CSE454: Explorations of Computational Intelligence in Computer Engineering Applications.
Fall 2019

Course Information:

Lecture Times: MWF 11-11:50am
Location: Park 146
Number of Credits: 3
Instructor Information:
      Dr. Jennifer Winikus
      716-645-4757
      jwinikus@buffalo.edu
      Davis 351

Course Description:

There are many areas of computer engineering that utilize computational intelligence. We will explore several computer engineering topics and a computational intelligence topic (or two) that applies to that situation and how to implement it. This approach is entirely application driven with assignments which focus on the implementation in the applications. Students will be expected when the course is done to be able to identify the type of problem and choose and implement a computational intelligence technique to attempt to solve the problem.

Course Prerequisites:

- CSE250 and PHY108, with CSE241 recommended
- Approved Computer Engineering or Computer Science Major

Textbook:

None, but supplementary readings will be provided.

Learning Outcomes:

Course Learning Outcome	Program Outcomes / Competencies	Instructional Method(s)	Assessment Method(s)
Identify the needs of an engineering problem	CS program: 2 CEN program: 1	Case studies, reading assignments, class exercises	Projects Exams
Understand the appropriate tool	CS program: 2 CEN program: 1, 7	Discussions, exercises	Projects Exams
Apply computational intelligence with a high level knowledge	CS program: 2,6 CEN program: 1	Discussions, exercises	Projects
Understand aspects of computer engineering applications	CS program: 1 CEN program: 1, 7	Exercises	Projects Exams
Familiarity with understanding literature	CS program: 3 CEN program: 3, 7	Readings, discussions	Report

Program Outcome Support:

Program Outcome Support

0: Not Supported, 1: Minimally Supported, 2: Supported, 3: Strongly Supported

CEN Program Outcome	1	2	3	4	5	6	7
Support Level	3	0	0	0	0	0	1

CS Program Outcome	1	2	3	4	5	6
Support Level	0	3	1	0	0	1

Grading Policies

Your grade will be comprised of:
20 % Exam 1
30 % Exam 2
10 % Other Assignments
10 % Controller Project
10 % Sampling Project
10 % Microgrid Project (or similar design/optimizations problem)
10 % Literature Project
Extra credit opportunities may be offered.

Other assignments include 3 group activities and two practice exams.

Your final score for the course will be converted into a letter grade as follows:

- A: 100–94
- A-: 93–90
- B+: 89–87
- B: 86–84
- B-: 83–80
- C+: 79–77
- C: 76–74
- C-: 73–70
- D: 69–60
- F: 59–0

The instructor reserves the right to curve grades if appropriate and as they choose.

Incompletes (I/IU): The course follows the university undergraduate [incomplete](#) policy.
A grade of incomplete ("I") indicates that additional coursework is required to fulfill the requirements of a given course. Students may only be given an "I" grade if they have a passing average in coursework that has been completed and have well-defined parameters to complete the course requirements that could result in a grade better than the default grade. An "I" grade may not be assigned to a student who did not attend the course.

Prior to the end of the semester, students must initiate the request for an "I" grade and receive the instructor's approval. Assignment of an "I" grade is at the discretion of the instructor. Upon assigning an "I" grade, the instructor shall provide the student specification, in writing or by electronic mail, of the requirements to be fulfilled, and shall file a copy with the appropriate departmental office. Students must not re-register for courses for which they have received an "I" grade

Collaboration Policies

Unless explicitly told, all work is to be done independently with only the assistance of TAs and the instructor. You may discuss the general concepts of assignments and what the question asks for with other students but you must not discuss answers.

Unauthorized collaboration will result in an "F" in the course as a violation of academic integrity.

Departmental Statement on Academic Integrity in Coding Assignments and Projects

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All academic work must be your own. Plagiarism, defined as copying or receiving materials from a source or sources and submitting this material as one's own without acknowledging the particular debts to the source (quotations, paraphrases, basic ideas), or otherwise representing the work of another as one's own, is never allowed. Collaboration, usually evidenced by unjustifiable similarity, is never permitted in individual assignments. Any submitted academic work may be subject to screening by software programs designed to detect evidence of plagiarism or collaboration.

It is your responsibility to maintain the security of your computer accounts and your written work. Do not share passwords with anyone, nor write your password down where it may be seen by others. Do not change permissions to allow others to read your course directories and files. Do not walk away from a workstation without logging out. These are your responsibilities. In groups that collaborate inappropriately, it may be impossible to determine who has offered work to others in the group, who has received work, and who may have inadvertently made their work available to the others by failure to maintain adequate personal security. In such cases, all will be held equally liable.

