TND004: course information

This course information is valid from VT2/2025 to VT2/2026.

Contents

Aim of the course

The course gives a solid knowledge of fundamental data structures, and their accompanying algorithms, such as stacks, queues, lists, trees, hash tables, and graphs. Sorting and performance analysis are also important topics discussed in the course.

The course goals are described in the studieinfo.

Course responsible

Aida Nordman.

Pre-requisites

The course requires knowledge in programming in **C++** (e.g. as given by the TNG033 course) and mathematical concepts such as numerical series which are covered in analyis II.

Course points and workload

This course awards 6 ECTS credits. According to university regulations, one credit corresponds to 27 hours of work (i.e. 3 days of 9h/day). Thus, the course involves about 162 hours of work (i.e. ~4 weeks).

How to contact us

The email addresses for the course staff can be found in the course room on Lisam. All communication with the staff (such as course-related questions) must be conducted through your LiU email or by speaking with the staff during scheduled course hours. No other communication channels are available.

To ensure all student emails are addressed, the following rules must be followed when emailing about the course. Emails that do not adhere to these rules will be disregarded:

- Use your LiU email address when contacting course staff.
- Include the course code in the subject line (e.g., "`TND004: …`").

If we need to share information with all **registered** students, we will use the course email list. Please note that any programming code sent via email will be ignored.

Course website

All relevant course information (such as deadlines, plan for the lectures, labs, old exams, etc) is posted on the course website.

The course website is updated during the course. Moreover, access to parts of this site requires a password. The password is available in the Lisam course room.

How is Lisam used in the course

Lisam course room is used for the following.

- Lab group registrations (use the *Signup* function).
- Quizzes.
- Post course schedule.
- Post exams/labs evaluation criteria ("*bedömningskriterier*").
- Post *redovisning* time slots assigned to students.
- Post lab assistants' email.
- Some lab assistants may require that you submit written answers to some of the lab exercises via Lisam.

Recall that course material is posted in the course website.

Late course registrations

Course registration is late, if it's received after the course start (i.e. March 31).

- Course registrations after April 4 imply that you cannot participate in the 1st HA lab session.
- Course registrations after April 17 imply that you can be denied access to the quizzes in the course.

Organization

The course consists of

- 1 information session of (at most) 2h.
- 15 lectures. Each lecture is 2h at the campus.
- 5 lessons of 2h each.
- 4 "*handledning*" (**HA**) lab sessions. Each **HA** lab session is 4h at the campus.
- 5 "*redovisning*" (**RE**) lab sessions. Each **RE** lab session is 4h (~20 minutes for each lab group).

Lectures and lessons are given in English. Swedish and English may be used in the labs.

Literature

The course book - in English - is given below.

> **Data Structures and Algorithm Analysis in C++**
> Mark A. Weiss. 4th edition, 2013.

We stress that the course book is important. Thus, make sure you have the course book from the start of the course.

Course software

- Visual Studio 2022, with desktop development for C++.
- CMake.
- Clang compiler for windows.

The software above is installed in the lab rooms. The computers in the lab rooms run on Windows.

Please note that it is not the responsibility of the course staff to install software on personal computers.

Examination

To earn the 6 credits, you must successfully complete both the laboratory work and the final **individual** examination. You have three chances to take the exam during the academic year.

- You get 3 ECTS points, if you complete all lab exercises and demonstrate them before any set deadlines expire.
- You get 3 ECTS points, if you pass the final individual exam.

During the course, students also have the possibility to do two non-mandatory individual quizzes. Two bonus points are awarded for the final exam, upon approval on each quiz (see section "Quizzes" for more information).

If you have questions about exams in general, exam dates, exam locations, or exam registrations, then you should contact the LiU-examination service (email: tenta@liu.se, phone: 013-281010).

Course evaluation criteria ("*bedömningskriterier*")

The criteria for evaluating your solutions for the final exam and labs can be found here.

Quizzes

The course has two **non-mandatory individual** quizzes done in distance mode. Each quiz should be seen as an opportunity for self-assessment.

It is not allowed to discuss **any** aspect related to the course with other people except for the university staff on duty during the quizzes. Put in other words, students doing the quizzes should consider that the same restrictions about communication with other students, or other persons outside the university staff, apply as if doing the quizzes at the university campus under supervision of exam watchers. Suspicions of academic dishonesty are reported to the disciplinary board who can decide on a suspension from university studies up to six months.

