CS 490R – Intelligent Systems / Artificial Intelligence Course Syllabus and Calendar – Fall 2013

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Contents

1 Overview

Artificial Intelligence (AI) has been a goal of computer scientists since the earliest days of computing. It has benefited and suffered from overblown expectations. It has had seasons of high respect and great disdain. Every computer scientist needs a basic understanding of AI, including its terminology and its accomplishments.

1.1 There May Be Changes

Like all courses I teach, I will be keeping an eye out for ways this one could be improved. Changes generally take the form of opportunities for extra credit, so nobody gets hurt and some people may be helped. If I make a change to the course and it seems unfair to you, let me know and I will try to correct it.

1.2 Preparation

We assume you can program in at least one language available under Linux. We require that programs in your chosen language can be run from the command line. There will be three programming tasks that require this skill. Commonly students use either Perl, Java, or C++ for these tasks.

We assume that you are familiar with the content usually learned in an Algorithms class, including manipulation of lists, trees, and graphs, and including search (breadth first, depth first).

2 Course Details

- **Course Number:** CS 490R, formerly CS 440.
- **Title:** Intelligent Systems
- **Course Description:** Fundamental issues in intelligent systems, search and constraint satisfaction, knowledge representation and reasoning. (Prerequisite: CS 301.)
- **Textbook:** *Artificial Intelligence, A Modern Approach, Second Edition*, by: Stuart Russell and Peter Norvig 1080 pages. ISBN: 0-13-790395-2. Prentice Hall.
- **Classroom:** GCB 101
- **Start/End:** Tue, Sep 10 to Tue, Dec 9
- **Class Time:** TTh 09:20 to 10:50
- **Final Exam:** Thu, Dec 12, 10:00–12:50

The textbook is a department rental. The third edition has been published but we will continue to use the second edition because it is adequate for our needs. If you wish, you can purchase the second

or third edition (through Amazon, for instance) and use it instead of renting the second edition.

The textbook views the field as having a goal to build intelligent agents. I think this framework makes it easier to understand what AI really is and is not.

If you plan to study Artificial Intelligence at graduate school, you are strongly encouraged to dig deeply into the textbook. It is excellent.

2.1 Important Website Links

- **Don Colton Home Page (General):** http://doncolton.com/
- **Prof Colton Home Page (BYUH):** http://byuh.doncolton.com/
- **Course Home Page:** http://byuh.doncolton.com/cs440/
- **Learning Management System:** https://dcquiz.byuh.edu/

2.2 The Instructor

- **Instructor (me):** Don Colton
- **My email:** doncolton2@gmail.com
- **My Office:** GCB 128 or 111
- **Office Hour:** MWF 13:10 to 13:40

I may digitally record the audio of my lectures some days.

3 Learning Objectives

In this class we will gain the basic understanding of AI that is needed by every computer scientist. We will write several programs that utilize AI technology.

By the conclusion of this course, students will do the following.

1. Explain fundamental issues in intelligent systems.
2. Explain search in terms of problem space and goal state.
3. Correctly perform propositional calculus resolution.
4. Correctly perform conditional probability calculations.
5. Explain and use Bayes theorem.
6. Construct and test intelligent agents in several settings.
7. Use a corpus to develop a speech recognition program.
8. Defend the need for having established corpora for speech.

4 Grading

Grading is on a standard 60/70/80/90 model using 1000 points.

Based on 1000 points

930+	A	900+	A–	870+	B+
830+	B	800+	B–	770+	C+
730+	C	700+	C–	670+	D+
630+	D	600+	D–	0+	F

https://dcquiz.byuh.edu/ is my personal Learning Management System. There I maintain an online grade book. You can see how your points are adding up. You can compare your points with other students in the class (without seeing any names).

http://byuh.doncolton.com/cs440/2135/sguide.pdf is a study guide that includes specific details about the exams and programming assignments.

Readings (200 points): Each week for 11 weeks, two points are awarded for each ten minutes of reading, up to 20 points (100 minutes) per week. 200 points are needed for full credit toward your final grade. Any extra points earned will be treated as extra credit.

We anticipate that you will actually spend about nine hours per week on activities related to this class, with three hours in class, maybe two hours in readings, and the other four hours in other forms of study, including taking practice tests and writing programs.

The first point is simply for reading. The second point is for making an oral report in class. As you read, you should prepare notes (talking points) about your readings. Prepare to talk for about three minutes. You can talk, for example, about what you studied, why you selected it, what you learned,

and/or where you think your studies might lead you next.

For example, if you read for 50 minutes, that will earn you 5 points. If you then deliver a three-minute oral report on that reading, you will double those points.

