

REQUEST FOR APPROVAL TO USE W-DESIGNATION

LSC # 17-26
Action App-11-17
UWUCC-App-11/28/17
Senate
App 12/5/17

COVER SHEET: Request for Approval to Use W-Designation

TYPE I. PROFESSOR COMMITMENT

- Professor Terrence Fries Phone 724-357-4492
- Writing Workshop? (If not at IUP, where? when?) IUP Writing Workshop, May 2014
- Proposal for one W-course (see instructions below)
- Agree to forward syllabi for subsequently offered W-courses?

TYPE II. DEPARTMENT COURSE

- Department Contact Person _____ Phone _____
- Course Number/Title _____
- Statement concerning departmental responsibility _____
- Proposal for this W-course (see instructions below)

TYPE III. SPECIFIC COURSE AND SPECIFIC PROFESSOR(S)

- Professor(s) _____ Phone _____
- Course Number/Title _____
- Proposal for this W-course (see instructions below)

SIGNATURES:

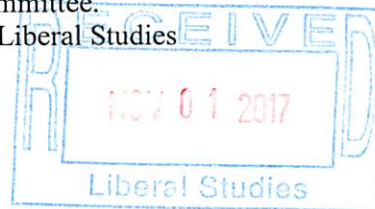
- Professor(s) T. Fries
- Department Chairperson [Signature]
- College Dean [Signature]
- Director of Liberal Studies Edel Kelly Gail Schust UWUCC

COMPONENTS OF A PROPOSAL FOR A WRITING-INTENSIVE COURSE:

- I. "Writing Summary"--one or two pages explaining how writing is used in the course. First, explain any distinctive characteristics of the content or students which would help the Liberal Studies Committee understand your summary. Second, list and explain the types of writing activities; be especially careful to explain (1) what each writing activity is intended to accomplish as well as the (2) amount of writing, (3) frequency and number of assignments, and (4) whether there are opportunities for revision. If the activity is to be graded, indicate (5) evaluation standards and (6) percentage contribution to the student's final grade.
- II. Copy of the course syllabus.
- III. Two or three samples of assignment sheets, instructions, or criteria concerning writing that are given to students. Limit: 4 pages. (Single copies of longer items, if essential to the proposal, may be submitted to be passed among LSC members and returned to you.)

Please number all pages. Provide one copy to Liberal Studies Committee.

Before you submit: Have you double-checked your proposal against "The Liberal Studies Committee's Most Frequently Asked Questions"?



WRITING SUMMARY – COSC 405 Artificial Intelligence

COSC 405 Artificial Intelligence is proposed for identification as a “W” course. The course is taught every third semester, but it is not listed as a Liberal Studies elective. Because of the prerequisites, students are junior or senior computer science majors. There may be an occasional computer science minor. Class size is limited to 30 students. The course will count toward a computer science upper level elective.

Four types of writing will occur in this course.

1. TECHNICAL REPORTS FOR PROJECTS (Writing to Reflect on Process)

Six technical reports of 2 to 3 pages each will be produced. These reports are written to describe an artificial intelligence programming project which the student has completed. Reports of this nature contain implementation details, including programming logic and data structures used. The report will indicate the rationale for choosing the selected logic and/or structures. The results of the program and testing need to be presented clearly and precisely. The purpose of these reports is to help the student reflect on implementation decisions and critical analysis of the test results. Six projects with technical reports will enable students to implement and experiment with different artificial intelligence paradigms. The reports will be graded on content (70%) and writing style (30%). These reports will constitute 30% of the final grade.

2. CRITICAL ANALYSIS PAPERS (Writing to Stimulate Thought)

Five essays of 1 ½ to 2 pages in length will be written. In each paper, you will research and discuss a controversial topic in artificial intelligence, such as an ethical issue, the safety of artificial intelligence and robotics, or the singularity proposed by Kurzweil. The paper should be well-organized and cogent. Students will submit a draft of the paper which will be returned with comments. The revised paper will be submitted one week after return of draft and be graded on content (70%) and writing style (30%). These papers will constitute 10% of the final grade.

3. RESEARCH REPORT (Writing to Integrate Learning)

One research report of 8 to 10 pages will be assigned. Students will select, with the help of the instructor, a topic in artificial intelligence that will not be covered in detail in the course. The student will research the topic using at least three professional sources and produce a report describing the topic in detail and summarizing his/her assessment of the current research. An outline will be submitted prior to midterm and returned with comments. A rough draft will then be submitted approximately four weeks after return of the outline with comments. The rough draft will be returned with comments and students will be allowed at least two weeks to revise the draft and submit the final report. The draft and final report will be graded on content (70%) and writing style (30%). The research report will constitute 15% of the final grade.

