

Introduction to Algorithms CELEN086

Module Handbook

Credits: 10

This handbook contains important information about the module. Read it in full at the beginning of the semester and re-read it whenever you have a question. If you do not find an answer to your question here, contact the module convenor or your tutor.



**University of
Nottingham**
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Module convenor:

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Contents

1. [Who is teaching on this module?](#)
2. [What is this module about?](#)
3. [What will I learn on this module?](#)
4. [What are the learning activities on this module?](#)
5. [How is the module assessed?](#)
6. [What are the assessment criteria?](#)
7. [What do I need to know about feedback?](#)
8. [Where can I find the module readings and materials?](#)
9. [What happens if I fail?](#)
10. [Other important information about this module](#)
11. [Important policies to know](#)

1. Who is teaching on this module?

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NOTE: Updated office hours can be found on Moodle.

2. What is this module about?

This module provides fundamental understanding of the concept of algorithms using underlying mathematical and logical reasoning. To enhance students' understanding of some of the above concepts, prerequisite mathematical topics where necessary will also be covered in this module.

3. What will I learn on this module?

- Computing basics for algorithms and pseudocodes.
- Recursion concept for designing algorithms.
- Techniques for designing algorithms such as divide-and-conquer, helper functions, sub-algorithms.
- Introduction to concepts of data structures: lists, trees, graphs.
- Lists: algorithms on lists, searching and sorting algorithms such as linear search, binary search, insertion sort, merge sort, bucket sort and their time complexities.
- Trees: algorithms on trees; binary trees; binary search trees (BST); traversal schemes on BST; building BST from list.
- Graphs: concepts of different graphs; Euler path and Euler circuit; topological sorting; minimum spanning tree; shortest path algorithms such as Dijkstra's algorithm, Prim's algorithm, Kruskal's algorithm.

4. What are the learning activities on this module?

Teaching Scheme

1 lecture and 1 seminar in every teaching week.

Activity	Number of weeks	Sessions (per week)	Duration (hours)
Lecture	11	1	1
Seminar	10	1	1

- *Lectures:*

There will be 1-hour lecture in DB A05 every week (Weeks 2, 4-8, 10-14. For week numbers, please refer to the [University Academic Calendar](#)). Lecture slides will be available on Moodle one day after the lecture.

- *Seminars:*

There will be 1-hour seminar every week (Weeks 4-8, 10-14) that covers topics discussed in the lecture of the previous week. Seminar slides will be available on Moodle on each Friday.

- *Self-study:*

At UNNC, we emphasize self-study. It has been calculated that this module will take up to 100 hours of your time including approximately 20 hours of lectures and seminars. Therefore, for every 1 hour of lecture/seminar we expect that you will contribute around 4 hours towards reviewing class materials, practicing on problem sheets and reading relevant self-study materials that suggested by your tutor.

- *Independent learning week:*

In week commencing 11 November (Week 9), students will undertake self-study on individual and group work to develop problem-solving skills acquired in this module.

- *Office hours:*

You are encouraged to take advantage of office hours offered by the teaching team in each week to get help on difficulties you may have with on understanding the contents or working out practice questions. Information of time and venue will be updated on Moodle.

Tentative teaching schedule

Schedule	Content
23/09/24 Lecture 1	Module introduction, structure of algorithms, computing basics
07/10/24 Lecture 2	Algorithm design, functional programming, sub-algorithm, Luhn algorithm, recursion
14/10/24 Lecture 3	Recursion technique, properties of recursive algorithms. Euclid's algorithm, revised Euclid's algorithm
21/10/24 Lecture 4	Introduction to data structure, lists, operations on lists using recursion
28/10/24 Lecture 5	Searching and sorting on lists, linear search, binary search, insertion sort, time complexity
04/11/24 Lecture 6	Divide and conquer technique, merge sort, bucket sort
11/11/24	Independent Learning Week (No Lectures and No Seminars)
18/11/24 Lecture 7	Trees, binary trees, algorithms over binary trees, traversing methods: breadth first search (BFS), depth first search (DFS), preorder, inorder, and postorder algorithms
25/11/24 Lecture 8	Binary search trees (BST), algorithms for BST operations, building a BST from a sorted list
02/12/24 Lecture 9	Graphs, Euler path and Euler circuit, Dijkstra's shortest path algorithm
09/12/24 Lecture 10	Minimum spanning tree, Prim's and Kruskal's algorithms
16/12/24 Lecture 11	Revision