Your study time must represent your undivided attention. (You cannot claim credit for reading while watching TV, for instance.) It can be spent skimming a large number of pages or reading carefully a small number of pages. You can choose where to read.

Conditional Probability (100 points): We will study conditional probability for about two weeks and give you three chances on three separate days to get your best score on a 30-minute, 50-question probability test.

Vacuum Agent (150 points): You will program a vacuum agent. It will compete with other vacuum agents at cleaning a (virtual) room. Your score will be based on your program's cleaning performance. This will be our focus for about three weeks.

Resolution (100 points): We will study propositional calculus resolution for about two weeks and give you three chances on three separate days to get your best score on a timed 25-question resolution test.

Wumpus Agent (150 points): You will program a wumpus-hunting agent. It will compete with other agents. Your score will be based on your program's performance. This will be our focus for about three weeks.

Numbers Recognition (150 points): You will program a speech recognition program. It will receive phonetic transcriptions of spoken numbers and will convert them into words. You will compete with other such programs. Your score will be based on your program's performance. This will be our focus for about three weeks.

Final Exam (150 points): You will write briefly about a number of terms selected from the textbook and from our in-class discussions. The exam will be "half open" by which I mean that during the first half of the exam, it is closed-book and closed-notes. At the middle of the exam time I will announce that you can open your books. The remainder of the exam is open-book and open-notes. Answers must be written in your own words, not simply copied from the book.

5 General Calendar

Tu Sep	10	24: Syl, CP
Th Sep	12	23: CP, exam
Tu Sep	17	22: CP, R1, exam
Th Sep	19	21: CP, exam
Tu Sep	24	20: VA, R2
Th Sep	26	19: VA bake off
Tu Oct	01	18: VA, R3
Th Oct	03	17: VA bake off
Tu Oct	08	16: VA, R4
Th Oct	10	15: VA bake off
Tu Oct	15	14: Res, R5
Th Oct	17	13: Res, exam
Tu Oct	22	12: Res, R6, exam
Th Oct	24	11: Res, exam
Tu Oct	29	10: WA, R7
Th Oct	31	9: WA bake off
Tu Nov	05	8: WA, R8
Th Nov	07	xx: ISECON, No Class
Tu Nov	12	7: WA, R9
Th Nov	14	6: WA bake off
Tu Nov	19	xx: EIL Program Review, No Class
Th Nov	21	5: NR
Tu Nov	26	4: NR, R10
Th Nov	28	xx: Thanksgiving, No Class
Tu Dec	03	3: NR, R11
Th Dec	05	2: NR bake off
Tu Dec	10	1: NR bake off
Th Dec	12	0: Final

6 Tutoring and Study Groups

For a 400-level class, tutoring basically does not exist. Your best bet is to ask about things during class. You are also welcome to bring your questions to me during office hours or outside of office hours. And other faculty may enjoy discussing your questions with you.

6.1 Study Groups

You are encouraged to form a study group. If you are smart, being in a study group will give you the opportunity to assist others. By assisting others you will be exposed to ideas and approaches that you

might never have considered on your own. (Some will be flat out lame. Others will be insightful and challenging.) You will benefit.

If you are less smart, being in a study group will give you the opportunity to ask questions from someone that remembers what it is like to be totally new at this subject. They are more likely to understand your questions because they sat through the same classes you did, took the same tests as you did, and probably thought about the same questions that you did.

7 BYUH Learning Framework

I believe in the BYUH Framework for Learning. If we follow it, class will be better for everyone.

Prepare: Before class, study the course material and develop a solid understanding of it. Try to construct an understanding of the big picture and how each of the ideas and concepts relate to each other. Where appropriate use study groups to improve yours and others understanding of the material.

In CS 490R: Read, practice, and program. Find interesting topics to ask about.

Engage: When attending class actively participate in discussions and ask questions. Test your ideas out with others and be open to their ideas and insights as well. As you leave class ask yourself, "Was class better because I was there today?"

In CS 490R: Participate in the in-class activities and discussions.

Improve: Reflect on learning experiences and allow them to shape you into a more complete person: be willing to change your position or perspective on a certain subject. Take new risks and seek further opportunities to learn.

In CS 490R: Read, practice, and program. Find interesting topics to ask about.

8 Standard Statements

All syllabi are encouraged or required to address certain topics. These are generally considered to be common sense, but we find that it is useful to mention them explicitly anyway.

