

COS 212

Data Structures and Algorithms



Rules, regulations, and some
good advice

Lecturers

- Coordinator:
 - Dr Anna Bosman
- 2nd Lecturer:
 - Mr Willem van Heerden



Module Content

Data Structures

- What is a data structure?
- Linked lists, trees, graphs, hash tables

Algorithms

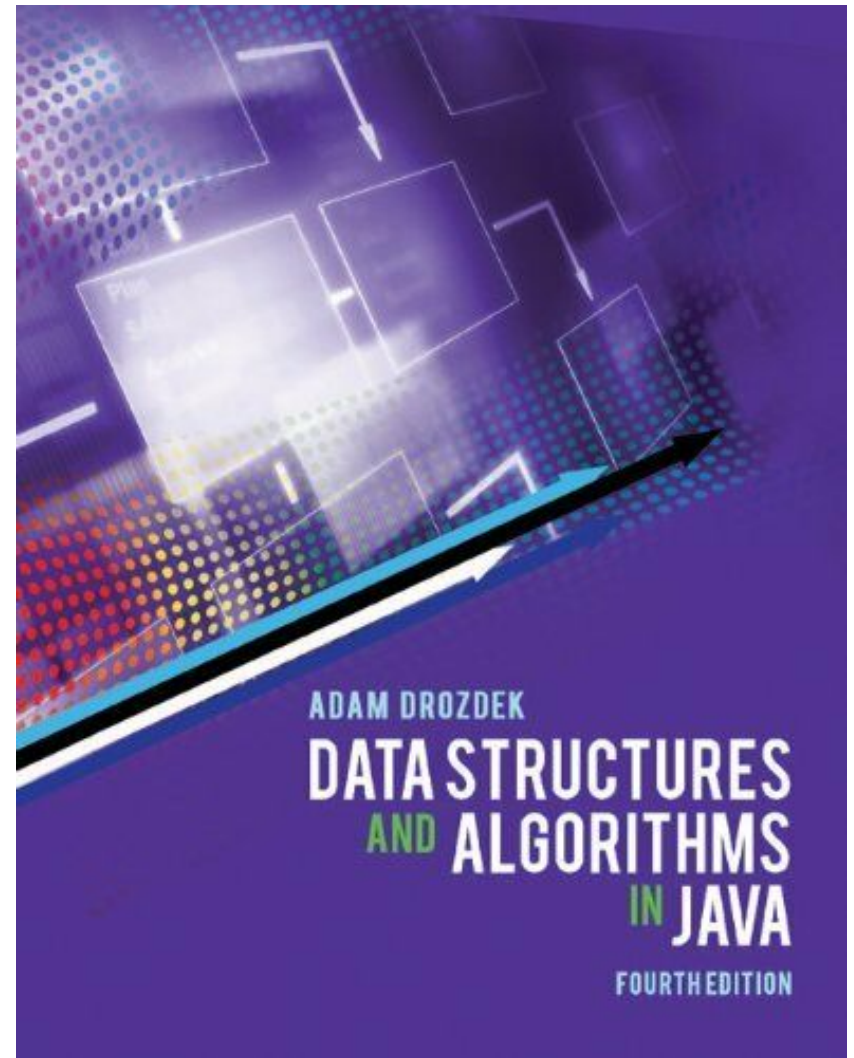
- What is an algorithm?
- Algorithms specific to data structures
 - **Example:** Given a structure representing a geographic map, how do you find the quickest route from point A to point B?
- Searching, sorting, traversing algorithms

Efficiency

- How efficient are the algorithms?
- How efficient are the data structures?
- What do we mean by efficiency, and how do we **measure** it?

Prescribed Textbook

- Title:
 - **Data Structures and Algorithms in Java**
- Author: Adam Drozdek
- Edition: Fourth Edition
- Publisher: CENGAGE
- ISBN: 978-981-4392- 78-5
- **Should you buy it?**
 - **Yes:** all written tests will be open-book. We will follow the textbook material closely, and you will be expected to have read the chapters covered in class.



“80% of success is showing up.”

—Woody Allen

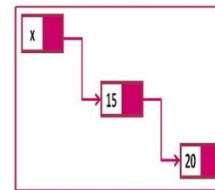
Course Activities

- Theory lectures (3 per week): **pre-recorded**
- Practicals (1 per week): **help available on Discord**
 - <https://discord.gg/qNVUmVtgUu>
- Tutorials (1 per week): **live on ClickUP**
- Assignments (~ 1 every two-three weeks, 4 in total)
- Examination opportunities (3 in total): **via ClickUP**

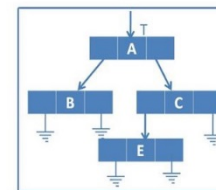
All activities except theory lectures will contribute towards your final mark



