CSC 8810 (Computer Number 88048) Fall 2014 (2 pages)
Computational Intelligence
Langdale Hall 631, 5:30-7:15 p.m., Monday Wednesday

Instructor: Dr. Yanqing Zhang
Office: 743
Phone: 404-413-5733 (o)
Fax: 404-413-5717 (o)
E-mail: yzhang@gsu.edu
Website: http://www.cs.gsu.edu/~cscyqz/courses/ci/ci.html
Office Hours: 3:00 p.m.-4:30 p.m. Monday, Wednesday or by appointment


Course Content: Introduction to basic computational intelligence techniques (neural networks, fuzzy logic, genetic algorithms, etc.) and their applications in green computing, computational Web intelligence, data mining, biomedical informatics, health informatics, security, cloud computing, sensor networks, etc.

Prerequisite: CSC 4810/6810 Artificial Intelligence.

Course Requirements: All students should not only learn basic theoretical principles but also accumulate practical hands-on experience. Importantly, each student must independently write a good conference paper of IEEE paper format to summarize a programming project, and give presentations.

Class Policy:
- Attendance: Students are required to attend all classes.
- Academic honesty: Plagiarism will result in a score of zero on the test or paper.
- Assignments and Projects: They should be handed in on time, otherwise when past due, the deduction is 10% for each late day.
- Withdrawals: Oct. 14 is the last day to withdraw and possibly receive a W.
- Make-ups: Must need the instructor's special permission.

Grading Policy:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-term Exam 20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Exam 20%</td>
<td>B+ [87, 90]</td>
<td>B [83, 87]</td>
<td>B- [80, 83]</td>
</tr>
<tr>
<td>Assignments 15%</td>
<td>C+ [77, 80]</td>
<td>C [73, 77]</td>
<td>C- [70, 73]</td>
</tr>
<tr>
<td>Projects 40%</td>
<td>D+ [67, 70]</td>
<td>D [63, 67]</td>
<td>D- [60, 63]</td>
</tr>
<tr>
<td>Attendance 5%</td>
<td>F [0, 60]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tentative Course Outline and Schedule:

| Topic 1: Computational Intelligence | Ch. 1, handouts | Aug. 25, 27 |
| Topic 2: Fuzzy Logic               | Ch. 2, 3 and 4, handouts | Sept. 3, 8, 10, 15 |
| Topic 3: Neural Networks           | Ch. 8, 9, and 11, handouts | Sept. 17, 22, 24 |
| Topic 4: Neuro-Fuzzy Systems       | Ch. 12, and handouts | Sept. 29, Oct. 1, 6 |
| * Mid-term Exam                     | Oct. 8        |
| Topic 5: Genetic Algorithms        | Ch. 18, and handouts | Oct. 13, 15, 20 |
| Topic 6: Green Computing            | handouts      | Oct. 22, 27 |
| Topic 7: Computational Data Mining  | handouts      | Oct. 29, Nov. 3, 5 |
| Topic 8: Computational Web Intelligence | handouts | Nov. 10 |
| Topic 9: Biomedical Informatics     | Ch. 19 and 20, handouts | Nov. 12 |
| # Project Presentations             | Individual Project | Nov. 17, 19, Dec. 1, 3 |
| * Final Exam                        | Dec. 8        |
| Research Paper (5-10 pages), ppt file and software | Dec. 11 |
Course Learning Objectives:
1. Topic 1: Computational Intelligence (CI)
   - Know what CI is
   - Know history of CI
   - Know what basic techniques of CI
   - Know applications of CI
2. Topic 2: Fuzzy Logic
   - Know fuzzy sets
   - Know fuzzy reasoning using fuzzy IF-THEN rules
   - Know different fuzzy models
   - Know how to design a fuzzy logic system using a program language (C++, Java, etc.)
3. Topic 3: Neural Networks
   - Know internal structure of an artificial neural network
   - Know the perceptron and its limitation
   - Know the backpropagation learning algorithm and its limitation
   - Know basic knowledge of unsupervised neural networks
   - Know how to make a neural network system using a program language (C++, Java, etc.)
4. Topic 4: Neuro-Fuzzy Systems
   - Know an architecture of a neuro-fuzzy system
   - Know ANFIS
   - Know Soft Neural Network developed by the instructor
   - Know how to make a neuro-fuzzy system using a program language (C++, Java, etc.)
5. Topic 5: Genetic Algorithms (GA)
   - Know how GA work
   - Know how to make a GA system using a program language (C++, Java, etc.)
6. Topic 6: Green Computing
   - Know how to use CI techniques in green computing
7. Topic 7: Computational Data Mining
   - Know basic concepts of data mining
   - Know how to use soft computing techniques in data mining
8. Topic 8: Computational Web Intelligence (CWI)
   - Know CWI
   - Know basic CWI applications
   - Know how wired or wireless intelligent agents work
9. Topic 9: Biomedical Informatics
   - Know how to use CI techniques in Biomedical Informatics

Course Objectives of Programming Project and Conference Paper:
- All students can learn how to use advanced computational intelligence techniques and a programming language to design a small intelligent system for a specific application.
- All students can learn how to write a high-quality conference paper with theoretical investigation and practical simulations.
- The paper with at least 5 pages uses the 2-column IEEE Paper format (in class Website).
- All students can learn how to give a clear technical presentation for a research paper.

Statement: This course syllabus provides a general plan for the course; deviations may be necessary.