Unit Outline*

INMT8526 (6 Credit points) / INMT8826 (8 Credit points)

Artificial Intelligence in Business

Semester 2, 2011
Crawley

Professor Peter Goldschmidt

Business School
www.business.uwa.edu.au

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UNIT DESCRIPTION

Introduction

This unit focuses on the use of computational intelligence in management, business and administration. Considerable attention is given to general theoretical principles but the main focus is on applying available computer packages to solve problems.

Unit content

This unit enables students to understand and apply flexible computer-based systems that learn to solve problems—genetic algorithm, fuzzy logic and neural networks. This is in a business management and planning environment. Hybrid methods and the relatively new swarm intelligence models are also introduced.

The Goal of the unit

The goal of this unit is to familiarise and expose the student with current and advanced computational techniques base on the concepts of artificial intelligence. In business, applied artificial intelligence has moved from stand-alone systems to systems that are fully integrated with other business computer applications. This unit will present these techniques to the students to add to their repertoire of computational tools.

Learning outcomes

On completion of this unit, you should be able to:

- Understand and apply expert systems, genetic algorithm, fuzzy logic and neural networks in a business management and planning environment. Hybrid methods and the relatively new swarm intelligence models will also be considered.
- Achieve some understanding of applied computer based systems which learn to solve problems - artificial intelligence and evolutionary computing.
- Develop a 'hands-on' capacity to apply these methods.
- Assess the potential to apply artificial intelligence, evolutionary computing and expert systems in business and administrative contexts.
- Judge where to use these methods and the strengths of each.
- Compare artificial intelligence and evolutionary computing with analytical and simulation approaches to solving business problems.
- Interpret and judge the work of specialised analysts.
Educational Principles and Graduate Attributes

In this unit, you will be encouraged and facilitated to develop the ability and desire to:

1. master the subject matter, concepts and techniques of their chosen discipline(s) at internationally-recognised levels and standards;
2. acquire the skills required to learn, and to continue through life to learn, from a variety of sources and experiences;
3. adapt acquired knowledge to new situations;
4. communicate in English clearly, concisely and logically;
5. acquire the skills needed to embrace rapidly-changing technologies in a global environment;
6. think and reason logically and creatively;
7. undertake problem identification, analysis and solution;
8. question accepted wisdom and be open to new ideas and possibilities;
9. acquire mature judgment and responsibility in ethical, moral, social, and practical, as well as academic matters;
10. work independently and in a team;
11. acquire cross-cultural and other competencies to take a citizenship and leadership role in the local, national or international community.

TEACHING AND LEARNING RESPONSIBILITIES

Teaching and learning strategies

This unit will include formal lectures, in class discussions and analysis of research articles. Students will be exposed to advanced AI approaches used in business and finance and relate these approaches to research articles and their practical assignments and end of term projects. Feedback will be continuous throughout the teaching semester.

Teaching and learning evaluation

You may be asked to complete two evaluations during this unit. The Student Perception of Teaching (SPOT) and the Students’ Unit Reflective Feedback (SURF). The SPOT is optional and is an evaluation of the lecturer and the unit. The SURF is completed online and is a university wide survey and deals only with the unit. You will receive an email from the SURF office inviting you to complete the SURF when it is activated. We encourage you to complete the forms as your feedback is extremely important and can be used to make changes to the unit or lecturing style when appropriate.

SPOT and SURF surveys are conducted each year and the feedback obtained from these is acted upon in order to improve the student experience.

For example, student feedback relating to handouts of reading articles handed out bi-week was changed to distribution at the start of the semester in order to allow students to prepare their reports and to read ahead of the class discussions.
Attendance
Participation in class, whether it be listening to a lecture or getting involved in other activities, is an important part of the learning process, therefore it is important that you attend classes. More formally, the University regulations state that ‘to complete a course or unit students shall attend prescribed classes, lectures, seminars and tutorials’. Where a student, due to exceptional circumstances, is unable to attend a scheduled class, they are required to obtain prior approval of the unit coordinator to be absent from that class. Any student absent from class without having had such absence approved by the unit coordinator may be referred to the faculty for advice and may be required to withdraw from the unit.

CONTACT DETAILS

We strongly advise students to regularly access their student email accounts. Important information regarding the unit is often communicated by email and will not be automatically forwarded to private email addresses.

