# CSCE 625-600 AI: Spring 2020

## Syllabus

**NEWS:** *1/17/20, 02:46PM (Fri)*

- [01/14/20] Course web site goes online!

**Read-Only Bulletin Board.: 1/12/20, 12:59PM (Sun)**

*Page last modified: 1/17/20, 02:46PM Friday.*

General Information   Resources   Weekly Schedule   Credits   Lecture Notes   Example Code   Read-Only Board

## I. General Information

**Instructor:**

Dr. Yoonsuck Choe
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Office: HRBB 322B
Phone: 979-845-5466
Hours: Tue/Thu 11:00pm-12:00pm (2020 Spring)

**Prerequisite/Restrictions:**

CSCE 221 (Data Structures and Algorithms) or equivalent.

**Lectures:**

Tue/Thu 2:20pm-3:35pm, ZACH 350 (2020 Spring)

**Goals:**

To understand the problems in AI and to learn how to solve them:

1. traditional methods in AI (search, pattern matching, logical inference, theorem proving, planning, etc.).
2. modern approaches in AI (learning, probabilistic approaches, etc.).

**Textbook:**

Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (AIMA, hereafter), **3rd Edition**, Prentice Hall, New Jersey, 2010.
Book Homepage

> Note: The 4th edition is coming soon, but it will not be out until later in this semester, so we will have to stick with the 3rd edition.

Henry Brighton and Howard Selina, *Introducing Artificial Intelligence: A Graphic Guide*, Icon Books, 2010.
[Book web page](#)

> Note: Earlier print of this book under the title "Introducing Artificial Intelligence" is the same in its content. Original publishing year is 2003.

## Computer Accounts and Usage:

1. Computer accounts: if you do not have a unix account, ask for one on the CS web page. We will be using the [CMU Common Lisp](#) as our main language. You may use a different language but example code will only be made available in Lisp.
2. CMU Common Lisp:
   - [Carnegie Mellon U. Common Lisp homepage](#)
   - Departmental linux machines will have these installed soon. In the meanwhile, you can download and run a local binary version from [https://www.cons.org/cmucl/download.html](https://www.cons.org/cmucl/download.html) (Linux, MacOS X, FreeBSD, ...)

## Topics to be covered:

See the [Weekly Schedule](#) section for more details.

1. Introduction
2. LISP
3. Search
4. Game playing, alpha-beta pruning
5. Propositional Logic, first-order logic, theorem proving
6. Planning
7. Uncertainty, probabilistic approaches
8. Learning
9. Advanced topics (including DeepLearning)

## Grading:

1. Exams: 50% (midterm: 20%, final: 30%)

   **Make up exams**:
   - Only cases allowed under "Excused Absences" under TAMU [Student Rules, Rule 7. Attendance](#) will be eligible for make up exams. See 7.2 Absences and 7.3 Absence Documentation and Verification. Please read this very carefully. (For example, non-acute medical service does not constitute an excused absence, and it is the student's responsibility to provide documentation substantiating the reason for absence.)
   - There will be no make up exam for those who do not show up for the exam without prior notice.
   - **Make up exams will be different from the original exams although the difficuly will be adjusted to be comparable.**

   **Exam rules**
   - All exams will be closed book. Put all books, notes (exception below), cell phones, calculators, or any information containing media in your bag.
   - You may bring a 1-sheet hand-written note (US letter paper; you can use both sides). Write your full name on the top left corner of page 1. A4 or any other sized paper, two pages glued together, photocopied or printed notes, name not written or not written in the exact location specified are all in violation of this rule, and this will result in a 10-point penalty.
   - (Depending on the classroom) If you're right handed, sit in a right-handed seat. If you're left handed, sit in a left-handed seat.
   - Bring your student ID or Texas driver's license. You will not allowed to take the exam without an ID.

- Aggie honor code will be strictly enforced.

2. Homeworks: 20% (about 4, 5% each)
3. Programming Assignments: 30% (about 3: 10% each)

There will be no curving. The cutoff for an `A' will be 90% of total score, 80% for a `B', 70% for a `C', 60% for a `D', and below 60% for an 'F'.

Late penalty: 1 point (out of 100) per hour. Late submissions will not be accepted 4 days after the deadline and/or after the solution has been posted.

### Academic Integrity Statement:

AGGIE HONOR CODE: An Aggie does not lie, cheat, or steal or tolerate those who do.

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

For additional information please visit: http://aggiehonor.tamu.edu/

Local Course Policy:

- All work should be done **individually** and **on your own** unless otherwise allowed by the instructor.
- Discussion is only allowed immediately before, during, or immediately after the class, or during the instructor's office hours.
- If you find solutions to homeworks or programming assignments on the web (or in a book, etc.), please check with the instructor if you can use it.

### Students with Disabilities:

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit http://disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

## II. Resources

1. **CMU Common Lisp** (This one will be used in the class.)

