CS4820 Artificial Intelligence

Department of Computer Science
College of Arts and Sciences
Valdosta State University

Semester Fall 2017

Class Tuesday, Thursday, 12:30pm – 1:45pm, 1207 Nevins Hall

Prerequisite CS3410 with a grade of "C" or better

Course Description

(From the VSU catalog; Obsolete.) Definition of artificial intelligence, Common Lisp, logic programming, search techniques, knowledge representation including schemas and scripts, ART-enterprise as an expert system, and principles of expert systems.

This course is to demystify the theories and techniques associated with the field of artificial intelligence. It covers a wide variety of techniques currently defined as AI and shows how they can be useful in practical, everyday applications. Subjects covered include artificial neural networks, genetic algorithms, fuzzy logic, etc., and each of them is concluded by a real-world project designed for the students to develop.

Learning Outcomes

1. Precisely describe and explain the fundamental principles and general mechanisms in Artificial Neural Networks (ANN)
2. Develop Java programs to solve real-world problems using ANN
3. Precisely describe and explain the fundamental principles and general mechanisms in Genetic Algorithms (GA)
4. Develop Java programs to solve real-world problems using GA
5. Precisely describe and explain the fundamental principles and general mechanisms in Fuzzy Expert Systems
6. Develop Java programs to solve real-world problems using Fuzzy Logic
7. Precisely describe and explain the fundamental principles and general mechanisms in the A* pathfinding algorithm
8. Develop Java programs to solve real-world problems using A*

Instructor	Dr. Zhiguang Xu
Office	2113, Nevins Hall
Office Hours	9:00am – 12:00pm and 2:00pm – 4:00pm Wednesday (or by appointment)
Phone	229-333-5783
Web Page	https://vsu.view.usg.edu/
Email	zxu@valdosta.edu (We primarily communicate through emails and other tools within BlazeVIEW. **So do NOT write to my Valdosta address directly unless in emergency cases.**)

Textbook(s)

Artificial Intelligence, A Guide to Intelligent Systems, 2nd edition
By Michael Negnevitsky
Publisher: Addison-Wesley
ISBN: 0-321-20466-2

Course Coverage

Chapter 1 Introduction to Knowledge-based Intelligent Systems

- Intelligent machines, or what machines can do?
- The history of artificial intelligence, or from the "Dark Ages" to knowledge-based systems
- …

Chapter 6 Artificial Neural Networks

- Introduction, or how the brain works?
- The neuron as a simple computing element
- The perception
- Multi-layer neural networks
- Accelerating learning in multi-layer neural networks
- Hebbian Learning, a unsupervised neural network
- …

Chapter 7 Evolutionary Computation

- Introduction, or can evolution be intelligent?
- Simulation of natural evolution
- Genetic Algorithms
- Case study: maintenance scheduling with genetic algorithms
- …

Chapter 4 Fuzzy Expert Systems

- Introduction, or what is fuzzy thinking?
- Fuzzy sets
- Linguistic variables and hedges
- Operations of fuzzy sets
- Fuzzy rules
- Fuzzy inference
- …

A^* Pathfinding of Game AI (additional materials will be provided)

- Defining the search area
- A^* searching algorithm
- Scoring
- Finding a dead end
- Terrain Cost
- Influence Mapping
- …

And other Subjects in AI if time permits.

Grading Policy

Your grade will be calculated based 5+ evenly weighted group and individual projects. Strong Java programming skills are assumed and demanded.

Grading scale:

Final Grade	*Credit*
A	90-100 (including 90)
B	80-89 (including 80)
C	70-79 (including 70)
D	60-69 (including 60)
F	0-59

Course Policy

For the sake of the efficiency of the class, please observe the following rules:

- Late project will NOT be accepted. <u>You must turn in projects and all requested documents at the beginning of the class on the due date</u>.
- For each project, problems and/or disagreement concerning the grade, if any, must be resolved within TWO weeks after the project is turned back to the

students. No change will be made to the grade any more afterwards, for whatever reason.
- NO make up project/assignments/tests for this course.
- Programs that do not compile = Zero score.
- Answers that do not come with justifications = Zero score.

Attendance and Absence

- You are expected for every scheduled class meeting (be on time and stay for the full class period).

Statements

Title IX Statement: Valdosta State University (VSU) is committed to creating a diverse and inclusive work and learning environment free from discrimination and harassment. VSU is dedicated to creating an environment where all campus community members feel valued, respected, and included. Valdosta State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including pregnancy status, sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, national origin, disability, genetic information, or veteran status, in the University's programs and activities as required by applicable laws and regulations such as Title IX. The individual designated with responsibility for coordination of compliance efforts and receipt of inquiries concerning nondiscrimination policies is the University's Title IX Coordinator: Maggie Viverette, Director of the Office of Social Equity, titleix@valosta.edu, 1208 N. Patterson St., Valdosta State University, Valdosta, Georgia 31608, 229-333-5463.

Access Statement: Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (VP) and 229-219-1348 (TTY). For more information, please visit VSU's Access Office or email: access@valdosta.edu.

Important Dates

August 14:	First Class Day
September 4:	Labor Day Holiday
October 5:	Fall Midterm

(A.K.A. Last day to withdraw. Please pay special attention to the "LIMIT ON COURSE WITHDRAWALS" policy. See details at https://www.valdosta.edu/academics/academic-affairs/advising/five-course-withdrawal-policy-faq.php)

October 9 ~ 10:	Fall Break
November 22 ~ 24:	Thanksgiving Holidays
December 4:	Last Class Day