CIS 263 Data Structures and Algorithms

Course Introduction

Course Introduction: CIS 263

Communication Channels:

- ***Blackboard** messages (primary choice)*
- *Email*
- *In person/Online*

  By appointment (Booking Calendar):
  Mackinac Hall (MAK) D-2-216 (Allendale)

Course Faculty

Kamrul Hasan

INSTRUCTOR

Pronouns: he/him/his
Email: hasanka@gvsu.edu;
hasanka@mail.gvsu.edu

Week 1: CIS 263 Introduction

Blackboard Introduction
&
Walkthrough!

Week 1 Plan

- **Get to know each other (networking)**
- Set up our course objective, guidelines, and evaluation procedure.
- Review of Introductory Data Structures
- Set up our programming development environment(s), more specifically,
  - Google Colab(oratory) on your Google drive,
- Introduction to Analysis of Algorithms

About myself

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- **Probabilistic ML**
    - **Semi-supervised Learning**
    - **Generative AI** (example: LLMs ,ChatGPT)

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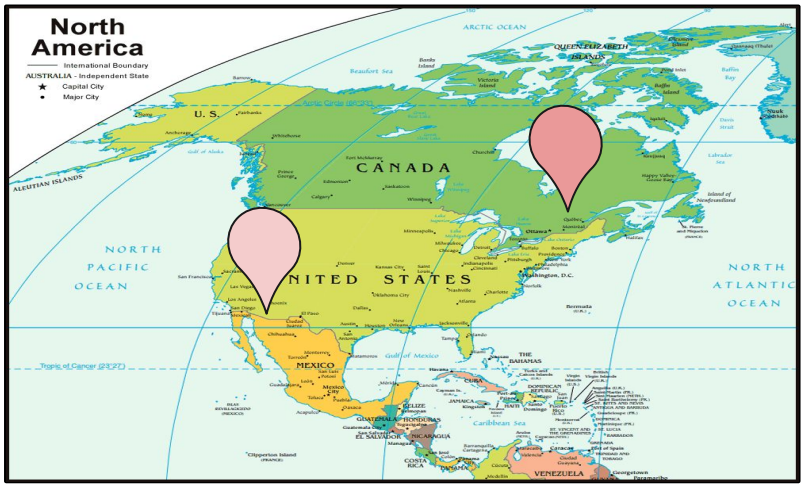
- **Last ~9 years as a Data Scientist; delivered several AI products in multiple domains**

jda. BlueYonder IVADO LABS



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- Travelling
- **Gardening**

About you!

- I hope I would get to know each of you as we progress
- We will meet in person and/or virtually as per our availability
- We will collaborate as a group
    - For discussion different topics: course specific and beyond
- I will seek your suggestions
- Do you want to share your expectations out of this class?

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- Introduction to Analysis of Algorithms

General information (about the course)

Description: Broad introduction to

- to Algorithms and data structures, including heaps, hash tables, trees, graphs, greedy algorithms, divide and conquer, and dynamic programming will be covered.
- Analysis of algorithms as well as the complexity class of problems (P, NP, NPC) will be studied.
- Other topics include approximation, randomized algorithms and data structure implementation.

Prerequisite: *C or better in either CIS 163 or CIS 164) and (MTH 225 or STA 220)*

Objective: Completing this course, you should be able to:

- Understand the role of data structures and algorithms in designing efficient solutions.
- Select and implement appropriate data structures (heaps, hash tables, trees, graphs) for various problems.
- Analyze and develop algorithms, including greedy, divide-and-conquer, dynamic programming, randomized, and approximation approaches.
- Evaluate algorithm complexity and classify problems into P, NP, and NPC classes.
- Apply theoretical concepts to practical computing problems.

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General information (about the course)

Textbook(s): We will use the first book bellow as our main source of reference, the others will be used mainly for coding and special topics purposes. Most of these are available online and can be accessed through the library system.

Main source: Introduction to Algorithms, by **Thomas Cormen** et al. – MIT Press, Fourth Edition, 2022.

Requirements: **Blackboard**, **Computer** access, ability to run **Python** (and install any requisite Python packages). If you have trouble, talk to the instructor, and we will work out a solution together.

Additional resources (mainly for coding):

- Problem solving with algorithms and data structures using **Python**, by Bradley N. Miller, and David L. Ranum. Franklin, Beedle & Associates Inc.
- Data Structures and Algorithms in **Python** by Michael T, Goodrich, Tamassia Roberto, and Goldwasser Michael H.
- Grokking Algorithms: An **illustrated guide** for programmers and other curious people by Bhargava, Aditya; Simon and Schuster.

Delivery Plan

General information:

- See **Blackboard** for detailed schedule
- Planning and **delivery per week**
- **Course materials** and **assignments** will be available on Blackboard **mostly** at the beginning of each week; sometimes as we progress.

Update your Blackboard settings so you receive your emails, messages, and notifications in time.

