

COMP2521 24T2

Course Review and Exam

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course review
final exam

Slides adapted from those by Kevin Luxa 2521 24T1

Course Review

COMP1511

- gets you thinking like a *programmer*
- solve problems by developing programs
- express your ideas in the C language

COMP2521

- gets you thinking like a *computer scientist*
- know a set of fundamental techniques/structures
- able to reason about their applicability/effectiveness

- data structures: trees, graphs, hash tables, heaps, tries
- data structure/algorithm analysis: time/space complexity
- sorting and searching techniques
- graph algorithms

By the end of this course, you should be able to:

- Implement solutions to a wider range of problems
- Analyse performance characteristics of algorithms
- Analyse performance characteristics of data structures
- Make decisions about appropriate data structures and algorithms

For each specific data type, we considered:

- implementation in C (data structures, functions)
- operations (e.g., insert, search, delete, traverse)
- analysis of efficiency of operations
- applications of the data type

Recursion

Analysis of algorithms

- empirical analysis
- theoretical analysis
- time complexity and big-O

Sorting algorithms

- properties
 - time/space complexity
 - stability
 - adaptability
- elementary sorts
 - selection sort
 - bubble sort
 - insertion sort
 - shell sort
- divide and conquer sorts
 - merge sort
 - quick sort
- non-comparison-based sorts
 - radix sort

ADTs

- interface vs. implementation
- defining ADTs in C
- stacks
- queues
- sets

Trees

- tree terminology
- tree properties
- binary search trees
- balanced binary search trees
- avl trees

Graphs

- graph terminology/properties
- graph representations
- graph traversal
 - bfs/dfs
- graph problems
 - cycle checking
 - connected components
 - hamiltonian/euler paths/circuits
- dijkstra's algorithm
- minimum spanning trees
 - kruskal's algorithm
 - prim's algorithm

Hash tables

- hash functions
- collision resolution
 - separate chaining
 - linear probing
 - double hashing
- applications

Priority queues

- implementations
- binary heaps

Tries

- implementations
- applications

Assessments:

- 15% labs
- 10% quizzes
- 15% assignment 1
- 15% assignment 2
- 45% final exam

To pass **COMP2521**, you must:

- score at least 50/100 overall
- score at least 18/45 (40%) on the final exam
- score at least 25% on the theory part of the final exam
- score at least 25% on the practical part of the final exam

Final Exam

- 3-hour exam
- Tuesday 13th August
- Invigilated and held in CSE labs
- Closed book - no materials allowed
 - Provided resources are detailed
<https://cgi.cse.unsw.edu.au/~cs2521/24T2/dsa-manual>.
- Two sessions: morning and afternoon
 - You will be asked to indicate a preference via email
 - Exam organisers will allocate you to your preferred session if possible
 - You will receive an email with your allocation early Week 11
 - Students with a clash will be pre-allocated to appropriate session
 - To prevent communication between students in morning and afternoon sessions:
 - Students in morning session cannot leave early
 - Students in afternoon session will be corralled before the end of the morning session
 - Students in afternoon session are not allowed to be late

- UNSW on-campus exam rules apply
 - see <https://www.student.unsw.edu.au/exam/rules>
- Items/materials:
 - You must bring your UNSW student ID card
 - Must not be expired
 - You may bring a clear water bottle
 - You may bring a clear pencil case (or plastic sleeve) with pens/pencils
 - You may not bring your own keyboard/mouse or other hardware
 - All other items must be placed in your bag
 - Phone, smart watch, other electronic devices must be *switched off* and placed in your bag
- Deliberate violation of exam conditions will be treated as serious misconduct and may be referred to the SCIU

- Restricted environment - **not** your CSE account
- No access to Internet
 - Uh oh, no ChatGPT!
- No access to any of your files
- Available editors: gedit, VSCode, vim
 - All come with syntax highlighting
 - VSCode comes with clangd extension - provides IntelliSense
- Standard CSE lab machine commands available
 - make, clang, gdb, valgrind, man
- Calculator app available
- You get a chance to try out the exam environment during in-person Week 10 labs