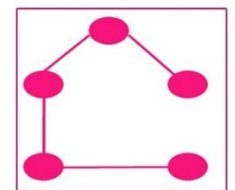
Sorting



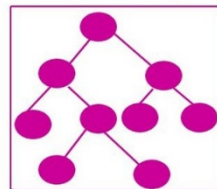
Link list



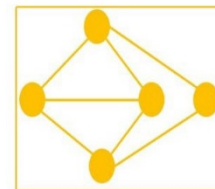
list



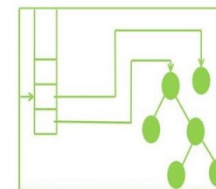
spanning tree



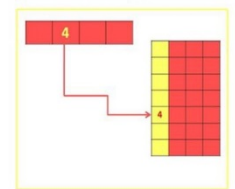
Tree



Graph



Stack



Hashing

Course Assessment

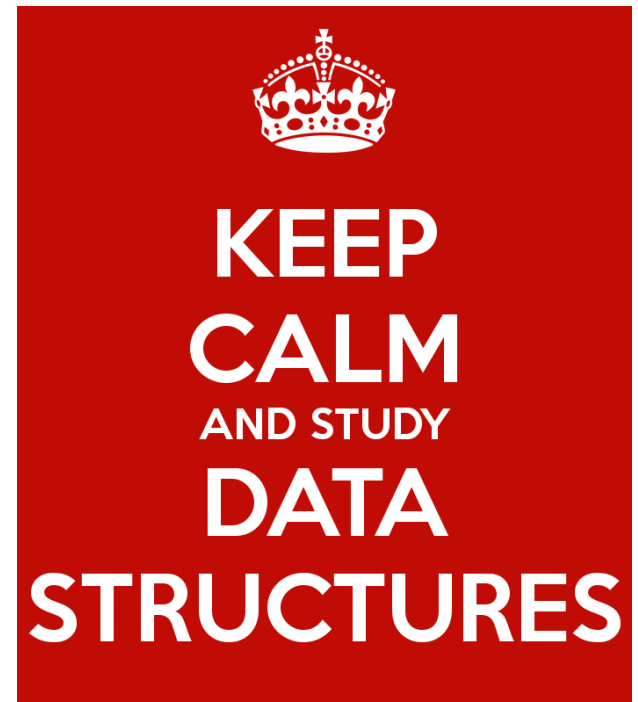


- Continuous assessment model
- There will be no formal semester mark and separate exam mark
- All evaluation events will count directly towards your final mark
- In order to pass **COS 212**, you need to obtain a final mark of at least 50% **and** obtain at least 40% for the EOs

Event Type	Contribution to final mark (%)	Comments
Practicals	10	Only 80% of your best practicals will count
Tutorials	10	Only 80% of your best tutorials will count
Homework Assignments	20	All homework assignments will count
Exam Opportunities	60	All exam opportunities will count

What are the chances that you will pass COS 212?

- Last year's pass rate for this course:
71%
- **Why did 29% of the class fail?**
 - Because subject matter is challenging enough to require some dedication.
 - You won't pass unless you put in some **effort**
- If you want to **pass**:
 - **Do not fall behind**
 - When something is not clear, ask questions, seek our help
 - **Seize every evaluation opportunity**
 - Pracs, tuts, assignments! Every percent counts
 - **Practice, practice, practice**
 - It's not enough to understand an algorithm when a lecturer shows it to you in class. Work through all examples by yourself!



Practicals

- Gives you a chance to apply the concepts learned in class. All coding for this course will be done **in Java**.
- Should be completed individually
- Each practical will run over the entire week (to be communicated via the CS website)
- No pracs this week!
- The teaching assistants will be available during the prac sessions via the Discord server
- Practical queries will be handled **only** during the prac sessions
- Only 80% best pracs will count towards your final mark
- No sick letters will be accepted.

Tutorials

- Compulsory **tutorial class** on a weekly basis
 - Tuesdays, 7:30 in the morning, BB Collaborate (ClickUP)
 - **No tuts this week**
- Tutorials, just like practicals, will cover work done in the previous week
- Tutorials will have two parts:
 - Discussion of a homework exercise
 - ClickUP test
- Tutorial tests should be completed individually, however the assistants will be available on Discord to guide you
- **Use tutorials to ask questions and get answers!**
- Only 80% best tuts will count towards your final mark.
- No sick letters will be accepted.

