



**Credit Hours:** 3

**Contact Hours:** This is a 3-credit course, offered in accelerated format. This means that 16 weeks of material is covered in 8 weeks. The exact number of hours per week that you can expect to spend on each course will vary based upon the weekly coursework, as well as your study style and preferences. You should plan to spend 14-20 hours per week in each course reading material, interacting on the discussion boards, writing papers, completing projects, and doing research.

**Faculty Information:** Faculty contact information and office hours can be found on the faculty profile page.

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## **COURSE DESCRIPTION AND OUTCOMES**

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**Course Description:**

This course introduces the basic concepts associated with artificial intelligence (AI) including heuristic search procedures associated with general graphs. Students will develop an understanding of knowledge representation and techniques associated with AI reasoning with uncertainty, with the goal of solving current-day complex problems within an organization. Emphasis will be on applying propositional logic, Bayesian probability analysis, and machine learning concepts to solve computationally-intensive problems.

**Course Overview:**

Artificial intelligence (AI) is a field that has been around for a long time and is constantly growing and evolving. Have you ever thought about how Alexa and Siri are able to perform so effectively? Have you ever played chess against the computer and the same techniques do not work over time? These are real-world examples and you will learn the principles that drive these systems and the methods utilized to implement them. This course is designed to teach the concepts behind solving problems using AI.

**Course Learning Outcomes:**

1. Discuss intelligent search methods in artificial intelligence.
2. Identify how to formulate a search problem using computational theories.
3. Apply methods and techniques for completing intelligent decision-making in knowledge representation.
4. Discuss the syntax and semantics of propositional logic and first-order logic.
5. Demonstrate how to represent uncertainty using Bayesian probability.
6. Identify how to use symbolic planning within an algorithm.
7. Implement machine learning techniques to solve a problem.

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## **PARTICIPATION AND ATTENDANCE**

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Prompt and consistent attendance in your online courses is essential for your success at CSU-Global Campus. Failure to verify your attendance within the first seven days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have deadlines, assignments, and participation requirements just like on-campus classes. Budget your time carefully and keep an open line of communication with your instructor. If you are having technical problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

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## COURSE MATERIALS

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### Required:

Neapolitan, R.E. (2018). *Artificial Intelligence* (2<sup>nd</sup> ed.). Boca Raton, FL: Chapman and Hall. ISBN: 9781138502383.

**NOTE:** All non-textbook Required Readings and materials necessary to complete assignments, discussions, and/or supplemental or required exercises are provided within the course itself. Please read through each course module carefully.

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## COURSE SCHEDULE

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### Due Dates

The academic week at CSU-Global begins on Monday and ends the following Sunday.

- **Discussion Boards:** The original post must be completed by Thursday at 11:59 p.m. MT, and peer responses posted by Sunday at 11:59 p.m. MT. Late posts may not be awarded points.
- **Opening Exercises:** Take the Opening Exercise before reading each week's content to see which areas you will need to focus on. You may take these exercises as many times as you need. The Opening Exercises will not affect your final grade.
- **Mastery Exercises:** Students may access and retake Mastery Exercises through the last day of class until they achieve the scores they desire.
- **Critical Thinking:** Assignments are due Sunday at 11:59 p.m. MT.

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## WEEKLY READING AND ASSIGNMENT DETAILS

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### Module 1

#### Readings

- Chapter 1 in *Artificial Intelligence*
- Sandewall, E. (2014). Editorial material: A perspective on the early history of artificial intelligence in Europe. *AI Communications*, 27(1), 81-86.
- Cipra, B. (1996). Will a computer checkmate a chess champion at last? *Science*, 271(5249),

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Critical Thinking (75 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

**Option #1: Using AI to Solve Business Problems**

How has the evolution of artificial intelligence enabled companies to be more efficient? How do companies utilize AI to save money? How could AI impact the long-term strategy of an organization?

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**Option #2: Combining AI with Other Technology**

How can utilizing AI, with other technology, help the overall effectiveness of AI? What type of technology do you think would pair well when an organization is looking to scale?

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**PORTFOLIO PROJECT REMINDER**

Be sure to review the Portfolio Project Description and Portfolio Project Rubric in the Module 8 folder for details.

**Mastery Exercise (10 points)**

**Module 2**

**Readings**

- Chapter 2 in *Artificial Intelligence*
- Tsvetkova, M., García-Gavilanes, R., Floridi, L., & Yasseri, T. (2017). Even good bots fight: The case of Wikipedia. *PLoS One*, 12(2) doi:

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Critical Thinking (75 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

**Option #1: Logical Foundations of Artificial Intelligence**

Chapters 2 and 3 focus on how propositional and first-order logic influence AI's ability to predict outcomes and utilize data to make decisions. Write a paper that breaks down what makes these topics fundamental to artificial intelligence.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

### **Option #2: Creating and Analyzing Truth Tables**

Demonstrate an understanding of truth tables by creating at least two examples using three propositions expressed with words and logic. Create a truth table for each example and explain the results. After analyzing the results look at the table to see if your logic proposition needs to be changed.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#).

Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

#### **Mastery Exercise (10 points)**

## **Module 3**

### **Readings**

- Chapter 3 in *Artificial Intelligence*
- Chih-Wen Chang, Hau-Wei Lee, & Chein-Hung Liu. (2018). A review of artificial intelligence algorithms used for smart machine tools. *Inventions*, 3(3), 41.

#### **Opening Exercise (0 points)**

#### **Discussion (25 points)**

#### **Mastery Exercise (10 points)**

#### **Portfolio Milestone (75 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

#### **Project Outline: Option #1**

Review the final deliverable for the Portfolio Project. Choose Option #1 or Option #2. Create a high-level outline of your final deliverable, which outlines how you plan to structure your paper or presentation.

Your outline should conform to the [CSU-Global Guide to Writing & APA](#). Include at least three scholarly references. The CSU-Global Library is a good place to find these references.

#### **Project Outline: Option #2**

Review the final deliverable for the Portfolio Project. Choose Option #1 or Option #2. Create a high-level outline of your final deliverable, which outlines how you plan to structure your paper or presentation.

Your outline should conform to the [CSU-Global Guide to Writing & APA](#). Include at least three scholarly references. The CSU-Global Library is a good place to find these references.

## **Module 4**

### **Readings**

- Chapter 4 in *Artificial Intelligence*
- Larrañaga, & Moral. (2011). Probabilistic graphical models in artificial intelligence. *Applied Soft Computing Journal*, 11(2), 1511-1528.

- Kautz, H., & Singla, P. (2016). Combining logic and probability. *Communications of the ACM*, 59(7), 106.

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Critical Thinking (75 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

**Option #1: Insurance Companies Using AI**

Insurance companies are constantly evaluating their rates to determine how much to charge customers based on the probability of paying a claim. How do insurance companies use AI to mitigate risk? How can AI be used to benefit or hurt consumers based on the type of data acquired? Research at least one insurance company to see if there are any stories or case studies which support your analysis.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**Option #2: Defend Your Analysis Using Data**

You work for the Human Resources department and you are investigating gender bias in hiring. You gave hiring personnel equal numbers of male and female resumes to review, and then you investigated whether their evaluations were correlated with gender. When you submitted a paper summarizing your results to a psychology journal, the reviewers rejected the paper because they said this was an example of fat-hand manipulation. Investigate the concept of fat-hand manipulation and explain why the journal reviewers might have come to this determination. You should also include ways that you could validate your results to dismiss this conclusion.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**Mastery Exercise (10 points)**

**Module 5**

**Readings**

- Chapter 5 in *Artificial Intelligence*
- Artificial Intelligence Boosts Efficiency for Solar and Wind. (2017, Nov 22). Targeted News Service.
- John Zeleznikow. (2017). Can Artificial Intelligence and Online Dispute Resolution enhance efficiency and effectiveness in Courts. *International Journal for Court Administration*, 8(2), 30-45.

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Critical Thinking (75 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

**Option #1: AI as an Agent of Change**

The article “Artificial Intelligence Boosts Efficiency for Solar and Wind” discusses how AI has had a significant impact on the solar and wind industry. Explain how technology can change an industry. How important is having the right data for driving efficiency? Identify another industry that could benefit in a similar way and explain what data you would implement AI to drive change.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**Option #2: Increasing Efficiency and Effectiveness**

The article “Can Artificial Intelligence and Online Dispute Resolution enhance efficiency and effectiveness in Courts” discusses an interesting concept about using technology to improve the court system. Why is this application beneficial to the court system? What about the people who complain about the courts’ inefficiency? What data would you need to see to implement this in the U.S.? Explain why you would or would not recommend this.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**Mastery Exercise (10 points)**

**Module 6**

**Readings**

- Chapter 6 in *Artificial Intelligence*

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Critical Thinking (70 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

**Option #1: Coin Flip Probability**

Kerrich (1946) performed experiments, such as flipping a coin many times, and found that the relative frequency did appear to approach a limit. That is, for example, he found that after 100 tosses, the relative frequency may have been .51.

Perform this experiment and see if you obtain the same results. Explain what factors may impact your results and how you can use probability to increase the ability to predict these results.

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

### **Option #2: Applying Probability in the Casino**

A number of casino games are all about probability. In Blackjack, there are rules which you should follow about taking a hit or standing when the dealer is showing a 10.

Assuming that you are only using one deck, and there are only four cards on the table. If you have a 10 and a 7 showing, the dealer has a 10 showing, calculate the probability of the dealer's other card being an 8, 9, or a face card.

Explain why it makes sense to hit on a 16 but to stand on a 17. If the house will stand on a 17 and above, how would you justify this strategy?

