Course Specifications

Valid as from the academic year 2023-2024

Programming in C and C++ (E761018)

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

Credits 6.0   **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

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

Lecturers in academic year 2023-2024

| Naessens, Helga | TWO5 | lecturer-in-charge |
| Van Den Breen, Wim | TWO5 | co-lecturer |

Offered in the following programmes in 2023-2024	crdts	offering
Bachelor of Science in Engineering Technology(main subject Electronics and ICT Engineering Technology)	6	A
Bachelor of Science in Engineering Technology(main subject Information Engineering Technology)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	6	A
Linking Course Master of Science in Information Engineering Technology	6	A
Preparatory Course Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	6	A
Preparatory Course Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	6	A
Preparatory Course Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	6	A
Preparatory Course Master of Science in Information Engineering Technology	6	A

Teaching languages

Dutch

Keywords

Informatics, Programming Language, Object oriented Programming, C++, C, Pointers, Computer Science (P170), Informatics (P175), Computer Technology (T120).

Position of the course

An in-depth course in C and C++ for those already familiar with some programming language, like for example Java.

Contents

The section Programming in C includes the following topics:
- Basic concepts: variables and basic data types, operators, control structures, input/output, functions, arrays
- Pointers: basic concepts, call by reference, pointers and arrays, pointer to const, operations on pointers, pointer as result of a function, constant pointer, function pointers, C-strings
- Structs
- Dynamic memory management
- Linked lists
- Bit fiddling

The section Programming in C++ includes the following topics:
- Basic concepts: basic data types, reference type, function templates, console input and

output, namespaces, dynamic memory management
- Collections: introduction, iterators, overview of some containers
- Basic OOP in C++: classes in C++, class templates, constructor-destructor, copy constructor, separate compilation, objects as instance variables, friend functions and classes, operator overloading
- Inheritance in C++: public versus private inheritance, constructors/destructor in derived classes, overriding =-operator, keyword protected, polymorphism and dynamic binding, abstract classes, virtual destructor, multiple inheritance
- Exception handling
- Automatic type derivation, initialization syntax, move constructor and move operator, defaulted and deleted functions, functions as parameters and lambda functions, nullptr, smart pointers (unique_ptr and shared_ptr)

Initial competences

A good experience with some programming language (like for example Python): methods, sequence, selection, iteration, collections, …
For the section programming in C ++, the student must have notions of object oriented programming. If the student has no experience with this at the start of this course, it is best to follow the course 'object oriented programming' at the same time.

Final competences

1 Independently implement, test and execute a computer program in C and C++.
2 Transform a (object oriented) design into a working computer program in C and C++.
3 Analyze and structure a problem and translate it into a computer program in C or C++.

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

During the lectures (30 h) the theory is explained step by step, partly based on examples.
During the exercise sessions (30 h) the student works independently on his laptop.

Learning materials and price

Slides, examples and exercises with solutions are provided on the electronic learning environment.
Some books about the course topics are available in the library.

References

- Head First C, David Griffiths & Dawn Griffiths, ISBN 978-1-4493-9991-7
- Beginning C, 5th Edition, Ivor Horton, ISBN 978-1-4302-4881-1
- C in a Nutshell, Peter Prinz & Tony Crawford, ISBN 978-0-596-00697-6
- The C Programming Language, second edition, Kernighan & Ritchie, ISBN 978-0-1311-0362-7
- Programming in C, 4/E, Stephen G. Kochan, ISBN 978-0-3217-7641-9
- The C Programming Language, B.W. Kernighan, D.M. Ritchie, ISBN 978-0-1311-0362-7
- C++ Primer, 5th Edition, S.B. Lippman, J. Lajoie, B. Moo, ISBN 978-0-3217-1411-4
- A Tour of C++, 2/E, Bjarne Stroustrup, ISBN 978-0-1349-9783-4
- Problem Solving with C++: Global Edition, 10/E, Walter Savitch & Kenrick Mock, ISBN 978-1-2922-2282-0

Course content-related study coaching

The student can always make an appointment with the teacher.

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Written assessment with open-ended questions

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

PE: the exam is a written exam, consisting mainly of exercises, possibly complemented by a few theoretical questions.
NPE: there's a test about programming in C.

Calculation of the examination mark

In the first examination period:
• PE (written exam): 80%
• NPE (test): 20%
In the second examination period: score = maximum (E, 20% L + 80% E), where L is the score of the test (in the first examination period) and E the score of the exam in the second examination period.