Data structures (E761039)

Course size (nominal values; actual values may depend on programme)

Credits 3.0   **Study time 90 h**

Course offerings and teaching methods in academic year 2023-2024

| A (semester 1) | Dutch | Gent | lecture |
| | | | seminar |

Lecturers in academic year 2023-2024

| Leroux, Sam | TWO5 | lecturer-in-charge |

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Bachelor of Science in Engineering Technology(main subject Information Engineering Technology)	3	A
Linking Course Master of Science in Information Engineering Technology	3	A
Preparatory Course Master of Science in Information Engineering Technology	3	A

Teaching languages

Dutch

Keywords

Data structures, Computer science (P170), Informatics (P175)

Position of the course

Careful design of data structures has a major impact on the performance of computer programs. This course gives a survey of fundamental data structures and algorithmic methods and provides insight in their mechanisms.

Contents

An extensive survey of fundamental data structures, together with an analysis of their performance:
- Performance of programs. Asymptotic approximations. Importance of efficient data organization.
- Fundamental data structures: arrays, lists, stacks, queues, priority queues, trees.
- Important data structures: hash tables, binary search trees.
- External data structures: B-trees, B+-trees, external hashing

Programming exercises in the object-oriented language Java to apply these methods to various problems and to compare the theoretical performance with that of the implementations.

Initial competences

A good programming experience with Java.

Final competences

1 To be able to implement and to apply data structures.
2 To be able to choose the best data structures for a given problem statement.
3 To be able to analyze the complexity of different data structures and the operations on them.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Extra information on the teaching methods

- **Theory:** Lectures.
- **Labs:** Programming exercises on PC.
- **Self-study**

Learning materials and price

Syllabus (in Dutch): around 2,5 euro for a printed version, a digital version is available free of charge.

References

- CORMEN T.H., LEISERSON C.E., RIVEST R.L., en STEIN C., Introduction to Algorithms, 3rd ed., MIT Press, 2009, Cambridge MA.
- SEDGEWICK R., Algorithms in C++, Parts 1-4: Fundamentals, Data Structures, Sorting, Searching, Part 5: Graph Algorithms, 3rd ed., Addison-Wesley, 1998, Reading, MA.
- WEISS M.A., Data Structures and Algorithm Analysis in C++, 3rd ed., Addison-Wesley, 2006, Reading, MA.
- LEVITIN A., Introduction to the Design and Analysis of Algorithms, 3rd ed., Addison-Wesley, 2012, Reading, MA.
- MANBER U., Introduction to Algorithms. A Creative Approach, Addison-Wesley, 1989, Reading, MA.

Course content-related study coaching

The teachers are available for additional explanations during the labs and the student can always make an appointment with the teachers.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Skills test, Written assessment with multiple-choice questions, Written assessment with open-ended questions

Examination methods in case of periodic assessment during the second examination period

Skills test, Written assessment with multiple-choice questions, Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Calculation of the examination mark

- Theory (50%): written examination.
- Labs (50%): test.
- Calculation: 50% written examination + 50% test
- A weighted average is used to compute the final score for a training item. When the student obtains less than 8/20 for at least one of the components, they can no longer obtain a pass mark for the course unit as a whole. If the total score does turn out to be a mark of ten or more out of twenty, this is reduced to the highest fail mark (i.e. 9/20)
- Students who eschew one or more parts of the assessment can no longer obtain a pass mark for the course unit. Should the final mark be higher than 7/20, it will be reduced to the highest non-passable mark (i.e. 7/20).
- A partial mark of ten or more out of twenty can be transferred between the assessment periods of the same academic year.