COSC-6354 Artificial Intelligence
School of Engineering and Computing Sciences
Spring 2019

A. COURSE INFORMATION

Course number/section: COSC-6354.001
Class meeting time: TR 02:00-03:15PM
Class location: CI 127
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Dr. Alaa Sheta
Office location: CI-342
Office hours: M 1:00-3:00 PM, TR 12:30-2:00 PM
Telephone: 825-3711
E-mail: alaa.sheta@tamucc.edu
Appointments: Must be scheduled at least a week in advance by email

C. COURSE DESCRIPTION

Artificial intelligence has a unique place in science, sharing borders with mathematics, computer science, philosophy, psychology, biology, cognitive science, and others. The course aims to give a broad overview of AI techniques so that when students go into industry or research, they will be able to choose the correct AI techniques for the problems which arise. The course shall cover the fundamental concepts and methods for the design of computer-based, intelligent systems. Topics include a brief history, methods for knowledge representation, heuristic search techniques, logic, uninformed search, heuristic search, expert systems, reinforcement learning, and robot motion planning.

D. PREREQUISITES AND COREQUISITES

Prerequisites
None.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
No required book.

Optional Textbook(s) or Other References

Supplies
None
F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Understand the underlying architecture of an Intelligent Agent (IA).
2. Represent a problem as a search solving problem.
3. Learn various searching algorithms commonly using in AI.
4. Learn about various methods to represent knowledge and logic.
5. Understand the essential components of expert systems and be able to program one.
6. Understand the underlying principal for robot motion planning.
7. Understand how to learn by trial and error via Reinforcement Learning.
8. Understand how to represent the knowledge in the form of Tree Structure via Genetic Programming.

G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

This course will be a mixture of lectures and discussions. The student is expected to participate in all class activities actively. The student is also expected to do outside work on assignments, reading, class presentation, and project documentation.

H. **MAJOR COURSE REQUIREMENTS AND GRADING**

This is a theory and application course that demands all students attend all classes! Regular completion of all reading, homework, and other outside assignments are essential for success in this course. Your course grade will be decided on your performance in the programming homework assignments, term projects, two exams, and a final exam. The distribution of points is as follows:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Two Exams</td>
<td>40</td>
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<tr>
<td>Homework</td>
<td>10</td>
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<tr>
<td>Quizzes</td>
<td>10</td>
</tr>
<tr>
<td>Research Paper</td>
<td>40</td>
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Grade Scale: A (90-100%)  B (80-89%)  C (70-79%)  D (60-69%)  F (< 60%)
COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>ASSIGNMENTS</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Introduction to AI</td>
<td>Quiz 1</td>
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<tr>
<td>1/15, 1/17</td>
<td>AI Foundation and History</td>
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<tr>
<td>Week 2</td>
<td>Intelligent Agents: Definition and Some Examples</td>
<td>Reading on Intelligent Agent</td>
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<td>1/22, 1/24</td>
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<tr>
<td>Week 3</td>
<td>Environment Characteristics, Search Space and Problem Solving</td>
<td>Quiz 2</td>
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<td>1/29, 1/31</td>
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<td>Week 4</td>
<td>Uninformed Search: Depth First Search</td>
<td>HW1 Quiz 2</td>
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<td>2/5, 2/7</td>
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<tr>
<td>Week 5</td>
<td>Uninformed Search: Breadth First Search</td>
<td>HW2</td>
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<td>2/12, 2/14</td>
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<td>Week 6</td>
<td>Heuristic Search (A* Search, Dijkstra's Algorithm)</td>
<td>HW3 Quiz 3</td>
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<td>2/19, 2/21</td>
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<tr>
<td>Week 7</td>
<td>Heuristic Search (Genetic Algorithms)</td>
<td>First Exam on 2/28 HW4</td>
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<td>2/26, 2/28</td>
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<td>Week 8</td>
<td>Project Progress Presentation</td>
<td>Submission of the research paper first draft (10 points)</td>
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<td>3/5, 3/7</td>
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<td>Week 9</td>
<td>Spring Break</td>
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<td>3/12, 3/14</td>
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<td>Week 10</td>
<td>Expert Systems I</td>
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<td>3/19, 3/21</td>
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<td>Week 11</td>
<td>Expert Systems II and Clips Programming</td>
<td>HW5 Quiz 4</td>
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<td>3/26, 3/28</td>
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<td>Week 12</td>
<td>Clustering Algorithms</td>
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<td>4/2, 4/4</td>
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<td>Week 13</td>
<td>Reinforcement Learning</td>
<td>Quiz 5</td>
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<td>4/9, 4/11</td>
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<td>Week 14</td>
<td>Robot Motion Planning</td>
<td>Second Exam 4/18</td>
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<td>4/16, 4/18</td>
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<td>Week 15</td>
<td>Applications of AI, Machine Learning, Deep Learning, Natural Language Processing, Text Classification, others.</td>
<td>Submission of the final research paper (20 points)</td>
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<td>4/23, 4/25</td>
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<td>Week 16</td>
<td>Project Final Presentation</td>
<td>Final Presentation (10 points)</td>
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<td>4/30, 5/2</td>
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Final Exam on Tuesday, May 7, 2019, from 1:45PM – 4:15 PM.
We shall continue the final presentation of the research paper.