Delivery Plan

Networking and Course Introduction (2W)

Week of	Topic	Activity
January 12	Course Introduction Mathematical & Data Structure Review.	Class and course introduction, Background assessment & development environment setup
January 19	Mathematical & Data Structure Review (cont.) Array, Lists, Stacks and Queues	MLK Jr. Day Recess (Jan 19, 2026) Assignment 1
January 26	Trees: Generic Trees, Binary Trees and Binary Search Trees	Assignment 1 (due)
February 02	Trees (cont.): AVL trees, Tree Traversals and B+ trees	Quiz (1)
February 09	Sets, Maps, Priority Queues	Assignment 2
February 16	Hash Tables, Heaps	Assignment 2 (due)
February 23	Review & Midterm	Midterm: TBA
March 02	The Disjoint Set Class	Assignment 3 Spring Break (March 08 - March 15)
March 09	Algorithm Design Techniques: Backtracking Algorithms	Spring Break (March 08 - March 15)
March 16	Algorithm Design Techniques: (cont.)	Assignment 3 (due)
March 23	Graph Algorithms:	Quiz (2)
March 30	Graph Algorithms (cont), Dynamic Programming	Assignment 4
April 06	Dynamic Programming (cont.) Introduction to NP-Completeness	Assignment 4 (due)
April 13	How to solve a particular subset of NP-hard problems	
April 20	Course Review Week	Class ends: April 25
April 27	Exam Week	Final Exam: TBA

Semester ends: May 02, 2026

Delivery Plan

Trees
(2W)

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Delivery Plan

Sets, maps, PQ, Hash, Heaps (2W)

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Delivery Plan

Algorithm Design Techniques
(3W)

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Delivery Plan

Graphs
(2W)

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Delivery Plan

DP
(2W)

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Theory of Computation (2W)

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Wrap Up w

Evaluation

Grading distribution:

- Weekly reflections: 5%
    - *Attendance & participation: 2%*
    - *Class engagement: 3%*
- Homework assignments: 40%
- Quizzes: 15%
- Midterm: 15%
- Final exam: 25%

Grade points:

A	93%	**C**	73%
A-	90%	**C-**	70%
B+	87%	**D+**	67%
B	83%	**D**	60%
B-	80%	**F**	Below 60%
C+	77%		

Note: Your final grade percentage will be rounded to the next integer percentage value. For example, an **89.1%** will round up to a **90%.**

Policy & expectation

Expectation: I expect the following to ensure your success in this course:

- check Blackboard on a regular basis for announcements, course material, and assignments
- stay up to date with required course materials.
- let me know how the class and my teaching can be improved
- adhere to the **GVSU policy of Academic Honesty** http://www.gvsu.edu/coursepolicies/

Course policy:

- Weekly reflections and homework assignments are to be completed **individually**.
- Due dates: All assignments will be due at 11:59pm Michigan time on the due date (unless otherwise stated).
- Late policy: You will lose 10% off of your maximum grade per day late, to a cap of 3 days (30% off), after which the assignment will not be accepted.

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Academic Honesty:

- All students are expected to adhere to the academic honesty standards set forth by GVSU.
- In addition, students are expected to adhere to the academic guidelines as set forth by the CoC: https://www.gvsu.edu/computing/academic-honesty-30.htm
- You can learn a lot from your peers, therefore, I encourage collaboration, but passing their work off as your own is prohibited.

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With respect to all individual assignments in this course:

- Document collaboration; **no electronic transfer of code** between students is permitted.
- You are encouraged to engage in conversations in **online forum**s, but do not post solutions or solicit others to complete your work for you.
- You are encouraged to talk about problems with each other in **non-technical terms** (i.e., not code).
- Ultimately, **you are responsible** for all aspects of your submissions. You should be able to explain and defend if the work is entirely your own.

Policy & expectation

Use of Generative AI Tools for Learning

- Students are permitted to use generative AI tools (e.g., ChatGPT) to support their learning, such as clarifying concepts, generating test cases, or assisting with code debugging.
- However, AI must not be used to complete or generate any part of the final work submitted for credit.
- All AI use must be clearly documented, and students are responsible for verifying the accuracy of AI-generated content.
- Improper or undocumented use of AI may constitute an academic integrity violation.

For detailed usage guidelines, responsibilities, and documentation requirements, please refer to the full document: **“Guidelines for Using Generative AI Tools in Learning”**, shared through **Blackboard**.

Useful resources

Blackboard: Course materials, assignments, grades, and announcements will be posted to Blackboard (https://lms.gvsu.edu/). It is your responsibility to stay informed.

Other academic resources: GVSU also provides opportunities for students to improve your **academic skills** through resources, such as:

- The writing center
- Computing Success Center
- Speech lab
- Research consultants
- Library Resources

Disability support : If you are in need of accommodations due to disability you must present a memo to me from Disability Support Resources (DSR), indicating the existence of a disability and the suggested reasonable accommodations. If you have not already done so, please contact the Disability Support Resources office (215 CON) by calling 331-2490 or email to dsrgvsu@gvsu.edu. Please note that I cannot provide accommodations based upon disability until I have received a copy of the DSR issued memo. All discussions will remain confidential. For more information, see https://www.gvsu.edu/dsr/

Computing Success Center: he Computing Success Center, located in MAK A-1-101, is a great place to get help or simply hang out. The Computing Success Center offers free drop-in tutoring for a variety of College of Computing courses throughout the week during the academic year.

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