Experimental Course – seconed time offered!

Advanced Computational Intelligence (CpE 6001, EE 6001, SysEng 6001)
Fall 2019       Class Hours: W 7-9:30 PM CST      Room:  209 Comp Sci or DIS

Instructor:  Prof. Donald C. Wunsch II
Office:      131 EECH                Feel free to drop in if the door is open.
E-mail:      dwunsch@mst.edu Please use this, not S&T Connect or email through Canvas
Phone:       (573) 341-4521         Feel free to call this number.

Subject line: Advanced Computational Intelligence class

Course Description: Advanced topics in Computational Intelligence, Neural Networks, Evolutionary Computing, Swarm Intelligence, Artificial Immune Systems, Fuzzy Systems, Hybrid Systems, and related intelligent control, optimization and data analytics approaches. The course is seminar and project based. Students will obtain experience with learning from research literature, presenting research papers, some collaborative literature analysis, and conducting their own research project. Prerequisite: Computational Intelligence or a related course, work experience, or permission of instructor.

Readings are essential. Several articles, and a list of citations to others, are on the Canvas site and will be updated from time to time. Your first homework is to find and carefully read the article that looks most interesting to you before the next class.

Everyone is to make a detailed topic presentation and a brief project presentation. The dates and assigned topics are in the table below. (This is listed as an example from the previous time. It will be updated when I know who is in the course this time.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Topic</th>
<th>Date</th>
<th>ProjectPre</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlDabooni Seaar</td>
<td>Adversarial Learning, GANs</td>
<td>20-Sep</td>
<td>29-Nov</td>
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<tr>
<td>Arefin Samsil</td>
<td>CI Applications &amp; EM Algorithm in Scheduling, Esp MC scheduling</td>
<td>27-Sep</td>
<td>29-Nov</td>
</tr>
<tr>
<td>Brito da Si Leonardo Enzo</td>
<td>Information Theoretic Learning &amp; explanation in NN, esp time series &amp; clustering</td>
<td>6-Sep</td>
<td>6-Dec</td>
</tr>
<tr>
<td>Elnabaraw Islam</td>
<td>TensorFlow, Forge, GPUs, GitHub, Python</td>
<td>30-Aug</td>
<td>6-Dec</td>
</tr>
<tr>
<td>Lesinski Eugene (Geno)</td>
<td>Multiobjective Optimization w Evolutionary NN &amp; w feedback</td>
<td>25-Oct</td>
<td>15-Nov</td>
</tr>
<tr>
<td>Melton Nik</td>
<td>Advanced ADP techniques in CI</td>
<td>1-Nov</td>
<td>15-Nov</td>
</tr>
<tr>
<td>Saravade Vishal</td>
<td>Optimization with CI</td>
<td>8-Nov</td>
<td>15-Nov</td>
</tr>
<tr>
<td>Sampson Adam</td>
<td>Bayesian Nets, incl Dirichlet processes &amp; Graph Theory</td>
<td>18-Oct</td>
<td>15-Nov</td>
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<tr>
<td>Smith Joseph (Ben)</td>
<td>CI Applications in Games</td>
<td>11-Oct</td>
<td>29-Nov</td>
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<tr>
<td>Tanksley Dustin</td>
<td>Game Theory in CI</td>
<td>4-Oct</td>
<td>29-Nov</td>
</tr>
<tr>
<td>Yelugam Raghu</td>
<td>Convolutional NNs in Deep Learning</td>
<td>13-Sep</td>
<td>6-Dec</td>
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</table>

Groups: Your groups are people with the same Project Presentation date (rightmost column).

Grading: Your grade will be based on the following:

- Bibliography 10%
- Presentation(s) 25%
- Design Project (12/11/19 Report 40% + Presentation 25%) 65%

For each article or chapter you read, you need to write an annotation of at least a sentence and no more than a paragraph. You will prepare a document with all of these. The combined quantity
and quality of these will form your bibliography grade. At a minimum, you should read four articles carefully between each class period, although you will benefit from reading much more than that. Typically, a researcher will skim 4-16 articles for each article that deserves a careful reading. So, by the end of the semester you will have carefully read well over a dozen papers, and briefly read many more. I will cover what to look for in an article during the first week. On September 6, 11:59 PM, a Group Bibliography is due. You will team up with your group to make contributions to a joint bibliography. This will allow me to give you some early feedback about what I am looking for.

You should use your groups for rehearsing your project and topic presentations, discuss the articles you are finding, etc. You are not restricted to doing this with your groups but that is an easy default. It is important to learn from one another and this is a great mechanism for doing so.

You will have presentations on your own research interests and on some of the papers you are reading. The grade will depend just as much on delivery as on content. The design project will be a use of computational intelligence in your own research.

The classes will consist of my lectures, guest lectures, some videos I will select from online, and mostly your topic presentations, plus discussions.

**Policies:** Collaboration is permitted and encouraged. You will have great latitude over research papers and seminars, so go ahead and begin exploring. This is a graduate seminar course, so you need to read and study based on presentations in class as well as the literature outside of class, and incorporate that into your own research.

**Welcome to the class!**

PS: Here are some examples of useful links:
Neuroscience Bilkent Univ: http://hboyaci.bilkent.edu.tr/index.html
We can hold visual attention: https://www.youtube.com/watch?v=8cQVspzP0Ms
Steve Grossberg BU page: http://cns.bu.edu/Profiles/Grossberg/
Profile: https://www.bu.edu/research/articles/steve-grossberg-psychologist-brain-research/
Gail Carpenter BU page: http://techlab.bu.edu/members/gail/
GitHub pages (and you'll quickly find more):
https://github.com/ACIL-Group
https://github.com/tensorflow/cleverhans