Instructor: Associate Professor LAU Hoong Chuin (hclau@smu.edu.sg, 6828-0229)

Description:

This course explores select topics in intelligent systems for decision making, from the Artificial Intelligence and Operations Research (Management Science) perspectives. More precisely, we will be studying survey and research papers on resource allocation, planning and scheduling, under two broad themes:

- **Uncertainty**:
  - Meta-heuristic Search
  - Planning and Scheduling under Uncertainty
  - Robust Optimization

- **Multi-Agent Systems**
  - Distributed Problem Solving, Planning and Scheduling
  - Auctions and Negotiations
  - Computational Game Theory

Prerequisites:

- Graduate Course in Algorithms (and/or Operations Research)
- Undergraduate-level Discrete Mathematics, Probability & Statistics

Time: Tue 12-3pm  
Venue: SIS Seminar Room 3.2

References (tentative):

A number of survey and research papers to be distributed in class through SMU Vista.

Good references on Multi-Agent Systems:


Class Schedule (tentative):

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<td>Introduction / Intelligent Search</td>
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<td>Optimization, Planning and Scheduling Under Uncertainty</td>
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<td>Distributed Problem Solving (Dr William Yeoh)</td>
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<td>Agent-based Research in Finance and Urban Transportation (by Prof. Shih-Fen Cheng)</td>
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Slides and other materials can be downloaded from SMU eLearn.

Grading:
Class attendance and participation – 10%
Class presentation (2 rounds) – 20%
Reading reports – 20%
Project presentation and report – 50% (See below)

Mode of instructions: Students will learn concepts through active class participation, research paper reading and presentations, as well as writing a term paper.
Term Project

Each student should complete a survey paper based on the materials discussed in class.

Instructions:
- Read at least 4 published (conference or journal) papers on the selected topic
- Write a survey that covers the following:
  - Introduction: motivation, application domain, problem definition
  - Summaries of the techniques developed in each paper, clearly highlighting the strengths and weaknesses of each
  - A taxonomy of the various techniques if possible
  - Future research directions
- The paper should be no more than 8 double-column pages, in the IEEE format
- The report will be graded on (a) understanding of the chosen papers, (b) critique of the papers, and (c) presentation (clarity, organization, English).

Project Topic:

The project topic must be approved by the Course Instructor.

You can find papers from journals such as INFORMS J. Computing, Management Science, Operations Research, European J. Operational Research, Artificial Intelligence, Journal of AI Research, Autonomous Agents and Multi-Agent Systems, Journal of Experimental and Theoretical AI, Journal of Scheduling, Journal of Heuristics, IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Systems Man and Cybernetics. In addition, papers may also be obtained from very good AI conferences such as AAAI, IJCAI, UAI, AAMAS, IAT, ACM EC, KDD, and ICAPS. More details will be discussed in class.

Furthermore, various papers of interest can be obtained from the Course Instructor.

Schedule:

Week 7: Project Proposal
Week 13: Class presentation
Week 14: Survey report due