REASONING SYSTEMS

A STACKABLE COURSE FOR CERTIFICATE IN:
INTELLIGENT REASONING SYSTEMS (IRS)

OVER
6,250 GRADUATE ALUMNI

OFFERING OVER
150 ENTERPRISE IT, INNOVATION & LEADERSHIP PROGRAMMES

TRAINING OVER
135,000 DIGITAL LEADERS & PROFESSIONALS

Course Manager / Lecturer

issgz@nus.edu.sg

- Mr. GU Zhan 顾瞻 (Sam) lectures Master of Technology programme in the areas of data science, machine intelligence, and soft computing. Prior to joining ISS, he was in New Zealand running start-up, delivering artificial intelligence training programs. Sam had also spent many years in financial and engineering sector wearing versatile hats: data scientist, project manager, consultant, system manager and software engineer.

- He devotes himself into pedagogy, and is very passionate in inspiring next generation of artificial intelligence lovers and leaders.

Course Lecturer

isszfm@nus.edu.sg

- Dr. ZHU Fangming is with the Institute of Systems Science of the National University of Singapore (NUS-ISS). He currently lectures in the Master of Technology programme in the areas of evolutionary computation, neural networks and data mining. Prior to joining ISS, he was a postdoctoral fellow in the Department of Electrical and Computer Engineering at NUS. He also worked as a research and development engineer in an IT company before pursuing his PhD studies at NUS. His research interests include evolutionary computation, neural networks, data mining, machine learning, and pattern recognition. Fangming was a recipient of the prestigious Singapore Millennium Foundation (SMF) Postdoctoral Fellowship in 2003. He has also published many papers in leading journals and conferences.

Course Lecturer

issfz@nus.edu.sg

- Ms. FAN Zhen Zhen has been with Institute of Systems Science, NUS, since 2006. She currently lectures in the Master of Technology programme in the areas of case-based reasoning, text mining, KBS development, hybrid KBS, and formal specification. Prior to joining ISS, she was a senior research engineer at the Institute for Infocomm Research working in the areas of machine translation and natural language processing. Her current research interests lie in text mining and computational linguistics.

Learning Outcomes

1. **Identify** real world business use cases and applications of advanced intelligent reasoning systems.

2. **Integrate** advanced technical enablers in reasoning systems, including uniformed search, heuristic search, constraint satisfaction, simulation assisted learning, optimization, planning, system integration, programming, and data mining for knowledge discovery.

3. **Decompose** complex application scenarios into sub problems to be solved by assembling cooperative intelligent subsystems.

4. **Reflect** the architectures and techniques used in contemporary reasoning systems.

5. **Design** cooperative reasoning modules based on decomposed business outcomes.

6. **Create** hybrid reasoning system by applying suitable techniques and computer programming to solve complex problem under constraints.

Become T Shaped Expert

Reasoning Types	System Architectures	Knowledge Representation	Knowledge Acquisition	Uncertainty Management	Knowledge Discovery	Machine Learning
Rule/Process Based Reasoning System	Cognitive Reasoning System	Self Learning System	**Search & Optimization System**	Natural Language Processing System	Vision Based Reasoning System	Robotic Reasoning System

Agenda

Day 1

1.1 Reasoning Systems Overview

1.2 Uninformed Search Techniques

1.3 Informed Search Techniques (part 1/2)

1.4 Search Representation **Workshop**

Day 3

3.1 Reasoning using Optimization Techniques

3.2 Optimization Based Intelligent Systems

3.3 Optimisation Reasoning **Workshop**

Day 5

5.1 Hybrid Reasoning Systems

5.2 Contemporary Reasoning Systems

5.3 { Course **Assessment 2** }

5.4 Create Hybrid Reasoning System **Workshop**

(Graded workshop & project deliverables)

Day 2

2.1 Informed Search Techniques (part 2/2)

2.2 Search Based Intelligent Systems

{ Course **Assessment 1** }

2.3 Search Reasoning **Workshop**

Day 4

4.1 Knowledge Discovery Using Data Mining Techniques

4.2 Knowledge Discovery Applications and Systems

4.3 Knowledge Discovery **Workshop**

Agenda : Course Assessment & Grading
MTech Thru-Train

- **In-Class Assessments [Individual]** on 2nd & 5th lecture day
  - 15 minutes open book test (course level)
  - 60 minutes open book test (course level)

- **In-Class Workshops [Individual]** to be advised by co-lecturers

- **Project Work [Group]** due 23:59 on 1st Sunday in May/Nov
  - Refer to Practice Module

Agenda : Course Assessment & Grading
In-Class Assessments

- **Open book individual test**

- **Digitized assessment paper: Microsoft Word document .docx**

- **Internet (re)search is allowed but no online discussion, e.g. WhatsApp, Internet Messaging, Email, etc.**

- **Bring your IC identification card.**

[In-Class Workshops Submission]

- Deliverables in a single zip file

- Naming convention:
    1. A zip file (individual)   : *ID_FullName.zip* e.g. *A1234567B_Gu Zhan.zip*

- Upload to LumiNUS respective submission folders.

END OF LECTURE NOTES