8.1 Dress and Grooming Standards

The dress and grooming of both men and women should always be modest, neat and clean, consistent with the dignity adherent to representing The Church of Jesus Christ of Latter-day Saints and any of its institutions of higher learning. Modesty and cleanliness are important values that reflect personal dignity and integrity, through which students, staff, and faculty represent the principles and standards of the Church. Members of the BYUH community commit themselves to observe these standards, which reflect the direction given by the Board of Trustees and the Church publication, "For the Strength of Youth." The Dress and Grooming Standards are as follows:

Men. A clean and neat appearance should be maintained. Shorts must cover the knee. Hair should be clean and neat, avoiding extreme styles or colors, and trimmed above the collar leaving the ear uncovered. Sideburns should not extend below the earlobe. If worn, moustaches should be neatly trimmed and may not extend beyond or below the corners of mouth. Men are expected to be clean shaven and beards are not acceptable. (If you have an exception, notify the instructor.) Earrings and other body piercing are not acceptable. For safety, footwear must be worn in all public places.

Women. A modest, clean and neat appearance should be maintained. Clothing is inappropriate when it is sleeveless, strapless, backless, or revealing, has slits above the knee, or is form fitting. Dresses, skirts, and shorts must cover the knee. Hairstyles should be clean and neat, avoiding extremes in styles and color. Excessive ear piercing and all other body piercing are not appropriate. For safety, footwear must be worn in all public places.

8.2 Accommodating Special Needs

Brigham Young University Hawaii is committed to providing a working and learning atmosphere which reasonably accommodates qualified persons with disabilities. If you have any disability that may impair your ability to complete this course successfully, you are invited to contact the Students With Special Needs Coordinator at 808-675-3518. Reasonable

academic accommodations are made for all students who have qualified documented disabilities.

8.3 Plagiarism

We learn by watching others and then doing something similar.

Sometimes it is said that plagiarism is copying from one person, and research is copying from lots of people.

When you are having trouble with an assignment, I encourage you to look at not just one, but many examples of work done by others. Study the examples. See what you can learn from them. Do not automatically trust that they are right. They may be wrong.

Do not just copy. Do your own work. When I review computer code, sometimes I see quirky ways of doing things. They appear to work even though they may be wrong. And then I see someone else that has done it exactly the same wrong way. This does not feel like "doing your own work." Cut and paste is pretty much an honor code violation. Read and learn is totally okay. Copying other ideas is okay. I don't want to see any cut and paste.

http://en.wikipedia.org/wiki/Plagiarism has a wonderful article on plagiarism. Read it if you are not familiar with the term. Essentially, plagiarism is when you present the intellectual work of other people as though it were your own. This may happen by cut-and-paste from a website, or by group work on homework. In some cases, plagiarism may also create a violation of copyright law. If you borrow wording from someone else, identify the source.

Intentional plagiarism is a form of intellectual theft that violates widely recognized principles of academic integrity as well as the Honor Code. Such plagiarism may subject the student to appropriate disciplinary action administered through the university Honor Code Office, in addition to academic sanctions that may be applied by an instructor.

Inadvertent plagiarism, whereas not in violation of the Honor Code, is nevertheless a form of intellectual carelessness that is unacceptable in the academic community. Plagiarism of any kind is completely contrary to the established practices of higher education, where all members of the university are expected to acknowledge the original intellectual work of others that is included in one's own work.

CS 490R: In this course group work is permitted and encouraged but you are not allowed to turn in work that is beyond your understanding, whether you give proper attribution or not. Make sure you understand what you are submitting and why each line is there.

CS 490R: On exams you are required to work from personal memory, using only the resources that are normally present on your computer. This means the exams are closed book and closed notes. However, you are nearly always allowed (and encouraged!) to test your program by actually running it on the computer where you are sitting. Students caught cheating on the final exam may receive a grade of F for the semester, no matter how many points they may have earned, and they will be reported to the Honor Code office.

Faculty are responsible to establish and communicate to students their expectations of behavior with respect to academic honesty and student conduct in the course. Observations and reports of academic dishonesty shall be investigated by the instructor, who will determine and take appropriate action, and report to the Honor Code Office the final disposition of any incident of academic dishonesty by completing an Academic Dishonesty Student Violation Report. If the incident of academic dishonesty involves the violation of a public law, e.g., breaking and entering into an office or stealing an examination, the act should also be reported to University Police. If an affected student disagrees with the determination or action and is unable to resolve the matter to the mutual satisfaction of the student and the instructor, the student may have the matter reviewed through the university's grievance process.

8.4 Sexual Harassment

BYUH's policy against sexual harassment complies with federal Title IX of the Education Amendments of 1972 to protect university students from student-to-student sexual harassment both in and out of the classroom setting. Any incidents of such student-to-student harassment should be reported to either the Director of Human Resources (808-675-3713) or the Honor Code Office (808-675-3531). Allegations of sexual harassment are taken seriously. Upon re-

ceiving a report of sexual harassment, the Director of Human Resources will take appropriate action to resolve and correct conditions resulting from individual perceptions or from inappropriate behavior.