Computer Science 3201
Introduction to Nature Inspired Computing
Fall 2020

Department of Computer Science

Instructor: Mark Hatcher

Office Hours: Mondays 2-3pm for online chat where needed

e-mail: mhatcher@mun.ca
  • include COMP3201 in the subject line
  • correspondence must be via a valid @mun.ca email account
  • note that I DO NOT check email in Brightspace (D2L)
  • don't expect replies outside working hours (Monday to Friday 9am to 4:30pm)

Course Prerequisite: COMP 2002. Also note that this course requires programming in Java.

Course Content:
We will look at some popular nature-inspired computing methods. These methods have been applied to solve problems in various areas of the real world. Particular examples of nature-inspired computing methods studied include cellular automata, artificial life, neural networks, evolutionary computation and swarm intelligence.

Evaluation Scheme:
Assessment will be made through 4 assignments, each worth 20%, and a midterm exam also worth 20%.

There is no final exam for this course.

Where an assignment requires programming, it will be done in Java.

<table>
<thead>
<tr>
<th>Type</th>
<th>%</th>
<th>Approximate Due Dates (these may change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Assignments</td>
<td>20 each</td>
<td>September 25th, October 16th, November 6th, November 20th</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20</td>
<td>October 21st</td>
</tr>
</tbody>
</table>

Course Text:
The required course text is: *Introduction to Evolutionary Computing*, 2nd Edition (Eiben & Smith).

Other materials, including links to other sources, will be provided throughout the course.
Classes will be delivered asynchronously, so no live classes. Class slides and other course materials will be made available in Brightspace on a weekly basis.

### Course Schedule (tentative):

<table>
<thead>
<tr>
<th>Week Beginning</th>
<th>Topics</th>
<th>Readings</th>
</tr>
</thead>
</table>
| September 7th  | Introduction
Cellular Automata Part 1  | Class Slides #0, #1
The Nature of Code                                                             |
| September 14th | Cellular Automata Part 2                                               | Class Slides #2
Game of Life                                                        |
| September 21st | Problems to Be Solved
Evolutionary Computing Origins   | Class Slides #3, #4
Eiben & Smith Chapters 1, 2                                      |
| September 28th | Evolutionary Algorithms                                               | Class Slides #5
Eiben & Smith Chapter 3                      |
| October 5th    | Rep., Mutation, Recombination: Parts 1 & 2                           | Class Slides #6, #7
Eiben & Smith Chapter 4                               |
| October 12th   | Midterm Break 12th &13th Rep., Mutation, Recombination: Part 3        | Class Slides #8
Eiben & Smith Chapter 4                               |
| October 19th   | Fitness Selection and Pop. Management
Class Exam October 21st      | Class Slides #9
Eiben & Smith Chapter 5                               |
| October 26th   | EA Variants                                                           | Class Slides #10
Eiben & Smith Chapter 6                               |
| November 2nd   | Parameters and Parameter Tuning                                      | Class Slides #11
Eiben & Smith Chapter 7                               |
| November 9th   | Swarm Intelligence
Ant Colony Optimization
Particle Swarm Optimization | Class Slides #12, #13, #14
Swarm Intelligence                                           |
| November 16th  | Artificial Neural Networks                                           | Class Slides #15, #16, #17
Neural Networks and Deep Learning: Chapter 1                   |
| November 23rd  | Complex Systems
Artificial Life                                                  | Class Slides #17, #18
Intro to Complex Systems                                        |
| November 30th  | Alife Online Examples
Review                                                | Class Slides #19
Several online sources                                      |

### Assessment Schedule (tentative):

<table>
<thead>
<tr>
<th>Item</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>Sept 25th</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>Oct 16th</td>
</tr>
<tr>
<td>Class Exam</td>
<td>Oct 21st</td>
</tr>
<tr>
<td>Assignment 3</td>
<td>Nov 6th</td>
</tr>
<tr>
<td>Assignment 4</td>
<td>Nov 20th</td>
</tr>
</tbody>
</table>
Important Notes:

1. Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities (www.mun.ca/policy/site/policy.php?id=239). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre at the earliest opportunity (www.mun.ca/blundon).

2. In the event of university closure on the day of an exam, the exam will be given in the next scheduled class.

3. Assignments will require programming in Java.

4. Assignments are due at 11:59 p.m. on the specified date, in the specified manner. No late assignments will be accepted. It is your responsibility to make sure that the correct files are actually uploaded or present, so check for the confirmation that your files have been uploaded. Be aware that the files you submit for evaluation should be uploaded on or before the due date and much before the cut off time. Even if you are late by a few seconds you will not be allowed to submit your work; hence you should try to upload the files at least 15 minutes before the cut off time since your system clock is not synchronized with the CITL’s system clock and the cut off time is based on CITL’s system clock. Please note that if your files have been correctly uploaded, you will get a confirmation receipt from the Dropbox tool. If you do not receive this receipt, please contact the CITL Support team (https://www.citl.mun.ca/support/).

5. Note that, while the due times are at 11:59pm Newfoundland Time, help is not be available after 4:30pm on the due date, or on weekends. The last few hours from 4:30pm to 11:59pm should be used to finalize your work and submit it. Any questions you may have about the lab exercises, quiz or assignment should be asked well in advance of the due date/time to allow time for help to be given.

6. If, for special circumstances (such as medical or bereavement) you are going to miss an assignment or exam, then you must notify your instructor as soon as possible. Unless there is good justification this should happen before the assignment deadline, or before the start of the exam, and you must subsequently provide any related documentation (if required). Failure to do this can result in a mark of 0% for that work. For more information, please see the University Calendar - University Regulations - General Academic Regulations (Undergraduate) 6.7.5 (Exemptions from Parts of the Evaluation) and 6.15 (Appeal of Decisions) or consult the Registrar's Office. If your reasons for the missed work are acceptable, then your instructor will provide details of any alternate evaluation scheme.

7. This course does not have an option for writing deferred class exams. If, for any reason, you are going to miss the class exam, you should contact your instructor right away, before the exam begins, giving the reasons for missing the exam, and requesting that the weight of the missed exam be added to the weight of the final exam. If you first contact the instructor after the missed exam, you will have to provide documentation that proves why it was not possible to make contact beforehand. Any change will be subject to approval.

8. No supplementary exam will be given for this course. (See Supplementary Exams - University Calendar - Faculty of Science Degree Regulations 7.3 - Regulations to Govern Supplementary Exams in the Departments of Biochemistry, Computer Science, and Mathematics and Statistics.)

9. Assignments and the class exam must be original and independent work. Copying someone else's work or allowing your work to be copied is a serious breach of university regulations and ethics. Any and all copied material will receive the mark of 0%. If your assignments are quite similar then it can be construed as copying. (Even if you have done your own work but have consulted a friend as you are doing the assignment then the assignment will turn out to be quite similar.) Please see the University Calendar - General Academic Regulations (Undergraduate) - 6.12 (Academic Misconduct).