<table>
<thead>
<tr>
<th>Unit coordinator/lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
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<tr>
<td><strong>Email:</strong></td>
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<td><strong>Phone:</strong></td>
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<tr>
<td><strong>Consultation hours:</strong></td>
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<tr>
<td><strong>Lecture times:</strong></td>
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<tr>
<td><strong>Lecture venue:</strong></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Tutor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
</tr>
</tbody>
</table>
| **Email:** | Santhosh Palanisamy
<20688716@student.uwa.edu.au> |
| **Phone:** | TBA |
| **Consultation hours:** | TBA |
| **Tutorial times:** | Mondays 1:00pm – 2:00pm or 3:00pm – 4:00pm |
| **Tutorial Venue:** | BUSN: Computer Lab G87 |
TEXTBOOK(S) & RESOURCES

Unit Website
http://www.ecom.uwa.edu.au/enrolled_students/unit_pages

Recommended/required text(s)
No Textbook is required for this unit.

Software requirements

Expert Systems and Fuzzy
CubiCalc RTC, HyperLogic Corporation

Neural Network
NeuroShell 2, Ward Systems

Genetic Algorithm
Evolver 4.0 Professional Edition

These are provided in the labs.

Additional resources & reading material

Readings
There is no prescribed text. Readings will be distributed. It is often useful to scan other books and papers for the more comprehensible sections.

DSS/OR/Expert Systems

Fuzzy Logic
Artificial Neural Networks


Genetic Algorithms


Swarm Intelligence


Hybrid Systems

## UNIT SCHEDULE

<table>
<thead>
<tr>
<th>Week #</th>
<th>Week of</th>
<th>Prior Reading</th>
<th>Discussion Topic</th>
<th>Computing</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 August</td>
<td></td>
<td>Introduction to computational intelligence, fuzzy sets and fuzzy logic</td>
<td>No lab</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15 Aug</td>
<td>Giarratano &amp; Riley 283-324</td>
<td>Fuzzy for decision and multiple attributes</td>
<td>Applying fuzzy to business decisions</td>
<td>CubiCalc (2)</td>
</tr>
<tr>
<td>4</td>
<td>22 Aug</td>
<td>Galindo, Aranda, Caro, Guevara &amp; Aguayo, Patterson 1-36;</td>
<td>Introduction to artificial neural networks (ANN)</td>
<td>Initial exploration of ANN software</td>
<td>NeuroShell (1)</td>
</tr>
<tr>
<td>5</td>
<td>29 Aug</td>
<td>An-Sing Chena, Leungb, Hazem Daoukc; Charitou; Bloom</td>
<td>Advanced applications of artificial neural networks (ANN)</td>
<td>Apply ANN to forecasting, and assessment</td>
<td>NeuroShell (2)</td>
</tr>
<tr>
<td>6</td>
<td>5 Sept</td>
<td>Dias, Sousa and Cunha; Fish, Johnson, Dorsey, Blodgett</td>
<td>Introduction to genetic algorithm(GA); crossover, mutation, fitness, convergence</td>
<td>No lab</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>12 Sept</td>
<td>Taplin, Qiu, Salim &amp; Han, Ch.4, 7 (extracts)</td>
<td>GA to cope with intractable problems, multiple optima; GA-ANN hybrids</td>
<td>Introductory GA applications; use GA to fit a function GA options to find best ANN solutions; shop location</td>
<td>Excel Solver and Evolver (1)</td>
</tr>
<tr>
<td>8</td>
<td>19 Sept</td>
<td>TBA Corvid Exsys</td>
<td>TBA Corvid Exsys</td>
<td>TBA Corvid Exsys</td>
<td>TBA Corvid Exsys</td>
</tr>
<tr>
<td>Week</td>
<td>Date</td>
<td>Lecture</td>
<td>Reading</td>
<td>Notes</td>
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<tr>
<td>1</td>
<td>26 Sept</td>
<td>Study Break</td>
<td></td>
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<tr>
<td>2</td>
<td>3 Oct</td>
<td>TBA</td>
<td>TBA</td>
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<tr>
<td>3</td>
<td>26 Oct</td>
<td>Shuliang Li; Intelligent Systems for Market Strategy (handout); Hybrid EA and the Shape of the Search Space (handout);</td>
<td>Formulate a hybrid intelligent system for market strategy • Exact &amp; near exact solutions</td>
<td>No lab</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10 Oct</td>
<td>Fish, Johnson, Dorsey &amp; Blodgett; Rizzoli et al</td>
<td>• GA for marketing (ref Hurley et al) • Swarm intelligence • The 'ant pheromone’ model</td>
<td>PRESENTATIONS PowerPt</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>17 Oct</td>
<td>Gatarski, Breed better banners: ... Giarratano&amp;Riley 316-319 Applying the max-min fuzzy function in matrix form (handout)</td>
<td>• Evolutionary algorithms in marketing • Applying the max-min fuzzy operator</td>
<td>PRESENTATIONS PowerPt</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>24 Oct</td>
<td>Revision</td>
<td>Preparation for exam</td>
<td>PRESENTATIONS PowerPt</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>31 Oct</td>
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ASSESSMENT MECHANISM