Please be aware that using AI tools while taking a quiz may lead to a longer completion time.

The quizzes will take place on April 23 and May 21 (see also the course schedule).

- Each quiz consists of 8 exercises awarding 1p each.
- Each quiz is graded as either passed (**G**) or failed (**U**).
- To get approved (**G**) in a quiz you need 4p. In this case, you are also awarded 2 bonus points for **part 1** of the final exam.
- For every multiple-choice question, a wrong answer implies a penalty (i.e. points deduction). Not providing an answer implies no penalty at all.
- Only students registered on the course can do the quizzes.
- Quizzes bonus points can only be used during the academic year.
- Each quiz duration is 45 minutes.
- Quizzes are done using the quiz functionality available from the course room in Lisam.
- Any books, course material (*e.g.* lecture slides), or internet resources can be used while preparing your answers to the quizzes.

Finally, we cannot guarantee that any website, including the course website, is available during the quizzes. Problems with the servers can occur at any time, though not frequently, and are out of our control.

Which aid material can be used during the final exam?

The final examination is individual, handwritten, and conducted on campus.

During the final exam you can use the following material.

- A data structures book (e.g. course book). The following rules apply.
    - Comments and notes in the margin of the book, directly relating to the text and examples on the relevant pages are allowed */ kommentarer och noteringar som direkt rör text och exempel på sidan i fråga får finnas i sidmarginalen.*
    - Corrections to errors (errata) for the book on separate page(s) are allowed */ rättelser till felaktigheter får finnas.*
    - Bookmarks to easily find certain pages in the different chapters are allowed */ egna sidflikar för att enkelt kunna hitta t.ex. de olika kapitlen är tillåtna.*

    - Empty pages, such as the blank pages in the book, may not contain comments */ tomma sidor, in- och utsidorna av pärmarna, försättsblad*, etc., får inte innehålla kommentarer.
    - No extra pages or notes aside from those covered in the points above are allowed */ inga extra ark eller lappar, lösa eller fastsatta, får finnas utom det som täcks av ovanstående punkter*.
- Pencil and white paper.

No other help material is allowed during the exam. Note that solutions for exercises from previous exams, lessons, labs, or lecture notes are strictly forbidden during the final exam.

Final course grade

The final grade in this course can be either **3**, or **4**, or **5** and it is decided by the final individual examination which is composed of two parts. The final exam is done at the campus.

- **Part 1** awarding max 20 points.
- **Part 2** awarding max 7 points.

For more details, please refer to the course evaluation criteria, paying particular attention to the operationalization table.

Improving your course grade ("*plussa*")

If you have already passed the course but wish to improve your grade, you are not required to complete part 1 of the final exam—you only need to complete the exercises in part 2.

In case of suspicion of academic dishonesty

Quizzes and final examination must be solved **individually**.

Any suspicions of attempted cheating are reported to the disciplinary board, who can decide on a suspension for up to six months. We also stress that it is not the teachers' duty to take a final decision of whether there was cheating. For more information, please see the LiU website "Cheating, deception and plagiarism".

De lösningar som du skickar in i samtliga former av examination (laborationer, quizzes och tenta) ska vara ett resultat av ditt eget arbete. Det är inte tillåtet att lämna in lösningar som har kopierats från andra studenter, även om modifieringar har gjorts. Vi ser mycket allvarligt på alla tendenser till fusk. Det är dock inte lärarnas uppgift att avgöra om fusk förekommer. Vid misstanke lämnas ärendet till universitetets disciplinnämnd som, om de anser att fusk föreligger, kan besluta om

*avstängning upp till sex månader. För mer information, se LiU website "*Fusk och plagiat"

Use of AI tools in the course

AI tools are permitted in this Data Structures course, provided they are used to enhance your understanding of the concepts introduced and applied. However, keep in mind that while writing code that produces the correct output is an important aspect of your lab assignments, it is not sufficient on its own. You are also expected to fully understand and explain the code you submit, as well as justify the design choices. The ability to clearly articulate your code, analyze different data structures, and evaluate their effectiveness in solving problems is a crucial skill in the professional world.

Please be aware that using AI tools while taking a quiz may lead to a longer completion time.

Lectures

You can find a preliminary plan for the lectures in the course website. The corresponding course book sections, for each lecture, are also indicated. You are expected to read the indicated **book** sections. Those sections also include extra (course related) material that you need to read and understand.

