Course Syllabus

CSCE 4201 / 5210 Artificial Intelligence

Introduction to the foundations of (concepts and algorithms in) artificial intelligence, including topics such as search techniques, adversarial search & games, knowledge representation, problem-solving, logic, machine learning, perception, natural language processing, robotics, and the future of artificial intelligence.

Required Text:

Prerequisites:
There is really **no** strict prerequisite knowledge. The only prerequisite is that you be capable of relatively quickly filling any gaps in your knowledge or skills in the areas of probability, statistics, data structures, algorithms, and python. Given that AI is a bridge course for non-majors entering the MS in AI, the course should not have very large gaps for anyone. If you find that it does, please discuss this with the graduate assistants or instructor. *Coursera* ([https://online.unt.edu/learn/coursera](https://online.unt.edu/learn/coursera)) includes many courses that could also help fill some gaps. You might also find some of these python resources value: [http://python.berkeley.edu/resources/](http://python.berkeley.edu/resources/).

**TOPICS**

- **I ARTIFICIAL INTELLIGENCE**
  - 1 Introduction
  - 2 Intelligent Agents
- **II PROBLEM SOLVING**
  - 3 Solving Problems by Searching
  - 4 Search in Complex Environments
  - 5 Adversarial Search and Games
  - 6 Constraint Satisfaction Problems (university closed)
- **V MACHINE LEARNING**
  - 19 Learning from Examples
    - emphasizing Decision Trees and Artificial Neural Networks
  - 21 Deep Learning
- **VI COMMUNICATING, PERCEIVING AND ACTING**
  - 23 Natural Language Processing
  - 24 Deep Learning for Natural Language Communication
  - 25 Computer Vision
Final Exam: Thursday, April 29, 8:00am-10:00am, Zoom

ADA accommodation: UNT Policy 16.001: [https://policy.unt.edu/policy/16-001](https://policy.unt.edu/policy/16-001)

Academic Integrity Expectations: Do the right thing!
Per UNT Policy 06.003: [https://policy.unt.edu/policy/06-003](https://policy.unt.edu/policy/06-003)

consequences of violations could include course failure, or in some repeat cases, expulsion.

Learning Objectives:

1. Use and create programs that demonstrate understanding (including computational complexity) of search algorithms such as depth first, breadth first, iterative deepening, A*, Hill-climbing.
2. Implement programs that demonstrate understanding of two-person adversarial games (partially observable, stochastic, with state spaces too large to search).
3. Utilize and demonstrate fundamental principles of machine learning algorithms.
4. Use and create programs that show understanding of machine learning techniques.
5. Apply AI techniques in natural language processing, machine vision and robotics.

Major Assignments:

* Midterms: Several midterm exams (one exam per one to two chapters) will assess your competency with regard to the learning objectives and topics covered.
* Final Exam: A final exam will assess your competency with regard to the learning objectives and topics covered throughout the semester.

Final Exam: Thursday, April 29, 8:00am-10:00am, Zoom

Grading:

- 7% Class participation
  * ~2% attendance
  * ~2% video on during attendance
  * ~3% for 1 good question or class discussion weeks 1-5, 6-10 and 11-15
- 8% Reading responses class discussion
- 10% Quizzes (formative assessment, outside of class)
- 15% Homework
- 30% Exams (Final worth 2-3 times weight of other exams)
- 20% Project
* ~2% proposal
* ~2% background
* ~3% evaluation plan
* ~3% experimental design
* ~5% experiment write up
* ~5% analysis and discussion

10% Project Peer Reviews

Under extraordinary circumstances, late assignments might be accepted for partial credit if negotiated in advance with the instructor.

Attendance is required and will be reflected as a component of the class participation grade. For full credit, you must have your video turned on.