Note: Due to the nature of this course, mandatory attendance is required for all meetings, presentations, or work sessions as shown above. A grade reduction may be assessed for missing any day for which Dr. Sheta has not approved an authorized absence.

Note2: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
I. COURSE POLICIES

- **Course Syllabus**
  We will meet for lecture on Tuesdays and Thursdays when new material will be presented. We will follow the text generally, but the non-text material may also be included in the lectures. You are responsible for all the content presented during the lecture.

- **Readings**
  - The reading assignment will be provided on Bb every week.
  - It is the student duty to do the reading.
  - If you have any question about the reading, please let me know as early as possible.
  - Inability to finish the reading might affect your learning outcomes.

- **Homework Assignments and Quizzes:**
  1. Approximately five homework assignments will be given.
  2. The assignment will be given almost every one/two weeks.
  3. You MUST submit your HW on Bb.
  4. Your submitted assignment must be written in word/latex and submitted as pdf. No handwriting is allowed. Failure to do that will lead to zero grade.
  5. Any assignment MUST have a cover page which includes the assignment title, assignment number, the student name or team name for group assignment. 10% will be deducted if guidelines are not followed.
  6. The compressed file is not allowed. You would get zero grade if you submitted a compressed file.
  7. You need to include a description of the process you followed to develop your results in case of coding assignment, any tuning parameters, tables, and figures. Submitting the results/work without an explanation/analysis is not accepted (50% will be deducted from your grade).
  8. For late submission, maximum two days after the deadline, 50% will be deducted from your grade.
  9. It is your responsibility to check frequently (i.e., weekly bases) the posted contents, assignments or announcement on Bb.
  10. All assignment are due Saturday at 12:00 PM.

- **Team assignment/project**
  For team assignment, every team member has to submit to Bb. Failure to do that will lead to zero grade for that student.

- **Research Paper**
  - Each student has to work on a research paper based on a selected research topic. The student has to implement a literature review along with a list of reference and follow the standard IEEE format using LaTeX. Each student has to create an account on Overleaf. Overleaf provide an easy use interactive environment for professional research writing style.
  - The research paper should include programming and algorithm and provide all possible results. You MUST consulate Dr. Sheta.
• An in-class presentation is required.
• The research paper can be implemented in a team fashion of at **maximum two students. No more than two students are allowed. The instructor must approve all topics.**
• Each team needs to provide a summary of the project according to the given guidelines by the instructor on/before **Thursday, January 24, 2019.**
• A team will have to provide a short introduction in class after the topic is approved.
• Additional details on the research paper will be available later on the course website.

**Proposal Guidelines**
The adopted template for the research paper is the IEEE format. You must check and follow. **Do not delay this task to last mints because you will always have questions.**

**Research Paper/Project deliverables include:**
- Project/paper proposal
- Progress presentation
- Draft paper/report
- Final paper/report
- Final presentation

**Attendance/Tardiness**
You are expected to be in attendance, punctual, and prepared for class. If you are more than 10 minutes late to class, you will be counted as tardy. Please make sure that you will never be tardy to any of your classes or accept the consequences.

