

Digital Skills
Training
Programs at
Knowledge
Technology

**APPLIED
ARTIFICIAL
INTELLIGENCE**

- Our approach to this course is to teach the underlying concepts of Artificial Intelligence and how it can be applied as a problem-solving tool.
- Covers 12 modules in 7 days and we expect learners to be able to apply the concept of Artificial Intelligence to solve many of the business problems they face at their workplace.



KNOWLEDGE TECHNOLOGY
RESEARCH UNIT

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| Course Title | Applied Artificial Intelligence |
| Duration | 7 Days |
| Trainer | Assoc. Prof. Dr. Rayner Alfred |
| Cost | Email ralfred121@gmail.com or call 013-881-9966 for quotations |
| Max Participants | 25 |
| SYNOPSIS | |
| Our approach to this course is to teach the underlying concepts of AI and how it can be applied as a problem-solving tool. Going beyond the theory, our approach invites participants to go through several practical sessions, where learning is facilitated by live subject matter experts and enriched by practitioners in the field of Artificial Intelligence. | |
| LEARNING OUTCOMES | |
| The course requires learners to work on application projects. These projects require learners to apply the Artificial Intelligence concepts they have learned to be applied as a problem-solving tool. These application projects are intentionally made to be challenging. We expect learners to spend substantial time and effort solving the application projects. At the end of the course, we expect learners to be able to apply the concept of Artificial Intelligence to solve many of the business problems they face at their workplace. | |
| JUSTIFICATION TO LEARN APPLIED ARTIFICIAL INTELLIGENCE | |
| Artificial Intelligence (AI) is being used extensively to solve real-world complex problems. From driving automobiles to providing virtual assistance, use of artificial intelligence in our day to day lives are projected to increase manifold in the coming years. In fact, as per a survey conducted by PwC, business leaders said they believe AI is going to be fundamental in the future. In fact, 72% termed it a “business advantage.” | |

TOPICS LIST

- [1] INTRODUCTION TO ARTIFICIAL INTELLIGENCE
- [2] INTELLIGENT AGENTS AND UNINFORMED SEARCH
- [3] HEURISTIC SEARCH
- [4] ADVERSARIAL SEARCH AND GAMES
- [5] MACHINE LEARNING
- [6] CONSTRAINT SATISFACTION PROBLEMS
- [7] REINFORCEMENT LEARNING
- [8] LOGICAL AGENTS
- [9] AI APPLICATIONS: NATURAL LANGUAGE PROCESSING
- [10] AI APPLICATIONS AND COURSE REVIEW

COURSE SYLLABUS (7 DAYS)

| DAY | TOPICS COVERED | TIME |
|-------|---|------------------------|
| One | MODULE 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE <ul style="list-style-type: none"> ➤ Overview of AI ➤ Applications of AI ➤ AI foundation and history | 9:00 am – 10:30 am |
| | MODULE 2: INTELLIGENT AGENTS AND UNINFORMED SEARCH <ul style="list-style-type: none"> ➤ Intelligent agents ➤ Search agents ➤ Uninformed search ➤ Uninformed search examples | |
| | MODULE 3: HEURISTIC SEARCH ALGORITHMS <ul style="list-style-type: none"> ➤ Heuristics and greedy search algorithm ➤ A* search and optimality ➤ Search algorithms recap ➤ Local search | 11:00 am – 12:30 pm |
| | MODULE 4: ADVERSARIAL SEARCH AND GAMES <ul style="list-style-type: none"> ➤ Adversarial search and games ➤ Minimax algorithm ➤ Alpha-beta pruning ➤ Stochastic games | 2:30 pm – 4:00 pm |
| Two | MODULE 5: MACHINE LEARNING I <ul style="list-style-type: none"> ➤ Machine learning concepts ➤ K-nearest neighbours and training-testing ➤ Overfitting-underfitting and regularization ➤ Linear models for regression | 9:00 am – 4:30 pm |
| Three | MODULE 6: MACHINE LEARNING II <ul style="list-style-type: none"> ➤ Machine learning: perceptron ➤ Logistic regression ➤ Decision trees ➤ Naïve Bayes ➤ Ensemble methods | 9:00 am – 4:30 pm |
| Four | MODULE 7: MACHINE LEARNING III <ul style="list-style-type: none"> ➤ Neural networks ➤ Clustering ➤ Association rules | 9:00 am – 4:30 pm |

