Computer Science Department
cs.salemstate.edu\dept

SYLLABUS **Fall 2012**

CSC 340 Artificial Intelligence **3.0 credits**
Prerequisite(s): CSC215 and CSC 260

Instructor: Beifang Yi **Office**: MH 211A **Phone**: (978) 542-7246
email: byi@salemstate.edu **Hours**: T & R (10:50-1:30) **Web Site**: http://cs.salemstate.edu/~byi/
T (4:30-6:00pm, 10:00pm-10:30pm), W & F (12:50-1:20)

Section	Time	Room	Final Exam
01	T & R 9:25—10:40am	MH 301	**Friday 12/14, 8:00am-10:00am MH 301**

Catalog description:

This course studies the theory and application techniques which allow a computer to "behave intelligently". Various operational definitions of intelligence are discussed, along with the concept of "mechanized intelligence". The course includes case studies of expert systems which solve engineering design problems, diagnose disease, and learn from their environment via natural language and/or visual interaction with a user. The role of planning, goal formation, search analysis and evaluation, and various forms of representation will be discussed extensively. Three lecture hours per week.

Prerequisites: CSC 215 and CSC 260

Goals:

This course is intended to introduce the basic concepts of artificial intelligence. The student will employ hands-on case studies to internalize the techniques of AI. The course will develop an understanding of:

CG01: the concepts of the fundamental branches of artificial intelligence;
CG02: the basic approaches to problem-solving using AI techniques;
CG03: machine learning through induction, deduction, and reference;
CG04: Q-based and reinforcement learning.

Objectives:

Upon successful completion of this course the student will have

CO01: explained the rudimentary concepts of artificial intelligence techniques;
CO02: based on stated problem constraints, selected an artificial intelligence method of solution;
CO03: diagramed the learning methods of AI;
CO04: demonstrated through a project the simple method of Q-based learning.

Course Topics:

A detailed topics list and a general course bibliography can be found on the Computer Science Department website at http://cs.salemstate.edu/dept/index.php?page=184. Select CSC 340 to access a PDF document. The topics include:

- functional definitions of intelligence
- basic data representation and storage techniques
- defining bounds on a problem
- constraint propagation
- search techniques
  - finding a path
  - locating best path
  - adversarial approach to search

- general control paradigms using GPS as a starting point
- problem solving approaches
  - generate and test
  - rule based systems
- knowledge representation
  - review of basic techniques
  - inheritance
  - abstraction to summary units
  - frames
  - expansion to fundamental units
- learning
  - matching
  - rules and rule-like paradigms
  - learning by example
- application of preceding concepts (coverage dependent on time available)
  - language understanding matching
  - vision analysis
  - medical diagnosis
  - mathematical theorem proving

The emphasis of this course in on the understanding of the basic approaches to knowledge acquisition, representation and retrieval with respect to the general concept of simulating intelligent behavior. Various techniques for representing knowledge and rules are presented and discussed with emphasis on generalized problem-solving paradigms. Specific examples of AI and AI-related systems are included as a means of solidifying theoretical concepts. In addition to the above topics, we will also briefly introduce some of the following special purpose systems:

- genetic and evolutionary algorithms
- neural networks
- uncertainty in AI and Bayesian Belief Networks
- natural language understanding
- computer vision
- search using games
- planning

Text(s): (required) **Artificial Intelligence in the 21st Century**, by Stephen Lucci and Danny Kopec. Mercury Learning and Information LLC, 2013. (ISBN: 978-1-936-42023-0)

Additional references (optional)**:**

- *The Essence of Artificial Intelligence* by Alison Cawsey. Prentice Hall, 1997.
- *Artificial Intelligence Illuminated*, by Ben Coppin. Jones & Barlett. Inc.,2004.
- *Intelligence Systems, principles, paradigms, and pragmatics* by Robert J. Schalkoff. Jones & Bartlett, 2011.
- *Knowledge-based Systems by R. A. Akerkar and P. S. Sajja.* Jones & Bartlett, 2010.
- *Artificial Intelligence: A Modern Aproach*, 3rd edition by Stuart Russell and Peter Norvig. Prentice Hall 2010.
- http://www.visual-prolog.com/
- http://en.wikipedia.org/wiki/Prolog
- http://www.gprolog.org/
- http://ccl.northwestern.edu/netlogo/
- http://en.wikipedia.org/wiki/NetLogo

Cell phones:

Turn the ringer off, or, better yet, *turn the phone off*.

Class Attendance:

Class attendance is highly recommended. You are responsible for all materials presented in class, quizzes, examinations, and other announcements. No excuses of any nature will be construed as relieving you from the responsibility for completion of the course work assigned. Each student is responsible for completing all course requirements and for keeping up with all that goes on in the course (whether or not the student is present).

Final Grade:

Final grade will be determined using the following grading weights:

written assignments	30%
semester project and presentation	18%
programming projects	17%
midterm exam	10%
final exam	25%

Class attendance is not used to calculate the final grade; reading assignments are part of written assignments.

The following table shows how the course work is assessed against the course objectives:

	Written assignments	Projects	Examinations
CO01	✓		✓
CO02	✓	✓	✓
CO03	✓		✓
CO04		✓	✓

Semester Project and Presentation:

There will be one semester project and presentation. Students can choose any AI topics as their final projects upon the instructor's permission. For this assignment, the following materials should be submitted by their indicated due dates respectively : (1) semester project proposal (a brief description of which AI topic and what it to be done and expected results), (2) semester project progress report (of what has been done and what will be done and temporary results), and (3) semester project report (in addition to the class presentation, students are required to submit a formal project write-up/report, programming code, and presentation documents).