**Extra Credit**
There is NO EXTRA CREDIT - don't bother asking.

**Cell Phone Use**
*You are required to turn off your cell phone in class and pay attention to class discussions.*

**Laptop Use**
*Use of laptops and other electronic devices is restricted to taking notes.*

**Food in Class**
*Eating food in class is Not Allowed.*

**Missed Exam**
Missed exams will be graded as ‘0’.

**Others**
Read Section L!!!

J. **COLLEGE AND UNIVERSITY POLICIES**

**Academic Integrity (University)**
It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior. See Full University Policy at [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity)

**Classroom/Professional Behavior**
Texas A&M University-Corpus Christi, as an academic community, requires that each
individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that **must** submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.
  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816. [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

**OTHER INFORMATION**

These guidelines are designed to inform scholars of their responsibilities and of the course requirements in order to make this course a positive experience. The instructor is always available
for consultation and discussion with students on any aspect of a course and of these general guidelines.

1. Consider yourself as a scholar rather than a student. The term “student” may imply some passivity, whereas the term “scholar” implies active participation, understanding and searching. We will use these terms interchangeably with the meaning of “scholar” implied. Osmosis does not work in a learning environment!

2. Further, define yourself as a thinking explorer. You are responsible for your education; an instructor can only be a guide and a facilitator. An instructor cannot learn from you. If you come across something that really interests you, explore it further.

3. Your experience at this University should not consist of passing a series of courses to earn a degree. Your experience should rather be a series of activities that will give you an education.

4. Concentrate on “learning to learn”. You will have to be a life-long learner to survive in your chosen career.

5. There is no such thing as a stupid question; there is such a thing as a stupid answer. So ask questions, the instructor is taking all the risks! Ask questions of your instructor and of your fellow scholars. Many times questions are more important than answers.

6. The Internet is a tremendous resource and also a great danger. When you find information on the Internet, you have no idea if it is correct. View such information with caution. But, use the Internet to explore topics that interest you. Do not only prepare for the exam in a course – learn as much as you can on the topics introduced to you by the course material. You are responsible for the extent of your education! READ MINDFULLY !!!!

7. In addition to details of the syllabus given in class, the syllabus for the course includes all the chapters of the required textbook/s unless indicated otherwise by the instructor.

8. The final letter grade for the class will be based on the raw composite numerical score obtained from the weighted average of the tests, quizzes, exams, labs, etc. as indicated by the instructor. The raw composite numerical score may be adjusted (curved) based on the highest score, the statistical profile of the scores and other academic standards or other considerations. Generally, the letter grade of A is 90% and over of the adjusted score, a B is between 80% and 89% (inclusive) of the adjusted score, a C is between 70% and 79% (inclusive) of the adjusted score, a D is below 70% of the adjusted score and an F is below 65% of the adjusted score. An incomplete (I) will only be given in very unusual circumstances. The University regulations on incomplete grades state: “An incomplete notation may be given to a student who is passing but has not completed a term paper, examination, or other required work for reasons beyond the student’s control other than the lack of time”. Students are expected to take ALL tests, quizzes, exams, etc., and to complete and hand in all labs and other assignments. There is no provision for “extra credit”. No final grades will be given via the telephone, e-mail, etc.

9. All University rules, regulations and expected student conduct apply to this course. Students are held responsible for the information given in the current Catalog and Student Handbook.

10. All labs, assignments, etc. must be handed in on the assigned due date. Scholars having problems must notify the instructor well before the due date. Marks will be deducted for poor and sloppily presented work.

11. Labs, etc. handed in after the due date may be subject to a penalty of loss of marks. Labs, etc. handed in after the graded labs, etc. have been returned to students will get zero marks but must be handed into the instructor.

12. Scholars are asked to take special note of the penalties, which the University attaches to Academic Dishonesty. Consult the Student Handbook.

13. All work handed into the instructor must be the student’s own work. Extracts, excerpts, etc.
from the work of others must be suitably noted, acknowledged and properly referenced. Any Group Work will be judged in the same way. That is, it is the work of the group and the extracts, excerpts, etc. of others must be acknowledged.

14. All written and graphical work handed in must be presented neatly printed. Student’s written work will be judged on written communication skills, critical thinking and problem-solving ability.

15. There are NO provisions for making up missed exams except in cases where prior arrangements have been made and agreed to by the instructor.

16. Students must keep their given university e-mail address (i.e. firstname.lastname@islander.tamucc.edu). This will be the means of the instructor communicating with students.

17. All work submitted to the instructor (via e-mail or other means) must be clearly marked with the student’s name and the name and number of the course – this is especially important when work is submitted as an attachment to an e-mail.

18. The instructor reserves the right to make changes to the above with due notice to the students. These changes will be announced to the class (see 16 above) and each student is responsible for keeping herself/himself informed of such changes.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.