The purpose of assessment

The assessment is closely linked to the outcome statements, such as shown in the Assessment components below:

Aligning with the unit’s learning outcomes your individual work as well as the semester team project will be assessed in order to measure your progress throughout the semester. In order to ascertain your progress in learning the material your class participation and submitted work will be evaluated and feedback provided. A final exam will target broader issues discussed in the unit.

There are a number of reasons for having assessable tasks as part of an academic program. The assessable tasks are designed to encourage you to explore and understand the subject more fully. The fact that we grade your work provides you an indication of how much you have achieved. Providing feedback on your work also serves as part of the learning process.

Assessment mechanism summary


<table>
<thead>
<tr>
<th>Item</th>
<th>Weight (%)</th>
<th>Due date</th>
<th>Submission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1 - Fuzzy</td>
<td>10</td>
<td>19 August</td>
<td>Uniprint by 8:30 am</td>
</tr>
<tr>
<td>Assignment 2 - Neural Nets</td>
<td>10</td>
<td>12 September</td>
<td>Uniprint by 8:30 am</td>
</tr>
<tr>
<td>Assignment 3 - Genetic Algorithms</td>
<td>10</td>
<td>10 October</td>
<td>Uniprint by 8:30 am</td>
</tr>
<tr>
<td>Reading Reports</td>
<td>10</td>
<td>Fortnightly (Starting week 3)</td>
<td></td>
</tr>
<tr>
<td>Project and Presentation</td>
<td>15</td>
<td>Last weeks of the semester</td>
<td></td>
</tr>
<tr>
<td>Final exam</td>
<td>45</td>
<td>During exam period</td>
<td></td>
</tr>
</tbody>
</table>

Results may be subject to scaling and standardisation under faculty policy and are not necessarily the sum of the component parts.

Note 1: Results may be subject to scaling and standardisation under faculty policy and are not necessarily the sum of the component parts.

Note 2: The grade FC indicates failure to complete an identified essential assessment component and means failure of the unit.

Note 3: Your assessed work may also be used for quality assurance purposes, such as to assess the level of achievement of learning outcomes as required for accreditation and audit purposes. The findings may be used to inform changes aimed at improving the quality of Business School programs. All material used for such processes will be treated as confidential, and the outcome will not affect your grade for the unit.
Submission of Assignments

Submit your assignment in an electronic formatted PDF file by going to the Uniprint web site www.uniprint.uwa.edu.au, then click on “Student Assignments” and follow the instructions.

Assessment components

The following outline indicates the relative importance to give to each stage of the assignments and how to structure your report. The grading will allocate marks (printed on a marks slip) out of the percentage of the assignment mark for each of the four elements.

Assignment 1

20% Formulation, Scope, Investigations
   - Context of the problem and any background needed to understand the report
   - Narrow the scope to some specific questions
   - Identify key features of the system under investigation
   - Compile information and numerical data (but reasonable guesstimation is acceptable)
   - State assumptions and their justification

40% Model Building
   - The report should include relevant explanation and printouts
   - Including explanation of decisions about variables and adjectives.

20% Verification, Validation, Trials and Analysis
   - Describe how you satisfied yourself that the model does what you intended it to do and that it gives useful insights into the problem.
   - Brief outline of trials carried out and the results obtained.

20% Conclusions and Recommendations
   - A statement of what has been found or demonstrated.
Assignment 2

20% **Formulation, Scope, Investigations**
- Context of the problem and any background needed to understand the report
- Identify key features of the system under investigation
- Collect data

40% **Model Building**
- The report should include relevant explanation and printouts
- Including explanation of decisions about variables.

20% **Verification, Trials and Analysis**
- Describe how you satisfied yourself that the model does what you intended it to do and that it gives useful insights into the problem.
- Brief outline of trials carried out and the results obtained.

20% **Conclusions and Recommendations**
- A statement of what has been found or demonstrated.