Programming Projects:

There will be several (small) programming projects given in the semester. The topics and programming language(s) for the projects will vary—please note that this course does not provide any preparation for programming "training", i.e., everyone in this class should have a good knowledge of CSC260 (including CSC202) topics and should be well-prepared for starting on writing and testing code (even with a new programming language). Students with relatively weak programming background are encouraged to review the CSC202/CSC260 coursework as a preparation for the programming projects for this course.

There will be bonus projects given in the semester which are optional for bonus project credits.

Written Assignments:

There will be a series of written assignments from the textbooks and other sources: question-answering and short essay-writing. Reading is part of the written assignments.

Submission Deadlines/Late Penalties:

There are specific due dates/times for any assignments (written assignments, programming projects, semester project) and these assignments should be completed by the deadlines. **A penalty of 2%** will be applied for late submission for each day (including weekends and holidays). No missed presentations will be made up unless under extreme circumstances with advanced notification of the

instructor and/or certain supporting documentation.

All the assignments must be submitted at Canvas—the course online management system. Students may not turn in your assignment through emails or in printed copy format. Canvas will keep your last submission (usually, your new submission will automatically be replaced by the old one for the same assignment; thus it is the ***latest*** submission that will be graded by the instructor, whether it has been submitted on-time or late.). Extension of deadlines will be granted under exceptional circumstances (such as medical emergencies) and with supporting documents—in such cases, students must obtain emails from the instructor as the proof of deadline extensions.

All the assignments will be announced/given in class and/or through course website.

Semester project presentation cannot be made later than the presentation time except under emergent situations.

No assignment submissions will be accepted after the final examination.

Exams:

There will be one midterm (10% total) and one final (comprehensive) exam (25% total). The midterm will be held in week 8 *depending* on class progress. **Note:** Make-ups are given for examinations only under exceptional circumstances and with documented circumstances.

Missed Tests:

Missed tests will be made up *only under extreme conditions/emergency with the proper documentation*. Students who know in advance that they must be absent on an exam day for an excusable reason should notify the instructor prior to the exam day. Students who are absent on the day of the exam for an excusable reason should contact the instructor immediately following their absence. Makeup work will be permitted *only when* the instructor is presented with acceptable documentation for acceptable absences. It is your responsibility to notify your instructor of any excused absence as far in advance as possible.

Due Dates:

- **There will be a 2% penalty for each day (including weekends, holidays) an assignment (projects, assignments, etc.) is late**; penalties accrue at 12:00 midnight of the assigned due date.
- **No assignments will be accepted after the final examination**.

Study Groups:

While I strongly encourage study groups, I require that each student hand in his/her answers in her/his own words - if two answers are highly similar to each other, neither will receive credit.

When working on your programming projects, you may discuss with others the project topics, the algorithms and methodologies related to the project; but when you work on writing the code, this coding work should be 100% of your own work. **If two answers/written code segments come out exactly the same or highly similar, neither will receive credit and/or further actions will be taken** (such as reporting to the department and/or college). Given the nature of most of the projects, homework questions and writing assignments, it will be almost impossible for two people to come up with highly similar answers UNLESS they copy.

Important notice on programming project submission: there is a software package that can detect how much similar between programs (it can also detect whether the programs "follow" the same/similar logic/design. For example, Prorgram-A is modified version of Program-B with all the variable names changed and loops modified such that "for…" being replaced with "while…". Program-A and Porgram-B will be detected as "same" code, i.e., it is considered a plagiarism.)

Academic Integrity:

Academic Integrity Policy and Regulations can be found in the University Catalog and on the University's website (http://catalog.salemstate.edu/content.php?catoid=13&navoid=1295#Academic_Integrity). The formal regulations are extensive and detailed - familiarize yourself with them if you have not previously done so. A concise summary of and direct quote from the regulations: "Materials (written or otherwise) submitted to fulfill academic requirements must represent a student's own efforts". *Submission of other's work as one's own without proper attribution is in direct violation of the University's Policy* and will be dealt with according to the University's formal Procedures.

"Salem State University is committed to providing equal access to the educational experience for all students in compliance with Section 504 of The Rehabilitation Act and The Americans with Disabilities Act and to providing all reasonable academic accommodations, aids and adjustments. Any student who has a documented disability requiring an accommodation, aid or adjustment should speak with the instructor immediately. Students with Disabilities who have not previously done so should provide documentation to and schedule an appointment with the Office for Students with Disabilities and obtain appropriate services."

In the event of a University declared critical emergency, Salem State University reserves the right to alter this course plan. Students should refer to http://www.salemstate.edu for further information and updates. The course attendance policy stays in effect until there is a university declared critical emergency. In the event of an emergency, please refer to the alternative educational plans for this course located at http://cs.salemstate.edu/~byi/2012Fall/CSC340/emergency/index.html. Students should review the plans and gather all required materials before an emergency is declared.

Please remember that if, for any reason, you decide to drop this course, you **MUST** do so officially through the Registrar's office. The last day to withdraw from a course this semester is **November 26th**.

Note: This syllabus represents the intended structure of the course for the semester. If changes are necessary, students will be notified in writing and via all regular class communication mechanisms (class discussion, emails, and/or the instructor's website at http://cs.salemstate.edu/~byi/).