

Computer Science 3201

Introduction to Nature Inspired Computing

Fall 2024



Department of Computer Science

Instructor: Mark Hatcher

Office Hours: Tuesdays 12pm & Fridays 1pm, EN2032

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- include COMP3201 in the subject line
- note that I do **not** check email in Brightspace
- don't expect replies outside working hours (Monday to Friday 9am to 4:30pm)

Lectures: Monday, Wednesday, Friday 2-2:50pm, EN1054

Course Prerequisites: COMP 2001, COMP 2002 and STAT 2550 or STAT 3500. 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 six assignments, covering mixture of coding and theory, plus an in-class exam.

There is no final exam for this course.

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

Type	%	Approximate Due Dates (these may change)
6 Assignments	60 total (10% each)	September 23rd, October 16th, October 25th November 4th, November 13th, November 25th
Class Exam	40	week beginning October 28th

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 and exams will be delivered on-campus. Class slides and other course materials will be made available in Brightspace on a weekly basis. In the event that on-campus activities are suspended, classes and assessments will be delivered online, as seamless as possible.

Course Schedule (tentative):

Week Beginning	Topics	Readings
September 2nd	Introduction Cellular Automata Part 1	Class Slides #0, #1 The Nature of Code
September 9th	Cellular Automata Part 2	Class Slides #2 Game of Life
September 16th	Problems to Be Solved Evolutionary Computing Origins	Class Slides #3, #4 Eiben & Smith Chapters 1, 2
September 23rd	Evolutionary Algorithms	Class Slides #5 Eiben & Smith Chapter 3
September 30th	Rep., Mutation, Recombination: Part 1 & 2	Class Slides #6, #7 Eiben & Smith Chapter 4
October 7th	Rep., Mutation, Recombination: Part 3 Fitness Selection and Pop. Management	Class Slides #8 Eiben & Smith Chapters 4,5
October 14th	Midterm Break 14th & 15th Fitness Selection and Pop. Management	Class Slides #9 Eiben & Smith Chapter 5
October 21st	EA Variants	Class Slides #10 Eiben & Smith Chapter 6
October 28th	Class Exam October 28th Parameters and Parameter Tuning	Class Slides #11 Eiben & Smith Chapter 7
November 4th	Swarm Intelligence Ant Colony Optimization	Class Slides #12, #13 Swarm Intelligence
November 11th	Particle Swarm Optimization	Class Slides #14
November 18th	Artificial Neural Networks	Class Slides #15, #16, #17 Neural Networks and Deep Learning: Chapter 1
November 25th	Complex Systems Artificial Life	Class Slides #17, #18, #19 Intro to Complex Systems + <i>Several online sources</i>
December 2nd	Review	

Assessment Schedule (tentative):

Item	Topic	Due Date
Assignment 1	Cellular Automata	Sept 23rd
Assignment 2	Evolutionary Computation Coding Part 1	October 16th
Assignment 3	Evolutionary Computation Theory Part 1	October 25th
Class Exam		w/b October 28th
Assignment 4	Evolutionary Computation Coding Part 2	November 4th
Assignment 5	Evolutionary Computation Theory Part 2	November 13th
Assignment 6	Swarm Intelligence/Ant Colony Optimization	November 25th

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 the class exam it 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 cutoff 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 will 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 exercise, 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 in any event no later than 48 hours after the deadline/exam start. 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 the 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. Assignments and the class exam must be original and independent work. **The use of AI and other assistive technology such as Grammarly is forbidden.** Copying someone else's work, including use of an AI and online materials, 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**).

If you commit academic misconduct on two or more occasions in this course you will automatically receive a fail grade.