

COMP90054 AI Planning for Autonomy

| Credit Points: | 12.5 | | | | | | | | | | | | | | | | | | |
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| Level: | 9 (Graduate/Postgraduate) | | | | | | | | | | | | | | | | | | |
| Dates & Locations: | 2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus. | | | | | | | | | | | | | | | | | | |
| Time Commitment: | Contact Hours: 36 hours, comprising of two 1-hour lectures and one 1-hour workshop per week Total Time Commitment: 200 hours | | | | | | | | | | | | | | | | | | |
| Prerequisites: | <p>To enrol in this subject, students must satisfy one of these conditions:</p> <ul style="list-style-type: none"> # be admitted into the Computing specialisation of the 100 pt program of the MC-IT (Master of Information Technology) # have completed one of the following subjects: <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>COMP90048 Declarative Programming</td> <td>Semester 2</td> <td>12.50</td> </tr> <tr> <td>COMP30020 Declarative Programming</td> <td>Semester 2</td> <td>12.50</td> </tr> <tr> <td>COMP20007 Design of Algorithms</td> <td>Semester 1</td> <td>12.5</td> </tr> <tr> <td>COMP90038 Algorithms and Complexity</td> <td>Semester 1, Semester 2</td> <td>12.5</td> </tr> <tr> <td>COMP20003 Algorithms and Data Structures</td> <td>Semester 2</td> <td>12.5</td> </tr> </tbody> </table> | Subject | Study Period Commencement: | Credit Points: | COMP90048 Declarative Programming | Semester 2 | 12.50 | COMP30020 Declarative Programming | Semester 2 | 12.50 | COMP20007 Design of Algorithms | Semester 1 | 12.5 | COMP90038 Algorithms and Complexity | Semester 1, Semester 2 | 12.5 | COMP20003 Algorithms and Data Structures | Semester 2 | 12.5 |
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| Corequisites: | None | | | | | | | | | | | | | | | | | | |
| Recommended Background Knowledge: | None | | | | | | | | | | | | | | | | | | |
| Non Allowed Subjects: | 433-481 Agent Programming Languages 433-482 Software Agents 433-681 Agent Programming Languages 433-682 Software Agents | | | | | | | | | | | | | | | | | | |
| Core Participation Requirements: | <p><p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability</p> </p> | | | | | | | | | | | | | | | | | | |
| Coordinator: | Dr Timothy Miller | | | | | | | | | | | | | | | | | | |
| Contact: | tmiller@unimelb.edu.au (mailto:tmiller@unimelb.edu.au) | | | | | | | | | | | | | | | | | | |
| Subject Overview: | <p>AIMS</p> <p>The key focus of this subject is the foundations of automated planning and reasoning and their real-world applications. Automated planning is the AI approach to developing agents that make their own decisions and is becoming increasingly popular. Autonomous agents are active entities that perceive their environment, reason, plan and execute appropriate actions</p> | | | | | | | | | | | | | | | | | | |

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| | <p>to achieve their goals, in service of their users (the real world, human beings, or other agents). This subject shows how this work is relevant for many applications beyond the traditional area of artificial intelligence, such as resource scheduling, logistics, process management, service composition, intelligent sensing and robotics. The subject focuses on the foundations that enable agents to reason autonomously about goals, perception, actions and the knowledge of other agents during collaborative task execution.</p> <p>This subject is an elective subject in the Master of Science (Computer Science) and Master of Information Technology, in particular for the Distributed Computing and the Computing Specialisations. It can also be taken as an Advanced Elective subject in the Master of Engineering (Software).</p> <p>INDICATIVE CONTENT</p> <p>Topics are drawn from the field of advanced artificial intelligence including</p> <ul style="list-style-type: none"> # Agent modelling # Sensing and acting # Search algorithms and heuristic functions # Classical (AI) planning # Theorem proving # Introduction to modal logic and model theory # Epistemic logic # Dynamic logic # The situation calculus # Logical regression # Non-deterministic programming # Concurrency and multi-agent programming <p>:</p> |
| Learning Outcomes: | <p>INTENDED LEARNING OUTCOMES (ILO)</p> <p>On completion of this subject the student is expected to:</p> <ol style="list-style-type: none"> 1 Understand the theoretical concepts of automated planning and reasoning techniques 2 Be able to apply agent modelling techniques to analyse, design and implement a small agent-based system 3 Be able to evaluate, design, and implement automated planning and reasoning techniques 4 Understand the strengths and weaknesses of different automated planning and reasoning approaches for software agents 5 Be able to apply automated planning and concurrent programming techniques to non-trivial distributed problems. |
| Assessment: | <p>One team-based written assignment (10%) of approximately 1000 words between Weeks 5 to 6, involving 2 to 3 team members with each team member contributing approximately 13 - 15 hours or work, including preparation. Intended learning Outcomes (ILOs) 3 - 4 are addressed in these laboratory classes One team-based presentation (10%) of approximately 10 - 15 minutes duration due in Weeks 7 to 9, involving 2 to 3 team members, each member contributing approximately 13 - 15 hours of work. ILO 5 is addressed in this team-based assignment One programming-based assignment (30%) due in Weeks 11 to 12, requiring approximately 35 - 40 hours of work. ILOs 3 to 5 are addressed in this assignment One written 2-hour closed book end-of-semester examination (50%). ILOs 1 to 3 are addressed in the exam. Hurdle requirement: The examination is a hurdle and must be passed to pass the subject.</p> |
| Prescribed Texts: | <p>Hector Geffner and Blai Bonet, A Concise Introduction to Models and Methods for Automated Planning, Morgan & Claypool, 2013</p> |
| Breadth Options: | <p>This subject is not available as a breadth subject.</p> |
| Fees Information: | <p>Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees</p> |

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| Generic Skills: | <p>On completion of the subject the students should have the following skills:</p> <ul style="list-style-type: none"> # Ability to undertake problem identification, formulation, and solution # Ability to utilise a systems approach to complex problems and to design and operational performance # Ability to manage information and documentation # Capacity for creativity and innovation Ability to communicate effectively with both the engineering team and the community at large. |
| Notes: | <p>LEARNING AND TEACHING METHODS</p> <p>The subject involves two 1-hour lectures per week followed by a 1 one hour workshop held in a computer laboratory. Weekly readings are assigned from textbooks, and weekly laboratory exercises are assigned. A significant amount of project work is assigned.</p> <p>INDICATIVE KEY LEARNING RESOURCES</p> <p>At the beginning of the year, the coordinator will propose textbook(s) on computer graphics and interaction and will be made available through the University Book Shop and library. Students will have access to lecture notes and lecture slides. The subject LMS site also contains links to recommended literature and current survey papers of software agent principles.</p> <p>CAREERS / INDUSTRY LINKS</p> <p>The IT industry is a large and steadily growing industry and advanced artificial intelligence techniques such as software agents are increasingly an integral part of the many facets of this industry. The University of Melbourne and Microsoft have created a new teaching innovative, Apps@Melbourne, for the many talented students keen on developing Apps for tablet computers. Students enrolled in this subject have the opportunity to publish Apps they have developed on the store to be made available to the wider community.</p> |
| Related Course(s): | <p>Doctor of Philosophy - Engineering Master of Information Technology Master of Information Technology Master of Philosophy - Engineering Master of Science (Computer Science)</p> |
| Related Majors/Minors/ Specialisations: | <p>B-ENG Software Engineering stream MIT Computing Specialisation MIT Distributed Computing Specialisation Master of Engineering (Software)</p> |