Graduate Assistants:
Akansha Goel: akanshagoel@my.unt.edu
Office Hours: by appointment, Zoom: https://unt.zoom.us/j/4046374623

Jagdish Katariya: JagdishkumarKatariya@my.unt.edu
Office Hours: by appointment, Zoom: https://unt.zoom.us/j/4322894400

Solomon Ubani: solomonubani@my.unt.edu
Office Hours: by appointment, Zoom: https://unt.zoom.us/j/7277760117

Instructor:
Dr. Nielsen: Rodney.Nielsen@unt.edu
Director, Human/Machine Intelligence and Language Technologies Lab
Office Hours: by appointment, Zoom: https://unt.zoom.us/j/3859511105

Course Summary:

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
<th>Due</th>
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<tbody>
<tr>
<td>Tue Jan 12, 2021</td>
<td>CSCE 4201 / 5210 AI (Spring 2021) 1</td>
<td>10am to 11:30am</td>
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Thu Jan 14, 2021
CSCE 4201 / 5210 AI (Spring 2021 1)
10am to 11:30am

Sun Jan 17, 2021
RN: AI Chapter 2
due by 1:25pm

Mon Jan 18, 2021
RN: AI Chapter 1
due by 1:29pm

Tue Jan 19, 2021
CSCE 4201 / 5210 AI (Spring 2021 1)
10am to 11:30am

Thu Jan 21, 2021
CSCE 4201 / 5210 AI (Spring 2021 1)
10am to 11:30am

Sun Jan 24, 2021
Tentative Project Selection
due by 11:59pm

Mon Jan 25, 2021
AI prelim
due by 11:59pm

Tue Jan 26, 2021
CSCE 4201 / 5210 AI (Spring 2021 1)
10am to 11:30am
<table>
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<tr>
<th>Date</th>
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<tr>
<td>Sat Feb 6, 2021</td>
<td><strong>Meeting</strong> (<a href="https://unt.instructure.com/calendar?event_id=371968&amp;include_contexts=course_42759">https://unt.instructure.com/calendar?event_id=371968&amp;include_contexts=course_42759</a>)</td>
<td>12pm to 12:30pm</td>
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<td><strong>Project 3.A (CV) Optional QA Meeting</strong> (<a href="https://unt.instructure.com/calendar?event_id=371969&amp;include_contexts=course_42759">https://unt.instructure.com/calendar?event_id=371969&amp;include_contexts=course_42759</a>)</td>
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<td><strong>Project 3.B (CV) Optional QA Meeting</strong> (<a href="https://unt.instructure.com/calendar?event_id=371970&amp;include_contexts=course_42759">https://unt.instructure.com/calendar?event_id=371970&amp;include_contexts=course_42759</a>)</td>
<td>1:30pm to 2pm</td>
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<td><strong>Project 4 (Robotics) Optional QA Meeting</strong> (<a href="https://unt.instructure.com/calendar?event_id=371971&amp;include_contexts=course_42759">https://unt.instructure.com/calendar?event_id=371971&amp;include_contexts=course_42759</a>)</td>
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<td><strong>CSCE 4201 / 5210 AI (Spring 2021 1)</strong> (<a href="https://unt.instructure.com/calendar?event_id=342008&amp;include_contexts=course_42759">https://unt.instructure.com/calendar?event_id=342008&amp;include_contexts=course_42759</a>)</td>
<td>10am to 11:30am</td>
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<td><strong>Project Proposal</strong> (<a href="https://unt.instructure.com/courses/42759/assignments/1002339">https://unt.instructure.com/courses/42759/assignments/1002339</a>)</td>
<td>due by 11:59pm</td>
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<td><strong>Question/Contribution Weeks 1-5</strong> (<a href="https://unt.instructure.com/courses/42759/assignments/991649">https://unt.instructure.com/courses/42759/assignments/991649</a>)</td>
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<td><strong>Chapter 3 Exam</strong> (<a href="https://unt.instructure.com/courses/42759/assignments/1008408">https://unt.instructure.com/courses/42759/assignments/1008408</a>)</td>
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<td>Wed Mar 17, 2021</td>
<td>Machine Learning Programming Assignment</td>
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<td>Data Collection for Project</td>
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<td>Mon Mar 29, 2021</td>
<td>ANN Programming Assignment</td>
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<td>(<a href="https://unt.instructure.com/courses/42759/assignments/1024538">https://unt.instructure.com/courses/42759/assignments/1024538</a>)</td>
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<td>CSCE 4201 / 5210 AI (Spring 2021 1)</td>
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Peer Review of Project
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<tr>
<td>Mon Apr 5, 2021</td>
<td>Proposal #3</td>
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<td>CSCE 4201 / 5210 AI (Spring 2021)</td>
<td>10am to 11:30am</td>
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<td>Thu Apr 8, 2021</td>
<td>CSCE 4201 / 5210 AI (Spring 2021)</td>
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<td>Mon Apr 12, 2021</td>
<td>Computer Vision Programming Assignment</td>
<td>due by 11:59pm</td>
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<td>CSCE 4201 / 5210 AI (Spring 2021)</td>
<td>10am to 11:30am</td>
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<td>Thu Apr 15, 2021</td>
<td>CSCE 4201 / 5210 AI (Spring 2021)</td>
<td>10am to 11:30am</td>
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<td>Mon Apr 19, 2021</td>
<td>Natural Language Processing Assignment</td>
<td>due by 11:59pm</td>
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<td>Tue Apr 20, 2021</td>
<td>CSCE 4201 / 5210 AI (Spring 2021)</td>
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<td>Thu Apr 22, 2021</td>
<td>Question/Contribution Weeks 11-15</td>
<td>due by 11:30am</td>
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Final Class Report and Grade
(https://unt.instructure.com/courses/42759/assignments/1033693)
due by 11:59am