Your paper should be 2-3 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least two scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

**Mastery Exercise (10 points)**

## **Module 7**

### **Readings**

- Chapter 7 in *Artificial Intelligence*
- Science and technology: Riders on a swarm; artificial intelligence. (2010, Aug 14). *The Economist*, 396, 65-66.
- Brown, S. F. (2004). Send in the swarm. *Fortune*, 149(12), 52–54.

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Mastery Exercise (10 points)**

## **Module 8**

### **Readings**

- Chapter 9 in *Artificial Intelligence*
- Parreco, J., Hidalgo, A., Kozol, R., Namias, N., & Rattan, R. (2018). Predicting mortality in the surgical intensive care unit using artificial intelligence and natural language processing of physician documentation. *The American Surgeon*, 84(7), 1190-1194.
- Jaeger, H. (2016). Deep neural reasoning. *Nature*, 538(7626), 467-468.

**Opening Exercise (0 points)**

**Discussion (25 points)**

**Mastery Exercise (10 points)**

**Portfolio Project (275 points)**

Choose one of the following two assignments to complete this week. Do not do both assignments. Identify your assignment choice in the title of your submission.

### **Option #1: Create a Proposal for AI Implementation**

For your Portfolio Project, you are a consultant for a prestigious firm. Your client is a growing insurance company looking to understand more about incorporating artificial intelligence into the business to help them provide better service and reduce overall costs.

Compose a proposal that analyzes whether this is a worthwhile investment for the company to make. Design this proposal to submit to your client's CEO and CIO.

You may need to make some assumptions regarding cost and leadership roles, but make them realistic. Think about the problem and how you propose solving it. Keep in mind AI is very new to this organization, so explain what AI is and what they gain to benefit from using it. Also, think about any risks they may face and address them by providing solutions to build trust in your ability to deliver. You should think through what type of data you will need to collect, and what you plan to do with it. Feel free to provide examples and diagrams which connect the concepts to their problems. Provide information on what it would take to scale AI across the organization. Identify what groups within the company, or processes within the business, could benefit from it the most.

Your paper should be 8-10 pages in length and conform to the [CSU-Global Guide to Writing & APA](#). Include at least five scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

### **Option #2: Presenting AI to Stakeholders**

For your Portfolio Project, you are a consultant for a prestigious firm. Your client is a growing insurance company looking to understand more about incorporating artificial intelligence into the business to help them provide better service and reduce overall costs.

Compose a presentation that analyzes whether this is a worthwhile investment for the company to make. Design this presentation as if you were presenting to the CEO and CIO of an organization and you want to sell them on your company's ability to deliver. Include visuals that make the presentation engaging and support your content.

You may need to make some assumptions regarding cost and leadership roles, but make them realistic. Think about the problem and how you propose solving it. Keep in mind AI is very new to this organization, so explain what AI is and what they gain to benefit from using it. Also, think about any risks they may face and address them by providing solutions to build trust in your ability to deliver. You should think through what type of data you will need to collect, and what you plan to do with it. Feel free to provide examples and diagrams which connect the concepts to their problems. Provide information on what it would take to scale AI across the organization. Identify what groups within the company, or processes within the business, could benefit from it the most.

Your presentation should be 15-25 slides in length, including speaker notes, and conform to the [CSU-Global Guide to Writing & APA](#). Include at least five scholarly references in addition to the course textbook. The CSU-Global Library is a good place to find these references.

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## COURSE POLICIES

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Grading Scale	
A	95.0 – 100
A-	90.0 – 94.9
B+	86.7 – 89.9
B	83.3 – 86.6
B-	80.0 – 83.2
C+	75.0 – 79.9
C	70.0 – 74.9
D	60.0 – 69.9
F	59.9 or below

### Course Grading

20% Discussion Participation

0% Opening Exercises

8% Mastery Exercises

37% Critical Thinking Assignments

35% Final Portfolio Project

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## IN-CLASSROOM POLICIES

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For information on late work and incomplete grade policies, please refer to our [In-Classroom Student Policies and Guidelines](#) or the Academic Catalog for comprehensive documentation of CSU-Global institutional policies.

### **Academic Integrity**

Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /repurposing your own work (see CSU-Global Guide to Writing & APA for percentage of repurposed work that can be used in an assignment), unauthorized possession of academic materials, and unauthorized collaboration. The CSU-Global Library provides information on how students can avoid plagiarism by understanding what it is and how to use the library and internet resources.

### **Citing Sources with APA Style**

All students are expected to follow the CSU-Global Guide to Writing & APA when citing in APA (based on the most recent APA style manual) for all assignments. A link to this guide should also be provided within most assignment descriptions in your course.

### **Disability Services Statement**

CSU-Global is committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Disability Resource Coordinator at 720-279-0650 and/or email [ada@CSUGlobal.edu](mailto:ada@CSUGlobal.edu) for additional information to coordinate reasonable accommodations.

### **Netiquette**

Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults, or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom. If you have concerns about something that has been said, please let your instructor know.