

**SCHOOL OF ENGINEERING  
SYLLABUS AND COURSE POLICY FOR EN513  
ARTIFICIAL INTELLIGENCE  
LECTURE MW, F2F, 5:30 PM 6:50 PM, SPRING, 2023**

**Instructor Name** : Bahaa Ansaf

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**Office Hours (In person and Virtual):** <https://csupueblo.zoom.us/j/8898155175>

**11:00 am -12:00 pm TTH and 9:00-10:00 am MW.**

Please e-mail/call to make an appointment if you want to be sure I'm there (or if you can't make it during those times).

If you used ZOOM room, please wait until I let you in.

**Class meeting structure:**

**EN513 Lecture:** MW, 5:00 PM 5:20 PM, Room: T220.

The course structure is **F2F**; technology will be adopted to maintain social distancing and safety for the students and instructor. (Please, check course page on the BB for more details).

Any updates to course structure or meeting times or location will be posted in Announcements on Blackboard with an accompanying email by 7:00am the day of class or as soon as available. It is the student's responsibility to check this regularly and remain informed on course progress.

**Course Description:**

Topics in artificial intelligence including predicate calculus, search strategies, and machine learning with applications.

**Prerequisites:**

**Pre-requisites by topic:**

1. Mathematics: matrix algebra, vector spaces, statistics, geometry, trigonometry, and calculus
2. Programming skills (the students need to work on AI programming projects)

**Course Objectives or Student Learning Outcomes/Instructional Methods:**

At the end of this course, students are expected to have the following knowledge, attitudes or skills. (Code in parentheses indicates the related MS in Mechatronics Engineering and MS in Industrial Engineering outcomes)

1. Demonstrate advanced understanding various AI tools and logarithms (1,2)
2. Demonstrate advanced understanding various AI applications (1,2)
3. Develop advanced understanding various AI Ethics (1,2)

**Contribution to professional component:**

AI system design application

**Credit hours and expected student effort:**

**Credit-Hours: 4**

EN513: This three-credit course uses Face to Face format and will meet for 160 minutes per week (2 hours and 40 minutes), with the remainder of the work being done outside the class. Coursework, including homework, is expected to require about 300 minutes per week (5 hours) of student effort, including finals week.

**Important Dates:**

1. Midterms Project at end of week 7 or 8. (Tentatively)
2. Final project ( Due date shown on BB)

Anyone wanting to withdraw from this course may do so on or before the due date as in [the university academic calendar](#). This is the last day for dropping courses with a “W” recorded; after this date a student may not withdraw. Anyone receiving financial aid should contact the Financial Aid Office to determine the impact on his/her financial aid award.

**Topics Covered:**

| Topic                                                                                                                                                                                                                          | Suggested No. of Hours | Contribution to the course outcomes |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------|
| Introduction to AI                                                                                                                                                                                                             | 3                      | 1,2,                                |
| Fuzzy Logic Systems (FL).                                                                                                                                                                                                      | 6                      | 1,2                                 |
| Selected case studies and lab examples: Fuzzy Logic Systems (FL)                                                                                                                                                               | 3                      | 1,2                                 |
| Artificial Neural Networks (ANN): Classification, fitting, Approximation and time series applications, self-organized networks, and Convolutional network classification models ( <b>Deep learning and transfer learning</b> ) | 9                      | 1,2                                 |
| Selected case studies and lab examples: Traditional ANN, deep learning, and transfer learning                                                                                                                                  | 3                      | 1,2                                 |
| Evolutionary Computation: genetic algorithms (GA).                                                                                                                                                                             | 3                      | 1,2                                 |
| Evolutionary Computation: Evolution strategies and genetic programming (GP).                                                                                                                                                   | 3                      | 1,2                                 |
| Selected Case studies and lab examples: Evolutionary computation (GA, GP).                                                                                                                                                     | 3                      | 2                                   |
| Hybrid Intelligent Systems                                                                                                                                                                                                     | 3                      | 2                                   |
| AI Programming projects                                                                                                                                                                                                        | 12                     | 1,2                                 |
| Total hours:                                                                                                                                                                                                                   | 48                     |                                     |

**Program Student Learning Outcomes (SLOs)****MS in Mechatronics Engineering and MS in Industrial Engineering outcomes**

- 1- Demonstrate advanced understanding of the fundamental knowledge which serves as the basis for practice in their chosen specialization.
- 2- Apply those principles in the design and analysis of a system or process to meet specified needs.
- 3- Communicate effectively in writing and orally.

Evaluation of the Student Outcomes is done in conjunction with the evaluation of the Program Educational Objectives so that if the Objectives change, the effect on the Outcomes will be considered at that same time.

**Required Text(s) and Other Materials:**

Michael Negnevitsky “Artificial Intelligence a Guide to Intelligent Systems”,  
Third edition 2011.

**Additional references:**

- MATLAB documentation and resources for FL, Neural networks and deep learning, Global optimization, Neuro Fuzzy network , Adaptive network, Fuzzy controller
- Machine learning with Python for everyone, Mark E. FENNER, Addison-Wesley Data and Analytics Series, 2020.

- Fundamental of the new Artificial intelligence (neural, evolutionary, fuzzy and More), Toshinori Munakata, 2008.
- Artificial intelligence: A systems Approach M. Tim Jones. 2008
- Fuzzy systems for information processing, edited by k Asai, 2009.
- Advances in intelligent systems, edited by F.C. Morabito , 2009.

### Course Requirements:

#### EN513

20 % Homework/Lab/ class participation

30 % Midterm Project

50 % Final Exam (Project)

### Campus Resources

1. All class documents will be available at blackboard.colostate-pueblo.edu.
2. Matlab can be access through virtual applications (Apporto); student version need to purchase with selected AI Toolboxes to complete lab assignments and projects.

