

## CSC 425/525.001: Artificial Intelligence

Professor: Richard Fox  
Semester: Spring 2017  
Class Meeting Time: MW 4:45 pm - 6:00 pm  
Class Meeting Place: GH 250  
Office Hours: MWF 9:00 – 9:50 am, T 1:30 – 2:30 pm, R 1:00 – 2:00 pm, and by appointment

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**Textbook:** Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6<sup>th</sup> edition, George F Luger, Addison Wesley, 978-0-321-54589-3.

### Prerequisites and Credits:

C- or better in CSC 364. 3 Credit hours. This course fulfills a 4xx elective for CSC majors, a 5xx elective for MSCS graduate students, and a guided elective for DSC majors.

### Course Topics:

This course offers an introduction to the field of Artificial Intelligence (AI). We start with an examination of intelligence and what AI tries to accomplish. We examine in detail the role of knowledge in problem solving and how to codify it through knowledge representations. We examine a wide variety of AI algorithms including search techniques, rule-based chaining, algorithms for handling uncertainty, symbolic learning, neural network training, genetic algorithms and stochastic and probabilistic reasoning approaches. We examine AI applications and solutions from areas including diagnosis, planning and design, automated reasoning and natural language processing. NOTE: This course does not assume that the student already knows any AI programming language such as LISP or Prolog.

### Student Learning Outcomes:

By the end of this course, students will:

- understand the role of knowledge representations in AI and be able to transfer knowledge into one of several forms of representation
- understand the role of search and be able to implement a variety of search algorithms
- understand how expert systems work and the various strategies used
- understand the basic problem solving strategies for diagnosis and planning
- understand learning algorithms, how they work, their uses and their drawbacks
- understand the role of neural networks, genetic algorithms, rules, and uncertainty handling in AI systems
- be able to implement a rule-based system in Clips, Prolog, or a related language, a search based algorithm, and a learning algorithm

### Course Materials:

All lectures are written in PowerPoint and available through the instructor's course web site at <http://www.nku.edu/~foxr/CSC425/>. The web site will also provide useful links to AI web sites of interest and additional reading materials. All handouts and assignments will also be made available via the website (handouts will usually be in PDF format). Keep an eye on this website during the semester as it will be a mechanism for the dissemination of information such as corrections to assignments, hints on assignments, and expected results on assignments.

### **Undergraduate Student Assessment:**

Student grades will be determined by the student's performance on:

- 10-12 homework assignments to test the student's understanding of concepts (the last homework will be a take-home final worth twice that of any other homework)
- 4 group programming assignments to test the student's ability to implement AI algorithms, one program will require that you learn a rule-based language

The homework assignments and take-home final are worth 60% of your grade and the programs are worth 40% of your grade. Grading scale (subject to curve if necessary):

A: 100-93    A-: 92-90    B+: 89-87    B: 86-83    B-: 82-80  
C+: 79-77    C: 76-73    C-: 72-70    D+: 69-67    D: 66-60    F: 59-0

Mid-term grades will be posted in myNKU by March 14. The grade is *not a predictor of your final grade* but merely your grade to that point of the semester. The last date to drop with a grade of W is Monday, March 20.

### **Graduate Student Assessment:**

Student grades will be determined by the student's performance on:

- 10-12 homework assignments to test the student's understanding of concepts (the last homework will be a take-home final worth twice that of any other homework, graduate students will have additional questions on homework assignments that are not on the undergraduate assignments)
- 4 individual programming assignments to test the student's ability to implement AI algorithms, one program will require that you learn a rule-based language
- A term paper

The homework assignments are worth 50% of your grade, the programs are worth 40% of your grade, and the term paper is worth 10% of your grade. grading scale (subject to curve if necessary):

A: 100-93    A-: 92-90    B+: 89-87    B: 86-83    B-: 82-80  
C+: 79-77    C: 76-73    C-: 72-70    F: 69-0

Midterm grades are not posted for graduate students but will be made available upon request. The last date to drop with a grade of W is Monday, March 20.

### **Absentee Policy**

For financial aid purposes, the University is requiring that attendance be monitored during the first week of class. A student will be *administratively dropped* if that student has not attended class during the first class period and has not previously contacted the instructor. If for whatever reason you cannot attend the first class, contact the instructor to inform the instructor of your intention of staying in the class. You will receive no further warnings!

Aside from this first class period, the instructor will not take attendance. It is up to the student to attend class regularly and to determine what material you miss in the event of an absence. If an assignment is due on a date that the student is absent, it is the student's responsibility to make sure that the instructor receives the assignment prior to the beginning of class time (whether by Email or having someone reliable drop off the assignment to the instructor in his office, mailbox or classroom).

### **Schedule of topics and readings:**

See <http://www.nku.edu/~foxr/CSC425/schedule.html>.

## Homework and Programming Information and Policies:

There will be a number of homework and programming assignments. Due dates will be provided when each assignment is provided to the class. All assignments are due at the **beginning** of the class period of the due date. Late assignments will be accepted with a penalty of 20% per day late until an answer is posted. **All homework assignments must be word processed** (figures and other answers that would be awkward to type may be hand drawn/written). All assignments are to be submitted by hard copy in class. If you are not able to attend class, submit the assignment to the instructor in his office (you can slide it under the door) or deliver it to the main office (GH 400) to be put in his mailbox. Email submissions will only be allowed in emergency cases and must be received at least 2 hours before the start of class to be accepted on time. NOTE: make sure all of your assignments have your name at the top (in comments for programming assignments).

All homework assignments are **individual assignments** meaning that students should work alone at all times except when seeking clarification. If the instructor suspects students of copying off of each other or working together, the instructor will give a grade of 0 on those assignments and warn the students. A second offense will bring disciplinary action.