Slides and code used in the lectures will be made available from the course website soon after each lecture. The slides are complementary course material that does not replace the book.

Lectures take place on the campus.

Lessons

The main aim of the lessons is to give you the opportunity to enhance your understanding of the concepts introduced in the course by discussing possible solutions for some practical problems. It is also an opportunity for students to put forward questions and to review some of the topics introduced in the lectures. However, we cannot give individual feedback to students about code (that's reserved for lab sessions) nor make repetitions of the lectures.

Lessons take place at the campus.

Labs

This course includes **four sets of lab exercises**. For each set of exercises, 2 lab sessions, designated ***HA****ndledare* and ***RE****dovisning*, are scheduled. *HA* and *RE* lab sessions take place in the lab rooms.

You are awarded 3p (1p = 27h of work), if you are approved in all 4 sets of exercises. Thus, you are expected to spend ~80h of work for the lab exercises (i.e. at least 2 full weeks of work) of which at least 60h should be spent working in the exercises outside the scheduled lab hours.

Note also that

- You work in groups of two people.
- You need to register for the lab sessions (see "*How to register for the labs*").
- Note that lab 1 has a strict deadline.
- A late lab can be presented during a RE session provided there is time during the 4h scheduled time.
- During the **HA lab sessions**, you can get help from your lab assistant with the code, if you have questions or want feedback.
- You must demonstrate your solutions for lab exercises during the **RE lab sessions**. Note that these lab sessions include an individual examination and, consequently, each member of the group must be prepared to answer questions about the presented solution.
- Your solutions to the lab exercises can neither be presented in an HA session nor be sent by email.

At the end of the course, you will receive an email once the lab points are ready for registration in Ladok. If you haven't received your points, you must notify the course responsible by August 22, 2025. Any requests submitted after this date will be addressed as time allows.

How to register for the labs

- You work in groups of **two people**.
- There are three parallel lab classes (named A, B, and C).
- You must register your lab group in one of the lab classes by **April 3**.
- Registrations are done via Lisam (use the *Signup* function).

Lab registrations of students who have already completed the labs and been awarded points cannot be accepted.

Presenting your solutions for lab exercises

You should present orally your solutions to the lab exercises during the RE lab sessions (~20 minutes are usually enough). For each of the four sets of exercises, the course schedule indicates when you should present your solutions. Moreover,

- Programs that do not compile or fail to execute correctly are not accepted.
- We do not accept copied code that you neither understand nor are able to explain.
- Your code should be readable, well-indented, and use good programming practices.
- Code for the lab exercises cannot be sent for final approval by e-mail.
- A late lab can only be presented provided there is time during a RE session and the deadline has not expired.
- At most one late lab can be presented during a RE session.
- Some lab exercises require that you submit written answers to specific questions. Unreadable or unclear written answers are rejected.

If you are not approved in all labs by May 26, you can present labs during the re-exam period in January 2025. To do so, you must **email the course responsible by the end of week 50** to allow for scheduling. No other opportunities will be available until the course runs again in VT2/2026

IT-support for students

If you encounter issues with your LiU account, equipment, or software in the computer lab rooms, please contact LiU IT services and support. Remember, as a user of the lab rooms, it is your responsibility to report any problems you notice with the equipment or software to LiU IT services. You can call the helpdesk 013-282828 or email the helpdesk.

If you need help with the Lisam system then visit this webpage or call the helpdesk service.

Contacting the course staff about Lisam or other IT-related issues is not helpful, as we are unable to assist with these matters. Consequently, such emails will be disregarded.

Important dates and deadlines

Important dates for the course and deadlines are summarized on the table below and posted on the course website.

Event	Deadline
Course start	March 31
Register lab group	April 3, 10:00
Course registration	Registration after April 4 imply that you cannot take part on Lab1/HA Registration after April 17 may imply that you can be denied access to the quizzes
Lab 1	**RE** lab session on week 16, April 15, **strict deadline**
Presenting labs 2-4	**RE** lab session on weeks 22, 19, 20
Quiz 1	April 23, 17:00-18:00
Quiz 2	May 21, 17:00-18:00
Final computer exam	June 2, 08:00-12:00
Claim lab points	August 22, 2025
Presenting late labs after course ending	om-tenta period in January 2026 Email the course responsible not later than the end of week 50, 2025