Assignment 3

20% **Formulation, Scope, Investigations**
- Context of the problem and any background needed to understand the report
- Identify key features of the system under investigation
- Compile information and numerical data (but reasonable guesstimation of missing data is acceptable)

40% **Model Building**
- The report should include relevant explanation and printouts
- Including explanation of decisions about variables and structure

20% **Verification, Trials and Analysis**
- Describe how you satisfied yourself that the model does what you intended it to do and that it gives useful insights into the problem.
- Brief outline of trials carried out and the results obtained.

20% **Conclusions and Recommendations**
- A statement of what has been found or demonstrated.

Assignment 4 – The Term Project

Details of the term project will be discussed and distributes to the class early in the semester.

For the term project presentation, students will present and critically review their projects. The presentation represents 5% of the final grade and it should not last more than 12 min. The remaining 10% will be assigned to the project evaluation. PowerPoint presentations will be provided to your lecturer before the presentation (last three lectures of the semester).
Student Name: __________________________

Student Number: __________________________ Grade: __________________________

Group Number: __________________________

Presentation Day and Time: __________________________

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Poor</th>
<th>Average</th>
<th>Good</th>
<th>Excellent</th>
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<tbody>
<tr>
<td>Introduction</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>– Topic is clear</td>
<td></td>
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<tr>
<td>– Framework of presentation is clear</td>
<td></td>
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<tr>
<td>Body of Presentation</td>
<td></td>
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<tr>
<td>– Presentation of information follows a logical order</td>
<td></td>
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</tr>
<tr>
<td>– Sufficient information provided</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Appropriate use of results</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td></td>
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<tr>
<td>Conclusion linked to opening</td>
<td></td>
<td></td>
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<tr>
<td>– Main point summarised</td>
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<tr>
<td>Delivery</td>
<td></td>
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<tr>
<td>– Speech is audible</td>
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<tr>
<td>– Suitable vocabulary</td>
<td></td>
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<tr>
<td>– Full audience addressed/ eye contact</td>
<td></td>
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<td></td>
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<tr>
<td>– Little / no reading from text</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>– Time limit observed</td>
<td></td>
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<tr>
<td>Visual aids and handouts</td>
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<tr>
<td>– Visual aids visible to all</td>
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<tr>
<td>– Equipment operated correctly</td>
<td></td>
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<tr>
<td>– Effective</td>
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Comments: __________________________________________________________

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DOING THE PROJECT AND EARNING THE MARKS

The following outline indicates the relative importance to give to each stage of the project and how to structure your report. The grading will allocate marks (printed on a marks slip) out of the percentage of the project mark for each of the four elements.

20% **Formulation, Scope, Investigations**
- Context of the problem and any background needed to understand the report
- Narrow the scope to some specific questions
- Identify key features of the system under investigation
- Compile information and numerical data (but reasonable guesstimation is acceptable)
- State assumptions and their justification

**YOUR MARK __________**

40% **Model Building**
- The report should include relevant explanation and printouts
- Including explanation of decisions about variables and adjectives.

**YOUR MARK __________**

20% **Verification, Validation, Trials and Analysis**
- Describe how you satisfied yourself that the model does what you intended it to do and that it gives useful insights into the problem.
- Brief outline of trials carried out and the results obtained.

**YOUR MARK __________**

20% **Conclusions and Recommendations**
- A statement of what has been found or demonstrated.

**YOUR MARK __________**  **TOTAL MARK __________**

========================================================================

**Standard of Assessment**

The Business School must ensure that the processes of assessment are fair and are designed to maintain the standards of the School and its students. The School follows the University of Western Australia’s grading system:

Please note, regarding the final exam -

**To pass this unit, students are required to achieve a score of at least 45% in the final exam. Students who fail to achieve the minimum standard in the final exam but achieve an accumulated score based on all assessment components for the unit of 50 and above will be awarded a final mark of 48%.**
Submission of assignments

Submit your assignment in an electronic formatted PDF file by going to the Uniprint web site www.uniprint.uwa.edu.au click on “Student Assignments” and follow the instructions.

All assignments and projects are to be submitted via Uniprint must include the normal individual or team cover sheet.

Student Guild

Phone: (+61 8) 6488 2295
Facsimile: (+61 8) 6488 1041
E-mail: enquiries@guild.uwa.edu.au
Website: http://www.guild.uwa.edu.au

Charter of Student Rights and Responsibilities


Appeals against academic assessment

The University provides the opportunity for students to lodge an appeal against assessment results and/or progress status (refer http://www.secretariat.uwa.edu.au/home/policies/appeals).