5. How is the module assessed?

Mid-Semester Exam	
Weighting	25% of overall module marks
Date and Time	20 November 2024; time and venue TBC
Duration	60 minutes
Topics	All topics up to Lecture 6
Type of assessment	Written exam
Feedback	Multiple-choice and short answer questions
Notes	<ul style="list-style-type: none">• No calculators are permitted in this examination• No electronic devices capable of storing and retrieving text, including electronic dictionaries, may be used• Dictionaries are not allowed with one exception. Those whose first language is not English may use a standard translation dictionary to translate between that language and English provided that neither language is the subject of this examination. Subject specific translation dictionaries are not permitted

Coursework Assignment	
Weighting	25% of overall module marks
Deadline for submission	5 pm on 5 December 2024
Submitted via	Submission Box on module Moodle page
Feedback	4 questions
Notes	<ul style="list-style-type: none">• This coursework will be available on Moodle at 5 pm on 21 November 2024• You will have 2 weeks working on the coursework assignment, and make your final submission on Moodle electronically

End of Semester Exam	
Weighting	50% of overall module marks
Date and Time	Scheduled during University Exam Weeks
Duration	120 minutes

Topics	Full syllabus
Type of assessment	Written exam
Feedback	5 questions
Notes	<ul style="list-style-type: none"> • No calculators are permitted in this examination. • No electronic devices capable of storing and retrieving text, including electronic dictionaries, may be used. • Dictionaries are not allowed with one exception. Those whose first language is not English may use a standard translation dictionary to translate between that language and English provided that neither language is the subject of this examination. Subject specific translation dictionaries are not permitted.

6. What are the assessment criteria?

In order to pass this module your overall marks in this module must be 40% or over.

7. What do I need to know about feedback?

Feedback on your performance will be given regularly in lectures and seminars. For more personal/detailed feedback, you can make an appointment to discuss with one of the tutors during the weekly office hours.

8. Where can I find the module readings and materials?

All necessary material will be posted onto Module's Moodle page regularly on a weekly basis. There will also be related online resources provided there to assist students with their study on different topics of algorithms. It is your responsibility to check the Moodle page for updates and class announcements.

9. What happens if I fail?

In case of failure, you will be given a second chance to resit the final exam with **100%** weighting taken during the university period of resit examinations in August 2025. You need to achieve 40% marks or over to pass.

10. Other important information about this module

Attendance in Seminars and Lectures are compulsory. Your attendance will be recorded via the Attendance Monitoring System (AMS). In case of poor attendance or engagement, you will be referred to the student support officer. See attendance policy in the next page.

11. Important policies to know

Academic misconduct

There is **zero tolerance** of Academic Misconduct for all students studying at UNNC. Once academic misconduct is confirmed, it will result in appropriate penalties. Misconduct is any inappropriate activity or behaviour by a student which may give that student, or another student, an unpermitted academic advantage in marked assessment. This includes (and is not limited to) plagiarism (appropriating someone else's texts or ideas without proper referencing), asking someone else to complete one's assessments, sharing your answers to individual quizzes with other students.

Misconduct Policy:

<https://www.nottingham.edu.cn/en/academicservices/academic-misconduct/academic-misconduct.aspx>

Misconduct Procedure (UNNC):

<https://www.nottingham.edu.cn/en/academicservices/academic-misconduct/academic-misconduct.aspx>

Extenuating Circumstances (EC)

If you **miss an exam or other form of assessment** on medical or acute personal grounds, please follow the procedures to apply for EC. Extenuating Circumstances Procedure (UNNC):

<https://www.nottingham.edu.cn/en/academicservices/unnc-extenuating-circumstances-procedure/unnc-extenuating-circumstances-procedure.aspx>

Attendance policy

Please remember that **all classes are compulsory**. If you have to ask for leave you need to contact The Hub via TheHub@nottingham.edu.cn and provide evidence. Missing classes without authorized reasons will be recorded as **Absence** which may jeopardize your study.

A copy of the policy is posted here along other useful documents:

<https://moodle.nottingham.ac.uk/mod/folder/view.php?id=1738700>

If any of these links results broken, you can contact CPSO for assistance:

cpso@nottingham.edu.cn.