[Optional] Chapter 3
Formative Assessment Part 1
(https://unt.instructure.com/courses/42759/assignments/1007554)

[Optional] Chapter 3
Formative Assessment Part 2
(https://unt.instructure.com/courses/42759/assignments/1007789)

[Optional] Chapter 3
Formative Assessment Part 3
(https://unt.instructure.com/courses/42759/assignments/1008091)

[Optional] Chapter 3
Formative Assessment Part 4
(https://unt.instructure.com/courses/42759/assignments/1008127)

ANN Formative Assessment
Part 1
(https://unt.instructure.com/courses/42759/assignments/1019034)

ANN Formative Assessment
Part 2
(https://unt.instructure.com/courses/42759/assignments/1019036)

Attendance
(https://unt.instructure.com/courses/42759/assignments/988317)

Attendance (11th Feb)
(https://unt.instructure.com/courses/42759/assignments/1013630)

Attendance (11th Mar)
(https://unt.instructure.com/courses/42759/assignments/1022493)

Attendance (12th Jan)
(https://unt.instructure.com/courses/42759/assignments/1013620)

Attendance (13th Apr)
(https://unt.instructure.com/courses/42759/assignments/1035006)
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<td>1st Apr</td>
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<td>23rd Mar</td>
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<td>25th Feb</td>
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Attendance (30th Mar)
(https://unt.instructure.com/courses/42759/assignments/1027938)

Attendance (4th Feb)
(https://unt.instructure.com/courses/42759/assignments/1013628)

Attendance (4th Mar)
(https://unt.instructure.com/courses/42759/assignments/1015998)

Attendance (6th Apr)
(https://unt.instructure.com/courses/42759/assignments/1031298)

Attendance (8th Apr)
(https://unt.instructure.com/courses/42759/assignments/1032252)

Attendance (9th Feb)
(https://unt.instructure.com/courses/42759/assignments/1013629)

Attendance (9th Mar)
(https://unt.instructure.com/courses/42759/assignments/1018975)

Codio Asgnmt
(https://unt.instructure.com/courses/42759/assignments/993133)

Machine Learning Formative Assessment Part 1
(https://unt.instructure.com/courses/42759/assignments/1015658)

Machine Learning Formative Assessment Part 2
(https://unt.instructure.com/courses/42759/assignments/1015662)

Peer Review of Project Proposal #1
(https://unt.instructure.com/courses/42759/assignments/1004105)
Peer Review of Project Proposal #2
(https://unt.instructure.com/courses/42759/assignments/1007670)

Roll Call Attendance
(https://unt.instructure.com/courses/42759/assignments/992184)

Video On (11th Feb)
(https://unt.instructure.com/courses/42759/assignments/1011617)

Video On (11th Mar)
(https://unt.instructure.com/courses/42759/assignments/1022492)

Video On (13th Apr)
(https://unt.instructure.com/courses/42759/assignments/1035005)

Video On (15th Apr)
(https://unt.instructure.com/courses/42759/assignments/1036578)

Video On (16th Mar)
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Video On (23rd Mar)
(https://unt.instructure.com/courses/42759/assignments/1024687)

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Video On (25th Mar)
(https://unt.instructure.com/courses/42759/assignments/1025670)

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Video On (9th Mar)
(https://unt.instructure.com/courses/42759/assignments/1018973)