Departmental Policy on Violations of Academic Integrity

The CSE Department has a zero-tolerance policy for AI violation.
All AI violation cases will be reported to the department, school and university, and recorded.
Even the 1st offense will receive "F" for the course, unless the instructor deems it appropriate to reduce the penalty.
Subsequent violation of AI in any form and in any other course will automatically result in a "F" grade, with no exception.

Exam Policy

There will be 2 exams. Two exams will be in class, the final exam is scheduled by the registrar. You must have a valid ID with you at the time of the exam (UB Card will suffice) and your own writing tools. You can not borrow pens or pencils during the exam. During the exam there is to be no talking or looking at your phone, doing so may result in an automatic "F" on the exam based on the incident.

Any accommodations must be made in advanced barring extraordinary circumstances.

Due Dates

All submissions will be made on UBLearns.

Late work:
No late work will be accepted. No work will be accepted after midnight on Friday of the last week of classes barring extraordinary circumstances. This includes regrade requests.

If a regrade is desired, you have 1 week from the time the grade is released to requesting a regrade. Corrections are not allowed.

Email Policy

Students are responsible for email sent to their official University at Buffalo email address. Communication will not be done with non-university email addresses. A level of professionalism is expected with all communications.

Accessibility Resources

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources, 60 Capen Hall, 716-645-2608, and also the instructor of this course. The office will provide you with information and review appropriate arrangements for reasonable accommodations.

University Policies

You are expected to adhere to all university policies, including those listed below and not listed.

Academic Integrity Policy:
https://catalog.buffalo.edu/policies/academic_integrity_2019-20.html

Office of Academic Integrity
https://academicintegrity.buffalo.edu/

Policy on Accommodations:
https://www.buffalo.edu/administrative-services/policy1/ub-policy-lib/reasonable-accommodation.html

The Office of Equity, Diversity and Inclusion provides many resources including the following policies to be followed:

Discrimination and Harassment:
http://www.buffalo.edu/administrative-services/policy1/ub-policy-lib/discrimination-harassment.html

Religious Accommodation and Expression:
http://www.buffalo.edu/administrative-services/policy1/ub-policy-lib/religious-accommodation-expression.html

Departmental Academic Integrity Policy
https://engineering.buffalo.edu/computer-science-engineering/undergraduate/resources-for-current-students/academic-integrity-students.html

Student Code of Conduct
http://www.buffalo.edu/content/dam/www/studentlife/units/uls/student-conduct/ub-student-code-of-conduct.pdf

Classroom Behavior Expectations
https://catalog.buffalo.edu/policies/obstruction.html

Explanation of Grades
https://catalog.buffalo.edu/policies/explanation.html

University Statements

Sexual Violence

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If you have experienced gender-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if you so choose. Please contact UB's Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, you may also contact a Crisis Services Campus Advocate at 716-796-4399.

Mental Health

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other issues you may experience. You can learn more about these programs and services by contacting:

Counseling Services:

120 Richmond Quad (North Campus), 716-645-2720
202 Michael Hall (South Campus), 716-829-5800
Health Services:

Michael Hall (South Campus), 716-829-3316
Health Promotion:

114 Student Union (North Campus), 716-645-2837

Tentative Schedule

Week	Topic	Assignment
1	Syllabus, Computer Engineering Applications Overview, Why ML	
2	Fuzzy Logic	Controller Project Start
3	Fuzzy Logic	
4	Time Series - Sampling	Controller Project Due Start a sampling/rep problem
5	Time Series Rep - PAA/DTW	
6	Data Fusion of Time Series	Samp/rep prob due
7	Exam Microgrid control-intro	Microgrid Design problem start: (Design and Optimization Problem) 1. Construct the theoretical grid to model 2. Determine the relationships for the control system and identify what to optimize 3. Implement an optimization
8	Microgrid Control- sensor fusion	
9	Microgrid -Optimization	
10	Evolvable Hardware	
11	Evolvable Hardware	Microgrid project due Research Paper Start : read a technical journal article on an ML/CEN pairing then present a summary and analyze the paper -From an ACM or IEEE Journal/Transaction
12	Other Optimization and control -survey a few other cases and methods	
13	Other Optimization and control	Research paper due

	-survey a few other cases and methods	
14	Finals week	
15	Week lost due to thanksgiving/spring break	

Note: Evolvable hardware will likely be done with GA and Ant Systems.

Academic Content

This is a tentative list of topics:
- Fuzzy Logic
- General control problem formulation
- Genetic Algorithms
- Time series representation and sampling
- Microgrid control and optimization
- Evolvable Hardware
- Topics of application may be switched out to stay current with popular computer engineering applications

Important Dates

Last day to Add/Drop: Tuesday September 3rd
Last day to Resign: Friday November 8th
Last day of Classes: Friday December 6

Disclaimer

This syllabus is subject to change. All policy changes will be communicated to the course in a timely fashion. Please note that the schedule is tentative and to follow due dates provided on the assignments.