4. EXAMINATIONS (Prose Writing to Clarify Thinking, Build Intuition and Evaluate Instruction)

Descriptive short answer essay questions will appear on each examination and will constitute at least 20% of the grade on the examination. Clear and well-organized answers will be expected, but fully edited prose will not be required. The examinations will constitute 45% of the final grade, therefore, the essays will constitute 9% of the final grade.

Summary Chart for Writing Assignments*

A. Writing Assignments COSC 405 Introduction to Artificial Intelligence					
Assignment Title	# of Assignments	# of total pages	Graded (Yes/No)	Opportunity for Revision (Yes/No)	Written Assignment represents what % of final course grade
Artificial Intelligence Projects with Technical Reports	6	12-18	Yes	No	30
Critical Analysis Papers on articles and concepts	5	5-10	Yes	Yes	10
Research Report on selected Artificial Intelligence topic	1	8-10	Yes	Yes	15
Totals	12	25-38	NA	NA	55

B. Examinations (Complete only if you intend to use essay exams/short answers as part of the required number of pages of writing.)			
Exams	Approx.% of exam that is essay or short answer	Anticipated # of pages for essay or short answer, or approx. word count	Exam constitutes what % of final course grade
1.	20	2	15 (writing 3% of final grade)
2.	20	2	15 (writing 3% of final grade)
3.	20	2	15 (writing 3% of final grade)
Totals		6	45 (writing 9% of final grade)

**Total writing assignments should contain at least 5000 words (approximately 15-20 typed pages) in two or more separate assignments; written assignments should be a major part of the final grade—at least 50% or more.*

COURSE SYLLABUS
COSC 405 Artificial Intelligence

Prerequisites COSC 310 Data Structures and Algorithms

Required Texts *Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6th Edition*, George F. Luger, Addison Wesley, 2009.
ISBN-13: 978-0-321-54589-3

Course Description

Introduces the field of artificial intelligence. Explores and implements solutions using classical and modern artificial intelligence techniques. Includes state space search, logical inference, expert systems, optimization, knowledge representation, machine learning, handling uncertainty, and soft computing.

Course Objectives

Upon successful completion of this course, the students will be able to:

1. Assess the strengths and weaknesses of commonly used artificial intelligence techniques and determine which are most suitable for a particular problem.
2. Assess the strengths and weaknesses of and implement various state-space search algorithms.
3. Formulate and use propositional logic for inference problems.
4. Understand knowledge representation including frame-based and semantic nets.
5. Explain expert systems and choose one to implement using an expert system shell.
6. Assess the strengths and weaknesses of and implement various machine learning algorithms.
7. Explain and implement uncertainty representation including Bayesian networks, belief systems, and fuzzy logic.
8. Understand and implement a neural network for classification.
9. Understand and implement genetic algorithms for planning and optimization problems.

Evaluation Method

Grade Distribution		Grading Scale	
Quizzes	5%	90 – 100%	A
2 Tests	30%	80 – 89%	B
Final Exam (Cumulative)	15%	70 – 79%	C
Projects	25%	60 – 69%	D
Research Report	15%	< 60%	F
Critical Analysis Papers	10%		

Detailed Course Outline

A. History of AI	3 hours
B. Predicate Calculus	3 hours
a. Propositional Logic	
b. Predicate Calculus	
c. Logical Inference	
d. Unification	
C. Search	9 hours
a. State Space Search	
b. Heuristic Search	
c. A* Search	
d. Constraint satisfaction	
e. Minimax algorithm	
f. Alpha-beta pruning	
E. Expert Systems	6 hours
a. Rule-based production systems	
b. Model-based systems	
c. Case-based reasoning	
d. Planning	
F. Knowledge Representation	3 hours
a. Conceptual graphs	
b. Semantic nets	
c. Frames	
G. Machine Learning	4 hours
a. Supervised learning	
b. Unsupervised learning	
c. Reinforcement learning	
d. Knowledge acquisition	
H. Uncertainty	5 hours
a. Hidden Markov models	
b. Bayesian networks	
c. Dempster-Shafer	
d. Fuzzy Logic	
I. Soft Computing Techniques	6 hours
a. Neural networks	
b. Genetic algorithms	
J. Ethical issues in AI	1 hours
Tests (2)	2 hours

Evaluation Components

Projects

Six projects assignments with technical reports of 2 to 3 pages each will be produced. These reports are written to describe an artificial intelligence programming project which the student has completed. Reports of this nature contain implementation details, including programming logic and data structures used. The report will indicate the rationale for choosing the selected logic and/or structures. The results of the program and testing need to be presented clearly and precisely. The reports will be graded on content (70%) and writing style (30%). These reports will constitute 30% of the final grade.

Critical Analysis Papers

Five essays of 1 ½ to 2 pages in length will be written. In each paper, you will research and discuss a controversial topic in artificial intelligence, such as an ethical issue, the safety of artificial intelligence and robotics, or the singularity proposed by Kurzweil. The paper should be well-organized and cogent. Students will submit a draft of the paper which will be returned with comments. The revised paper will be submitted one week after return of draft and be graded on content (70%) and writing style (30%). These papers will constitute 10% of the final grade.

