Module Description for Module 4: Introduction to Programming

Module title	Introduction to Programming
Module number	M4
Programme	Computer Science
Applicability of the module	Applicable to other Computer Science Bachelor programmes
Module duration	2 semesters
Status	Compulsory module
Recommended semester during the programme	1-2
Credit points (Cp) of the module	15
Prerequisites for module participation	None
Prerequisites for module examination	1. Requirement for the participation in the partial module exam performances “Introduction to Programming with C“: i. Active participation (min. 80%) in exercises of the unit „Exercise Programming with C“ 2. Requirement for the participation in the partial module exam performances for ”Object-oriented Programming Basics”: i. A successfully completed partial module examination in „Introduction to Programming with C“ ii. Active participation (min. 80%) in exercises of the unit „Exercise Object-oriented Programming Basics“
Module examination	The examination includes two partial module examinations that are arranged in succession: • “Introduction to Programming with C“ in the form of a computer examination 120 minutes • “Objet-oriented Programming Basics“ in the form of a computer examination 120 minutes
Intended learning outcomes /acquired competences of the module	After successful completion of the programmes, the students have the following core competencies: • A good command of the most important linguistic elements and archiving functions • Ability to formulate solutions for simple tasks as a structured design, as well as their implementation in C • A good command of methods for error detection and error elimination • Modes of thinking and approaching based on Object-oriented programming • Understanding of concepts such as data encapsulation and code reuse. • Classes, inheritance, polymorphism.

	The following extracurricular skills are acquired: concept formation, structured problem solving, creative problem solving and command of methods for error detection and elimination. Capacity for teamwork by means of cooperation in groups and the ability to accept criticism and conflicts respectively as well as reflecting capacity, communication, connection of theory and practice.
Contents of the module	Lecture Introduction to Programming with C Exercise Introduction to Programming with C Lecture Object-oriented Programming Basics Exercise Object-oriented Programming Basics
Teaching methods of the module	Lectures and exercises
Total workload	450 h (10% extracurricular skills)
Language of the module	English
Frequency of the module	Annually

Unit Description for Module 4: Lecture Introduction to Programming with C

Name of the unit	Lecture Introduction to Programming with C
Code	
Corresponding module	Introduction to Programming with C
Lecturer	Prof. Dr. Bernd Güsmann, Prof. Dr. Wolfgang Rauch, Prof. Dr. Erich Selder
Contents of the unit	- Introductory example with basic language elements - Analysis of simple tasks and creating a structured solution proposal - Editing, compiling, executing programs - Elementary data types, variables, and arithmetic - Input/output - Branching and looping - Fields, string - Troubleshooting and fault elimination - Pointers, dynamic memory management - Subprograms (functions) and parameters, modular program structure, library functions - Files - Structured data types
Teaching methods	Lecture
Contact hours per week	2
Total workload of the unit (h)	100
Total time of contact hours (h)	30
Total time of examination incl. preparation (h)	10
Total time of practical training (h)	0
Total time of self-study (h)	60
Language of the unit	English
Recommended reading	• Erlenkötter,H., C Programmieren von Anfang an, Rowohlt, 2008 • Mittelbach,H., Einführung in C, Fachbuchverlag Leipzig, 2002 • Die Programmiersprache C. Ein Nachschlagewerk, Regionales Rechenzentrum für Niedersachsen/Universität Hannover, 1RRZN. • Kernighan, B.,W., Ritchie, D.,M., Programmieren in C, Hanser, 1990 • The manual for the standard functions belonging to the GNU-C compiler (GNU C Library) can be viewed at

	• http://www.gnu.org/software/libc/manual Current literature will be announced at the beginning of the semester
Type and form of assessment	No proficiency certificate
Grading of the assessment	None
Further information	

Unit Description for Module 4: Exercise Introduction to Programming with C

Name of the unit	Exercise Introduction to Programming with C
Code	
Corresponding module	Introduction to Programming with C
Lecturer	Prof. Dr. Bernd Güsmann, Prof. Dr. Wolfgang Rauch, Prof. Dr. Erich Selder
Contents of the unit	In the exercises for introduction to programming, the contents of the lecture will be applied through practical activity on the computer. The exercises serve to ensure that the students learn to understand and implement a task on the computer using a C program. The students are continuously provided with qualified individual feedback which supports their specific learning experience..
Teaching methods	Exercise
Contact hours per week	2
Total workload of the unit (h)	125
Total time of contact hours (h)	30
Total time of examination incl. preparation (h)	0
Total time of practical training (h)	50
Total time of self-study (h)	95
Language of the unit	English
Recommended reading	See Unit Lecture Introduction to Programming with C
Type and form of assessment	Exercises on the computer; Participation in at least 80% of all exercises is required for admission to the module exam.
Grading of the assessment	Undifferentiated
Further information	

Unit Description for Module 4: Lecture Object-oriented Programming Basics

Name of the unit	Lecture Object-oriented Programming Basics
Code	
Corresponding module	Object-oriented Programming Basics
Lecturer	Prof. Dr. Matthias Schubert, Carsten Biemann
Contents of the unit	Establish a focus with regards to contents: - Object-oriented approach - first example; possibly differentiation to procedural programming - Class concept, UML illustration - Classes, objects - Constructor incl. Overload, destructor - Copying and assigning objects - Operators, dynamic memory management - References - Setter/getter methods - Static object components - Inheritance, access rights - Polymorphism, late binding Furthermore, exclusive topics can be selected, e.g. - Multiple inheritance, virtual inheritance - Class and function templates - Standard libraries and standard template libraries
Teaching methods	Lecture
Contact hours per week	2
Total workload of the unit (h)	100
Total time of contact hours (h)	30
Total time of examination incl. preparation (h)	10
Anteil Praxiszeit	
Total time of self-study (h)	60
Language of the unit	English
Recommended reading	• Stroustrup, Bjarne. Die C++ Programmiersprache, Addison Wesley • Breymann, Ulrich C++ Einführung und professionelle Programmierung, Carl Hanser Verlag • RRZN- Handbuch. C++ für C Programmierer. 13. Auflage, RRZN Hannover Current literature will be announced at the beginning of the semester
Type and form of assessment	Independent programming in the form of a written exam 120 minutes
Grading of the assessment	Differentiated

Further information	

Unit Description for Module 4: Exercise Object-oriented Programming Basics

Name of the unit	Exercise Object-oriented Programming Basics
Code	
Corresponding module	Object-oriented Programming Basics
Lecturer	Prof. Dr. Matthias Schubert, Carsten Biemann
Contents of the unit	The contents of the lecture are put into practice and deepened on the basis of didactically meaningful examples and programming exercises. The students are continuously provided with qualified individual feedback which supports their specific learning experience.
Teaching methods	Exercise
Contact hours per week	2
Total workload of the unit (h)	125
Total time of contact hours (h)	30
Total time of examination incl. preparation (h)	0
Total time of practical training (h)	50
Total time of self-study (h)	95
Language of the unit	English
Recommended reading	See Unit Lecture Object-oriented Programming Basics
Type and form of assessment	Attendance at 80% of the exercises
Grading of the assessment	Undifferentiated (passed / not passed)
Further information	