### Attendance/Participation:

Attendance is important. Many of the homework and test problems will come from topics covered in class. You should attend class since it will help you do well in the class. If you miss class get the notes from a classmate. Also, In case you have been **infected with flu, do not attend to class and inform the instructor** immediately by phone or email. **For COVID19 infection, use university protocol and resources shown at last page.** No penalization will be taken for that particular lecture and you will be allowed to turn in your class assignments through Blackboard or email.

### Grading:

|    |         |
|----|---------|
| A  | 94~100  |
| A- | 90~93.9 |
| B+ | 85~89.9 |
| B  | 80~84.9 |
| B- | 75~79.9 |
| C+ | 70~74.9 |
| C  | 65~69.9 |
| D  | 60~64.9 |
| F  | 0 ~59.9 |

### Extra Credit:

#### Accommodations:

<https://www.csupueblo.edu/disability-resource-and-support-center/faculty-staff-resources.html>

If you have a documented disability that may impact your work in this class and for which you may require accommodations, please see the Disability Resource & Support Center (DRSC) as soon as possible to arrange services. The DRSC is located in OSC 201 and can be reached by phone (719-549-2648) and email ([csup\\_dro@csupueblo.edu](mailto:csup_dro@csupueblo.edu)).

### Starfish Performance Notifications

Starfish notifications inform you and your academic success team on your performance in this class. Reading these emails and/or texts and taking the suggested actions is highly encouraged for your success. Please access Starfish through PAWS to view your kudos or flags. You may also request assistance from many services through Starfish.

### Learning Resources:

adopted January 14, 2019 by Faculty Senate, amended July 2020

**Other Policies:**

See [Syllabus Reference Sheet](#) for full details on the following and more:

**The Wolfpack Counseling Center: Here to Listen. Here to help.**

For counseling assistance or services, please call us at: 719-549-2838.

**Academic Misconduct:**

*Academic misconduct is any form of cheating that results in students giving or receiving unauthorized assistance in an academic exercise or receiving credit for work which is not their own.*

*Academic misconduct is a behavioral issue as well as an issue of academic performance and therefore grounds for disciplinary action by both the instructor and the Director of Student Conduct and Community Standards.*

**Institutional Equity Statement**

CSU Pueblo is committed to equal educational and employment opportunities and to the elimination of all forms of Discrimination, Protected Class Harassment, and Retaliation. Any campus community member in need of support, resources, or guidance is welcome to contact the Office of Institutional Equity and Title IX Coordinator via email at [nicole.ferguson@csupueblo.edu](mailto:nicole.ferguson@csupueblo.edu), by phone at 719-549-2210, or in person at LARC 187.

**E-mails:** When the need arises, your professor will—through Blackboard—send you e-mails. It will be helpful if you check your student e-mail inbox (i.e., your assigned CSU-Pueblo account) regularly and keep it cleaned out so that messages from your professor don't "bounce." When you e-mail me, please put the course number in the subject line (e.g., "EN 513"). I will try to answer your e-mails within 48 hours. If you have a particularly urgent need, please e-mail me and leave a voice-mail (i.e., telephone) message as well. Please repeat your phone number (i.e., say it twice) when you leave a voicemail.

It is courteous to close the loop when we communicate by e-mail: initial e-mail to professor→professor's reply→confirmation that you received reply (e.g., "Thanks, Professor; got it"). If you send me an e-mail and don't get a reply, please call me. Strange things occasionally happen with e-mails. Assume I didn't get it and be persistent.

**Assignments:****Electronic Submission for the class Assignments/Quizzes/Tests:**

**Your submission must be in pdf format. I recommend using mobile app "Genius Scan" which will filter, collate and convert a collection of images into a single pdf file.**

**Homeworks:** Problem sets will typically be handed out on the first day for each new topic and due will be shown on the HW sheet and Blackboard. To receive credit, problem sets must be handed in at the beginning of class on the due date. Problem sets will not necessarily be assigned every week because of tests, holidays, etc.. Late submission will be allowed with up to 10-40% deductions after the due date.

**Quizzes:** several short exams (10-20 minutes) will be implemented during this class at the given due dates. I reserve right to give a quiz at any time during any class unit. The quizzes will be based on homework and might be given when attendance is low.

**Quality of Submitted Work:** Students are expected to produce professional quality reports for all required assignments. Every student is expected to present his/her written material in a neat, legible, and orderly fashion. Students should develop a concise manner of expression that should be clear, logical, and progressive towards a final conclusion. All submitted work for grading must be typed and stapled, unless otherwise specified. (Homework assignments do not have to be typed.)

**Collaboration:** Students are encouraged to help each other with homework and labs. You are forbidden from just copying or having someone else do your work for you. You are encouraged to study together for tests.

adopted January 14, 2019 by Faculty Senate, amended July 2020

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**Your submission must be in pdf format. I recommend using mobile app “Genius Scan” which will filter, collate and convert a collection of images into a single pdf file.**

**Make up Tests:** Make up tests will be given only for compelling reasons. Compelling reasons include sickness, natural disaster, etc. You must get prior approval if you know that you must skip a test.

**Help:** You can get help from your fellow classmates to study and out of class assignments. You can also get help from me. Send email to me to ask questions. If you want to see me in person, **I plan to be available during office hours (virtually)**. If you can’t meet during office hours, make an appointment using email.

**Note:** All of the materials developed and used by the professor (homework, quizzes, in-class activities, exams, recoded lectures) are my intellectual property or the intellectual property of another individual or that has been approved for use in this course only. None of us have given permission to have these materials shared online outside of our individual course or websites. (Check CSU-Pueblo’s Code of Student Conduct.)