Research Report

One research report of 8 to 10 pages will be assigned. Students will select, with the help of the instructor, a topic in artificial intelligence that will not be covered in detail in the course. The student will research the topic using at least three professional sources and produce a report describing the topic in detail and summarizing his/her assessment of the current research. The report will involve three separately graded components:

<i>Component</i>	<i>Percent of Overall Report Grade</i>	<i>Due</i>
Outline	10%	Week 6
Rough Draft	30%	Week 10
Final Report	60%	Week 14

The outline will be submitted returned with comments. A rough draft will then be submitted and returned with comments. Students will use the comments to revise the draft. The draft and final report will be graded on content (70%) and writing style (30%). The research report will constitute 15% of the final grade.

Classroom Policies

Attendance

Attendance is expected for all scheduled class meetings. Students are responsible for registering their attendance by signing in on the attendance sheet each class. Students are responsible for all material covered in class and in the textbook readings. All lecture slides and assignments will be posted on Moodle. In the event that you must miss class, please do not contact me asking what you missed. It is your responsibility to acquire any handouts or assignments from Moodle or classmates. Please note that Moodle is not a substitute for class attendance. The lecture slides contain only an outline of the complete material discussed in class.

You are allowed 3 unexcused absences without penalty. After these first 3 unexcused absences, 3% will be deducted from your overall grade average per absence. I start class on time and expect students in class when it starts. Late arrivals are disruptive and inconsiderate to your classmates. Persistent tardiness will be counted as absences. To obtain an excused absence, students must present written/electronic notification, preferably before the event. (Events include: illness—written excuse from a doctor or Health Center; university activities—letter from faculty member; funerals of relatives; religious observances—letter from your religious leader.) If arrangements are needed to make up missed course work, please notify the professor by e-mail as soon as possible. NOTE: Excused absences do not automatically waive or eliminate late penalties.

Exams

No make-up exams will be given unless you have obtained the instructor's permission *prior* to the exam time. Permission will only be granted for valid reasons such as a documented illness. Students who arrive late for an exam or a quiz will not be allowed additional time.

Late Assignments

Unless otherwise specified, all assignments are due at the beginning of class and must be submitted via Moodle. Late assignments will receive a 15% per day penalty (measured in 24 hour increments from time due). No assignments will be accepted later 72 hours (3 days) after the due date.

SAMPLE ASSIGNMENT: Project with Technical Report

Write a Java program to solve the 8-puzzle using a best-first search. The program should allow the user a choice of one of three possible heuristics for the estimated distance remaining to the goal:

1. $h(n) = 0$ (breadth-first search)
2. $h(n)$ = number of misplaced tiles
3. $h(n)$ = sum of distances of each tile to its goal position

The program should be named `Prog3.java` and allow the user to enter the start state one row at a time, and then display the solution path, level of the goal, and number of nodes generated. Test the program with the 2 starting state spaces shown below using each of the 3 heuristics.

2	8	3
1	6	4
7	5	

3	8	4
1	6	2
7		5

Deliverables:

1. Report (2-3 pages) containing:
 - a. Discussion of the program design you used. This should include a description of how you represented the 8-puzzle and the states in the search space, and how you obtain the solution path once the goal is found.
 - b. Analysis of the results of the test cases and the heuristics.
2. Output listings for each of the test cases and each heuristic (2 cases * 3 heuristics = 6 total).
3. Submit the source code via Moodle
4. Submit the report and printouts of source and test cases

Sample Essay Questions for Examinations:

1. Describe an admissible search algorithm.
2. Describe an A* search algorithm.
3. Describe the Turing test and how Turing proposed to prevent interrogator trickery.
4. Describe the three primary elements of a production system.
5. What is conflict resolution? Describe three methods of conflict resolution in a production system.
6. Describe forward chaining and backward chaining in a production system.
7. Describe what items are contained in the working memory of a production system and the purpose of each.
8. Describe the difference between a unipolar and a bipolar neuron.
9. Describe the difference between supervised and unsupervised learning in a neural network.
10. Describe how a genetic algorithm works and any 2 genetic operators.

Sample topics for Critical Analysis Papers:

1. Could intelligent machines become a threat to humanity or are the risks overblown?
2. Could artificial intelligence become more intelligent than its creator?
3. Discuss the safety of AI in self-driving cars.
4. Discuss whether a machine using weak AI methods can be labeled “intelligent.”
5. Is it possible for a machine to express emotions?
6. Is it possible for a machine to be self-conscious?

Research Paper

The topic for the research paper is to be selected by the student, in consultation with the instructor, and could involve expansion on any topic covered in the course or any topic found by the student by looking through appropriate literature.

Grading

The grading of written work will be explained to students as described in the “Writing Summary” section.