



Computer Science (COMP) 456

Artificial Intelligence (Revision 5)

Status:

Replaced with new revision, see the [course listing](#) for the current revision

Delivery mode:

Individualized study online with eText

Credits:

3

Area of study:

Science

Prerequisites:

COMP 268 or COMP 272 or COMP 306 or COMP 308, or professor approval.

Precluded:

None

Challenge:

COMP 456 has a challenge for credit option.

Faculty:

Faculty of Science and Technology

Notes:

Students who are concerned about not meeting the prerequisites for this course are encouraged to contact the [course coordinator](#) before registering



Overview

The course deals with a broad range of artificial intelligence (AI) topics. It introduces the programming languages for artificial intelligence Prolog and Lisp. The course begins with an introduction to AI applications, predicate calculus, and state space search. Then it delves into some central areas of artificial intelligence such as heuristic strategies, problem solving, knowledge representation, expert systems, and machine learning. Throughout the course, the student will frequently be required to work with examples.

Outline

COMP 456 consists of the following units:

Unit 1: Artificial Intelligence and Predicate Calculus

An introduction to artificial intelligence and predicate calculus. It presents AI roots and applications, and explains the concepts related to propositional and predicate calculus.

Unit 2: AI Programming Languages: Prolog and Lisp

The main concepts related to the AI programming languages Prolog and Lisp. It presents the syntax, data types, and control mechanisms for both languages.

Unit 3: Graph Theory and Strategies for State Space Searches

Concepts related to graph theory and finite state machines. It presents state space search algorithms and reasoning strategies.

Unit 4: Heuristic Search Algorithms

Heuristic search issues and applications. It presents algorithms such as hill-climbing, dynamic programming, and best-first search.

Unit 5: Control and Implementation of State Space Searches

Issues related to the control and implementation of state space search. It presents recursion-based searching and discusses architectures such as production and blackboard systems.

Unit 6: Knowledge Representation

Concepts and issues related to knowledge representation. It discusses ontologies and agent-based systems.



Unit 7: Expert Systems and Problem Solving

The expert systems model for problem solving. Other models for problem solving such as case-based reasoning, model-based reasoning, and hybrid models are discussed.

Unit 8: Introduction to Machine Learning



An introduction to machine learning. It presents the basic concepts and algorithms for both the symbol-based and connectionist models for machine learning.

Learning outcomes

Upon successful completion of this course, you should be able to

- discuss AI models and areas of application.
- elaborate upon different models for knowledge representation.
- explain the fundamentals of expert systems and apply them to problem solving.
- use graph theory and finite state machines to represent problems.
- develop AI solutions for problem solving using heuristic strategies.
- program AI systems using Prolog or Lisp.

Evaluation

To **receive credit**  for COMP 456, you must achieve a course composite grade of at least **D (50 percent)**  including a grade of at least 50 percent on the invigilated final examination and an average grade of at least D (50 percent) on the combined mark of the assignments and project. The weighting of the composite grade is as follows:

Activity	Weight
Assignment 1	15%
Assignment 2	15%



Activity	Weight
Assignment 3	15%
Project	25%
Final Online Exam	30%
Total	100%

The **final examination** for this course must be requested in advance and written under the supervision of an AU-approved exam invigilator. Invigilators include either ProctorU or an approved in-person invigilation centre that can accommodate online exams. Students are responsible for payment of any invigilation fees. Information on exam request deadlines, invigilators, and other exam-related questions, can be found at the [Exams and grades](#) section of the Calendar.

To learn more about assignments and examinations, please refer to Athabasca University's [online Calendar](#).

Materials

George F. Luger, 2008. *Artificial Intelligence. Structures and Strategies for Complex Problem Solving* (6th edition). Addison Wesley. ISBN

978-0-321-54589-3.  (eText)

George F. Luger, 2008. *AI Algorithms, Data Structures, and Idioms in Prolog, Lisp, and Java* (6th edition). Addison Wesley. ISBN 978-0-13-607047-4.

 (Print)

eText

Registration in this course includes an electronic textbook. For more information on [electronic textbooks](#), please refer to our [eText Initiative site](#).

Other Resources



The remainder of the learning materials for COMP 456 is distributed in electronic format in the course learning environment. Additional supporting materials of interest to COMP 456 students may occasionally be made available.

Special Course Features

COMP 456 is offered online and can be completed at the student's workplace or home. Students are required to acquire their own version of a Prolog compiler (the exact version will be determined by the course tutor).

Challenge for credit

Overview

The challenge for credit process allows you to demonstrate that you have acquired a command of the general subject matter, knowledge, intellectual and/or other skills that would normally be found in a university-level course.

Full information about **challenge for credit** [↗](#) can be found in the Undergraduate Calendar.

Evaluation





To **receive credit** [↗](#) for the COMP 456 challenge, you must achieve a grade of at least **D (50 percent)** [📄](#) on the examination and 50 percent on the project.

Activity	Weight
Project	50%
Exam	50%
Total	100%

[📄](#) **Challenge for credit course registration form**



Important links

- › [Academic advising](#) 
- › [Program planning](#) 
- › [Request assistance](#) 
- › [Support services](#) 

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery methods may vary from their individualized study counterparts.

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