Undergraduate students may work in groups of up to 3 for programming assignments, graduate students must work alone on these assignments. These assignments can be tackled in your choice of programming language except for program 2 which must be in a rule-based language (e.g., Clips, Jess, Prolog).

## Credit Hour Policy Statement:

In accordance with federal policy, NKU defines a credit hour as the amount of work represented in the achievement of student learning outcomes (verified by evidence of student achievement) that reasonably approximates one hour (50 minutes) of classroom instruction and a minimum of two hours of out-of-class student work. For every course credit hour, a typical student should expect to spend at least three hours per week of concentrated attention on course-related work including, but not limited to, class meeting time, reading, reviewing, organizing notes, studying and completing assignments. At least an equivalent amount of time is expected for other academic activities such as online courses, laboratory work, internships, practica, studio work and other academic work leading to the award of credit hours.

Estimates of the time required for a typical student to complete course expectations are as follows:

In-class: 3 hours/week * 15 weeks	37.5 hours/semester
Reading: 2 hours/week * 15 weeks	30 hours/semester
Programs: 4 assignments * 8 hours apiece	32 hours/semester
<u>Homeworks: 10-12 assignments * 3-4 hours apiece</u>	<u>38 hours/semester</u>
Total:	137.5 hours/semester (approx. 9 hours/week)

Students who do not spend an appropriate amount of time on this course will most likely obtain a poor grade and perhaps not pass the class.

### **Classroom Expectations:**

Cellphones must be on vibrate (PLEASE!) You may leave the classroom at any time other than during exams as long as you do so quietly. If you come in late, please be quiet. While the instructor is lecturing, please be quiet. Do not engage other students in conversation. **You may ask questions at any time during a lecture.** Please do ask questions and please ask for more example problems if you feel you need them. You are encouraged to bring a laptop to class if you feel it will help you.

### **Student Evaluation of Instructor and Course:**

Northern Kentucky University takes Instructor and Course Evaluations very seriously as an important means of gathering information for the enhancement of learning opportunities for its students. It is an important responsibility of NKU students as citizens of the University to participate in the instructor and course evaluation process. During the two weeks\* prior to the end of each semester classes, you will be asked to reflect upon what you have learned in this course, the extent to which you have invested the necessary effort to maximize your learning, and the role your instructor has played in the learning process. It is very important that you complete the online evaluations with thoughtfully written comments.

Student evaluations of courses and instructors are regarded as strictly confidential. They are not available to the instructor until after final grades are submitted, and extensive precautions are taken to prevent your comments from being identified as coming from you. Students who complete an evaluation for a particular course (or opt out of doing so in the evaluation) will be rewarded for their participation by having access to their course grade as soon as that grade is submitted by the instructor. On the other hand, any student who does not complete the course evaluation (or opt out of doing so in the evaluation) should expect to incur a two week delay in access to his or her course grade beyond the university's official date for grade availability. To complete online evaluations go to <http://eval.nku.edu>. Click on "student login" and use the same USERNAME and PASSWORD as used on campus.

In addition, you should be aware of:

- Evaluations can affect changes in courses. Evaluations without comments are less valuable and less credible than those filled out thoughtfully. Comments that are expressed well are more effective than those that are not.
- Positive feedback is just as important as criticism. Moreover, negative evaluations without any explanation and specifics are not especially useful.
- Once grades are submitted, all evaluations are read not only by the instructor, but also by the instructor's department chairperson.
- Evaluations not only provide feedback to your instructor, but also provide information to the department chair for use in performance evaluations. This information affects reappointments, promotions, salaries, and teaching assignments.

**Student Honor Code:**

This Student Honor Code [the "Honor Code"] is a commitment by students of Northern Kentucky University, through their matriculation or continued enrollment at the University, to adhere to the highest degree of ethical integrity in academic conduct. It is a commitment individually and collectively that the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements.

The purpose of the Honor Code is to establish standards of academic conduct for students at Northern Kentucky University and to provide a procedure that offers basic assurances of fundamental fairness to any person accused of violations of these rules. Each Northern Kentucky University student is bound by the provisions of the Honor Code and is presumed to be familiar with all of its provisions. Students also should aspire to conduct themselves in a manner that is consistent with the highest degree of ethical integrity in all matters, whether covered in the Honor Code or not. The success of this commitment begins in the diligence with which students uphold the letter and the spirit of the Honor Code. Students may view the complete honor code at <http://deanofstudents.nku.edu/policies/student-rights.html#policies>.

**Student Retention and Disabilities Services:**

Students experiencing roadblocks to academic success may seek assistance from the Learning Assistance Programs (LAP). Financial, personal, and social concerns sometimes interfere with the dedicated focus needed to be successful in college. LAP helps students connect to academic and support services, create individual learning plans, and advance successfully towards graduation. Services including Norse Advising, student support services, testing and disability services, the math center, the writing center and tutoring. More information is available at <http://lap.nku.edu>. Call 859 572-5475 for an appointment or stop by University Center 170. You can apply for a tutoring session through TutorTrac at <https://tutortrac.nku.edu/tracweb40/default.html>.

The University is committed to making reasonable efforts to assist individuals with disabilities in their efforts to avail themselves of services and programs offered by the University. To this end, Northern Kentucky University will provide reasonable accommodations for persons with documented qualifying disabilities. If you have a disability and feel you need accommodations in this course, you must present a letter to me from the Disability Programs and Services Office (SU 303), indicating the existence of a disability and the suggested accommodations. More information can be found at <http://disability.nku.edu> including how to register and assistant resources and technologies. See also the institutional policy for [ADA guidelines](#).

**Any questions? Please ask!**

**The instructor reserves the right to alter the syllabus if circumstances dictate.**