## III. Weekly Schedule and Class Notes

- **Lecture notes (in PDF format)**: all notes will be uploaded in this directory.
- It is **your responsibility** to download, print, and bring the notes to the class. Notes will be available 24 hours before each class.
- See the **TAMU Calendar** for breaks, etc.
- When reading the chapters, you do not have to memorize everything. A separate list of terms you need to know will be handed out prior to each exam.
- All reading material below refers to the AIMA book 3rd edition.
- More detail will be available as we go along.

| Week | Date | Topic | Reading | Assignments | Notices and Dues | Notes |
|------|------|-------|---------|-------------|------------------|-------|
| 1 | 1/14 | Introduction | Chapter 1 | | First day of class | slide01.pdf |
| 1 | 1/16 | Introduction LISP | Chapter 26 26.1 and 26.2 | | 1/17: Last day to add/drop | slide01.pdf slide02.pdf |
| 2 | 1/21 | Symbolic Differentiation | | | | slide02.pdf |
| 2 | 1/23 | Uninformed Search (BFS,DFS,DLS,IDS) | Chapter 3.1-3.6 | | | TBA 03 |
| 3 | 1/28 | Informed Search (BestFS,Greedy,A*) | Chapter 4.1-4.3 (4.4 optional) | Homework 1 TBA: Search and Game Playing See eCampus. | | TBA 03 |
| 3 | 1/30 | IDA*,Heuristic Search, Simulated Annealing, Constraint Satisfaction, etc. | Chapter 4, Chapter 6.1 | Program 1: Search and Game Playing | | TBA 03 |
| 4 | 2/4 | Game playing Min-Max, Alpha-Beta | Chapter 5 | | | TBA 03 |
| 4 | 2/6 | Game playing wrap up; Representation, logic, frames | Chapter 5 Chapter 7 | Homework 2 TBA: Propositional Logic | Homework 1 due (2/8 Sat) | TBA 03 TBA 04 |
| 5 | 2/11 | **TBA** | | | | |
| 5 | 2/13 | Propositional Logic | Chapter 7 | Homework 3 TBA: First-order Logic | Program 1 due (2/15 Sat) | TBA 04 |
| 6 | 2/18 | Theorem proving First order logic (FOL) | Chapter 8; Chapter 9 | | | TBA 04 |
| 6 | 2/20 | Theorem proving for FOL | Chapter 8; Chapter 9 | | Homework 2 due (2/22 Sat) | TBA 04 |
| 7 | 2/25 | **Midterm Exam** | In class | | 3/2: Mid-semester Grades due | |
| 7 | 2/27 | Inference for FOL | Chapter 9 | Program 2 TBA: Theorem Prover | | TBA 04 |
| 8 | 3/3 | Uncertainty | Chapter 13 | | Homework 3 due | TBA 05 |
| 8 | 3/5 | Uncertainty: Decision theory, Bayes rule | Chapter 13, Chapter 14 | | | TBA 05 |

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| 9 | 3/10 | **Spring Break**: 3/9-3/13 | | | | |
| 9 | 3/12 | **Spring Break**: 3/9-3/13 | | | | |
| 10 | 3/17 | Uncertainty: Belief network | Chapter 13, Chapter 14 | | | TBA 05 |
| 10 | 3/19 | Planning, Machine Learning Intro | Chapter 7.2, 7.7, 10.4.2, 11 | | Program 2 due (3/18 Wed) | TBA -planning TBA ml3 |
| 11 | 3/24 | Learning: Inductive learning, Decision trees, Perceptrons | Chapter 14, Chapter 18 | | | TBA 07 |
| 11 | 3/26 | Learning: Perceptrons, Multilayer networks | Chapter 18, Chapter 20 | Combined Homework 4 / Program 3 TBA: Uncertainty, Probabilistic Reasoning, Learning | | TBA 07 |
| 12 | 3/31 | Learning: Backpropagation | Chapter 18, Chapter 20 | | | TBA 07 |
| 12 | 4/2 | Learning: Unsupervised learning, Self-organizing maps | Chapter 18, Chapter 20 | | | TBA 07 |
| 13 | 4/7 | Learning: Recurrent networks, Genetic algorithms | Chapter 18, Chapter 20 | | | TBA 07 |
| 13 | 4/9 | Advanced topic: Neuroevolution | | | | TBA 06 |
| 14 | 4/14 | Advanced topic: Deep learning | | | Last day to Q-drop (4/14) | TBA -dl |
| 14 | 4/16 | Advanced topic: Deep learning | | | Combined Homework 4 / Program 3 due | TBA -dl |
| 15 | 4/21 | Advanced topic: AI in the industry | | | | |
| 15 | 4/23 | [Last day of class: 4/23] Advanced topic: Topic TBA | | | PICA evaluation ends 4/29 | |
| **16** | **5/5(Tuesday)** | **Final exam: May 5 (Tuesday): 1-3pm, in ZACH 350** | | | Degree candidate grades due | |

## IV. Credits

Many ideas and example codes were borrowed from Gordon Novak's AI Course and Risto Miikkulainen's AI Course at the University of Texas at Austin (Course number CS381K).