Please ensure you allocate sufficient time per week for the use of a computer, including time for newsgroups/discussion groups.

Study resources

Study resources we will provide for your study are:

- Weekly lecture PowerPoint slides
- Weekly laboratory tasks and exercises with sample solutions provided one to two weeks later;
- Assignment specifications and sample solution;
- Discussion groups;

- Relevant papers, and software on FIT3022 Moodle web site.
- This Unit Guide outlining the administrative information for the unit;
- The FIT3022 web site on Moodle, where resources outlined above will be made available.

Assessment

Overview

Examination (2 hours): 60%; In-semester assessment: 40%

Faculty assessment policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 50% then a mark of no greater than 49-N will be recorded for the unit.

Assignment tasks

Assignment coversheets

Assignment coversheets are available via "Student Forms" on the Faculty website:

<http://www.infotech.monash.edu.au/resources/student/forms/>

You MUST submit a completed coversheet with all assignments, ensuring that the plagiarism declaration section is signed.

Assignment submission and return procedures, and assessment criteria will be specified with each assignment.

• Assignment task 1

Title:

Assignment 1

Description:

Model and solve a decision support problem using MiniZinc in ECLiPSe, in two ways: using finite domains and an integer/linear model. The finite domain model (5%) must be accompanied by a written report on the model (5%), and the integer/linear model (5%) must be accompanied by another report describing this model (5%)

Weighting:

20%

Due date:

April 18th

• Assignment task 2

Title:

Assignment 2

Description:

Model a problem in MiniZinc (8%), writing a report on the model, its output on the two problem instances, and your choice of variables, constraints and cost expression (4%).

The problem is the Travel Guide Allocation problem, whose specification is also under week 10 on Moodle.

The second part is to write a report describing and contrasting finite domain and linear solvers (8%).

Weighting:

20%

Due date:

May 9th

Examination

- **Weighting:** 60%

Length: 2 hours

Type (open/closed book): Closed book

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

Refer to the Faculty Special consideration webpage or further details and to access application forms:
<http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html>

Late assignment

Assignments received after the due date will be subject to a penalty of 10% a day. Assignments received later than one week after the due date will not be accepted.

Return dates

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

Appendix

Please visit the following URL: <http://www.infotech.monash.edu.au/units/appendix.html> for further information about:

- Continuous improvement
- Unit evaluations
- Communication, participation and feedback
- Library access
- Monash University Studies Online (MUSO)
- Plagiarism, cheating and collusion
- Register of counselling about plagiarism
- Non-discriminatory language
- Students with disability
- End of semester special consideration / deferred exams