Assignments

- Larger programming exercises that must be completed **individually**
- There will be a total of **four** (4) homework assignments throughout the semester, each contributing a total of **5%** to your final mark
- You will have ~ 2 to 3 weeks to complete an assignment
- The deadlines for these assignments will not be extended and no excuses will be accepted for late submissions
- Homework assignments incorporate a component of **self study** to serve as enrichment and to test your ability to apply and generalize the knowledge you've obtained in the course

Plagiarism

- This department considers plagiarism to be a **serious** offence
- Disciplinary action **will** be taken against students who commit plagiarism
- Homework assignments and practicals will be checked for plagiarism with automated, intelligent software
- **DO NOT** share your code with others
- Helping friends a little too much can make both of you **guilty**



Exam Opportunities

- Total of **three** exam opportunities, each contributing 20% to your final mark
- Each of the exam opportunities will be a 2-hour ClickUP open book test
- Each EO will cover the work done prior to the event and exclude the work covered in the previous exam opportunities
- The detailed scope for each examination opportunity will be announced in advance via the course website
- To gain entrance to the final exam opportunity, you must have a final mark of at least 20%
- **Subminimum:** To pass COS 212, you must obtain **at least 40%** on average for the 3 EOs.
- To pass COS 212, your final mark must be **at least 50%**

Sick Test, Supplementary Exam

- If you miss either exam opportunity 1 or 2 for a valid medical reason, you will be allowed to write the **aegrotat (sick) exam opportunity**
 - Only **one** sick test for both EO 1 and 2
 - Will cover the material of **both** EO 1 and 2
- If your final mark after EO3 is between 40% and 49%, you will be allowed to write the supplementary exam
 - Supplementary exam will cover the material of the entire semester
 - It will replace all of your EO marks (60%)
 - **Pracs, tuts, and assignments will still count!**
 - **You must obtain at least 40% for the supplementary exam, and at least 50% final mark, to pass COS 212**
- If you are admitted to the supplementary exam, the highest final mark you could obtain for COS110 will be 50%

General Advice

- Watch theory lectures

- Statistical evidence suggests that attending the theory lectures significantly improves your **likelihood of passing** the course

- Practice makes perfect

- Do practicals and assignments individually
- *Debug* your code: start with simple cases, expand gradually
- Use *pen & paper* to figure out complex algorithms
- Strive for *understanding*, not just a pass
- The more you code, the better you get!

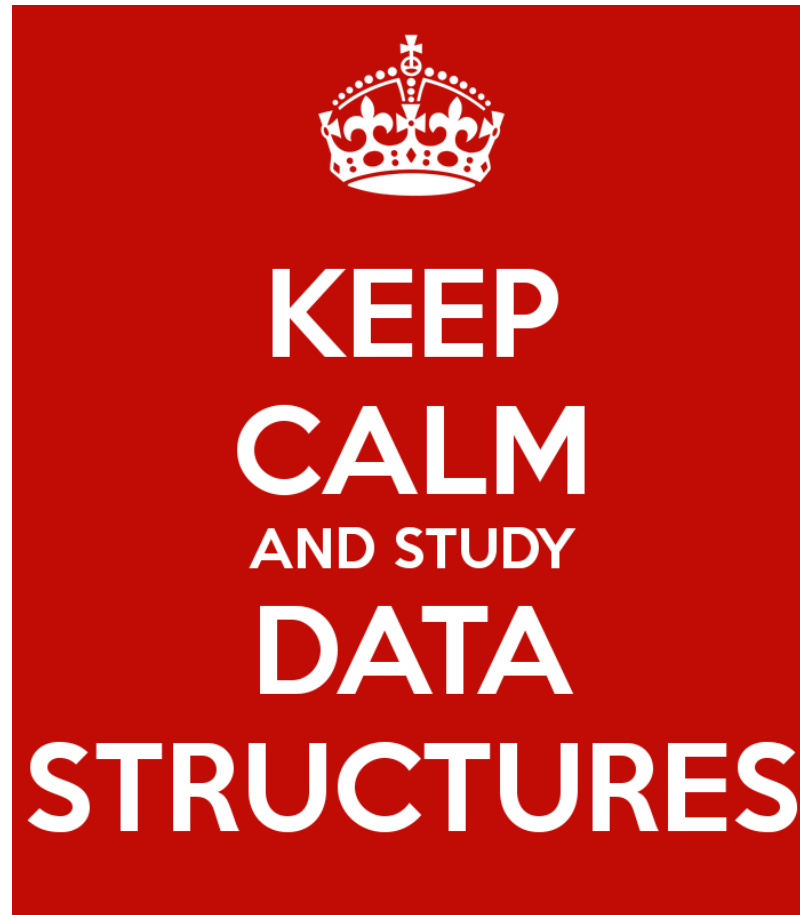
- Do not plagiarise, do not enable plagiarism

- You **do not learn** by submitting another student's work
- You prevent your friends from learning by giving them your solution

- Help is **always** available! Do not wait until it is too late.

- **No, we cannot (and will not) upgrade 49% to a pass. If you fail, you fail. Come again next year.**

Good luck!



P.S. You can do it!