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| Five | MODULE 8: CONSTRAINT SATISFACTION PROBLEMS <ul style="list-style-type: none"> ➤ Constraint satisfaction problems ➤ Cryptarithmic puzzle ➤ Backtracking ➤ Constraint propagation ➤ Problem structure | 9:00 am – 12:30 pm |
| | MODULE 9: REINFORCEMENT LEARNING <ul style="list-style-type: none"> ➤ Reinforcement Learning Introduction ➤ Reinforcement learning overview ➤ Markov decision process (MDP) ➤ Example of an MDP and Bellman equations ➤ Value function - Matrix notation ➤ Finding optimal policy in MDPs - iterative methods | 2:30 pm – 4:30 pm |
| Six | MODULE 10: LOGICAL AGENTS <ul style="list-style-type: none"> ➤ Knowledge-based agents ➤ The Wumpus world ➤ Logical agent ➤ Inference rules ➤ Reduced Wumpus world ➤ Model checking and inference ➤ Theorem proving and proof by resolution ➤ Conversion to CNF and resolution algorithm ➤ Forward and backward chaining ➤ Propositional logic: summary ➤ First order logic | 9:00 am – 4:30 pm |
| Seven | MODULE 11: AI APPLICATIONS: NATURAL LANGUAGE PROCESSING <ul style="list-style-type: none"> ➤ AI Applications: Natural language processing ➤ Text classification ➤ Language models ➤ Progress in NLP | 9:00 am – 4:30 pm |

TRAINER'S BIOGRAPHIES



RAYNER ALFRED

ASSOCIATE PROFESSOR OF COMPUTER SCIENCE

Certified IBM DB2 Academic Associate, Certified Tester Foundation Level (CTFL)

AREAS OF SPECILIZATION: Advanced Machine Intelligence, Data Analytics, Data Mining, Information Retrieval, Artificial Intelligence, Machine Learning, Knowledge Discovery

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Rayner Alfred is an Associate Professor of Computer Science at the Faculty of Computing and Informatics, Universiti Malaysia Sabah in Malaysia that focuses on Data Science and Software Engineering programmes. He leads and defines projects around knowledge discovery, information retrieval and machine learning that focuses on building smarter mechanism that enables knowledge discovery in structured and unstructured data. His work addresses the challenges related to big data problem: How can we create and apply smarter collaborative knowledge discovery and machine learning technologies that bridge the structured and unstructured data mining and cope with the big data problem.

Rayner completed his PhD in 2008 looking at intelligent techniques using machine learning to model and optimize the dynamic and distributed processes of knowledge discovery for structured and unstructured data. He holds a PhD degree in Computer Science from York University (United Kingdom), a master's degree in computer science from Western Michigan University, Kalamazoo (USA) and a Computer Science degree from Polytechnic University of Brooklyn, New York (USA) where he was the recipient of the *Myron M. Rosenthal Academic Achievement Award* for the outstanding academic achievement in Computer Science in 1994. He has authored and co-authored more than 100 journals/book chapters and conference papers, editorials, and served on the program and organizing committees of numerous national and international conferences and workshops.

Rayner is currently a member of IEEE, a Certified Software Tester (CTFL) from the International Software Testing Qualifications Board (*ISTQB*), and a certified IBM DB2 Academic Associate (IBM DB2 AA). He leads the Advanced Machine Intelligence (AMI) research group in UMS and he has led several projects related to knowledge discovery and machine learning on Big Data. Rayner is also the recipient of the Research Fellow at Japan Advanced Institute of Science and Technology (JAIST), Japan. He is also the recipient of multiple GOLD awards at national and international research exhibitions in Data Mining and Machine Learning based solutions (Face Recognition and Knowledge Discovery), that include International Trade Fair Ideas in Nuremberg, Germany (iNEA2018) International Invention Innovation Competition in Toronto, Canada (iCAN 2018), Seoul International Invention Exhibition in Seoul, Korea (SIIF 2010). He has secured RM6,931.433.00 worth of project grants. Some of his project researches include biometric authentication using face recognition, building security based on plate number recognition using deep learning, sentiment analysis for Malay and English in measuring public opinion, news-news correlation trending, machine learning algorithm-based solution for predicting diseases in health care, smart monitoring using an ensemble based face recognition system and smart information management and retrieval to name a few.