- Marked out of 100
- Two sections:
 - Short-answer (theory) questions, worth 40 marks
 - Programming questions, worth 60 marks
- Each question answered in a separate file
- Submit answers using the `submit` command
 - Submit as you complete each question
 - Check what you have submitted using the `submit` command

- Theory questions
- Tests your knowledge, understanding, critical thinking
 - Proofs not required
- Most questions will require explanation/justification
 - If question does not ask for explanation, then no need
- Questions may have sub-questions
- Each question will specify a file to write your answers in
 - Starter version of file will be provided
 - Each file will clearly indicate where to write answers for each sub-question

- Tests your problem solving and programming ability
- Each question will ask you to implement one function
- Questions will include examples
- Questions will provide sample test cases
 - Passing these test cases means your solution mostly works
- Your solution must attempt to solve the problem generally
 - Solutions that just hardcode return values for provided tests will receive zero
- Each question will specify a file to implement your solution in
 - Starter version of file will be provided
 - Makefile and main program will be provided
 - If solution requires ADT(s), they will be provided

- Helper functions allowed
- Defining your own `#defines`, structs, enums allowed
- Using any functions provided by `#included` libraries allowed
- Global/static variables **strictly forbidden**
- Inefficient solutions (within reason) allowed unless specified
- Questions may specify additional constraints
 - E.g., no while loops, for loops, or goto
 - E.g., time complexity must not be worse than $O(n)$
 - Your solution must abide by these constraints or you may receive fewer marks (or zero) for the question

- Solutions will be automarked
- All solutions will be manually inspected
 - To ensure constraints have been followed
- No marks awarded for style
 - But a human marker needs to be able to deduce the behaviour of your program
- Solutions receiving less than 50% from automarking may receive partial marks for making substantial progress towards a correct solution
 - Resulting mark will not be greater than 50%
- Marks awarded for code only - pseudocode or English description is not worth marks

- Students with extra exam time approved by ELS will be given extra time
 - Handled by CSE Exams team
- Exam paper shows the standard time limit (3 hours), any extra time is additional to it
- Email us if you have any concerns regarding ELS conditions

- UNSW policy is that you may be required to take two exams in one day
- Students with clashes will be automatically allocated to a non-clashing session by the CSE Exams team

- The exam is covered by UNSW's fit-to-sit policy
- By starting the exam:
 - You are saying "I am well enough to finish the exam"
 - You cannot apply for Special Consideration for issues that existed prior to the exam
- If you are unwell before the exam:
 - Do not attend the exam
 - See a doctor and get a medical certificate ASAP
 - Apply for Special Consideration
- If you become unwell during the exam: **talk to an exam supervisor ASAP**

- If you miss the original exam due to illness/misadventure
 - Apply for special consideration - you may be eligible for a supplementary exam
- Supplementary exams will take place between **Monday 2nd September** and **Friday 6th September 2024**, and will be in person, just like final exam

- Scaling depends on mark distribution
- We manually inspect the work of students just below the pass threshold
 - If we see many students who've sufficiently shown competency with basic course material but have not passed, exam mark may be scaled up

How to revise?

- Re-read lecture slides
- Review tutorial questions, lab exercises, quizzes
 - Redo them without looking at answers/solutions
- Do extra lab exercises and practice exercises
- Try to understand/reproduce lecture code
 - Programming is a skill that improves with practice

A big thank you to:

- Our lovely teaching staff
 - Kevin and Ethan for managing quizzes, tutorials, labs
 - Kevin for assignment 2
 - Tutors and lab assistants
 - Forum staff
 - Help session staff
- All of you!
 - For engaging with the course and giving it your all!

Course evaluation via myExperience:

- How did we do?
- What did you like?
- What could be improved?
- Let us know!
 - <https://myexperience.unsw.edu.au>
- Please give your tutors feedback - myExperience is the best way to give them feedback, and it will more likely than not make their day.

Incentive for myExperience completion:

- At 50% response rate, and for every 5% after:
 - We will reveal the topic and mark value of a randomly chosen exam question
 - Topic/mark value of one question revealed at 50%, 55%, 60%, 65%, 70%, ...

Good luck!

We hope what you've learned in this course will be useful.

We hope you get the mark you're aiming for!



Good luck with the exam, and with your future studies!