UNIVERSITÄT KLAGENFURT

Curriculum

for the Bachelor's degree programme

Applied Informatics

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Applied Informatics

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Section 1   General Remarks

(1)   The Bachelor's degree programme *Applied Informatics* is equivalent to 180 European Credit Transfer System credits (ECTS credits). This equates to an anticipated study duration of six semesters. The Bachelor's degree programme *Applied Informatics* is assigned to the group of engineering science degree programmes pursuant to Section 54 (1) of the Universities Act 2002 (UG).

(2)   The workload for the individual study effort is indicated in ECTS credits; the workload for one year should amount to 1,500 full hours, for which 60 ECTS credits are awarded (Section 54 (2) UG). The workload comprises independent study as well as the semester hours/contact hours, including participation in assessment procedures.

(3)   The Bachelor's degree programme is taught in German.

Section 2   Qualification Profile and Competences

(1)   The competency profile describes the academic and professional qualifications that students gain by completing the degree programme.

(2)   **Initial situation:** The main focus of the Informatics Bachelor's degree programme at the University of Klagenfurt is on *Applied Informatics*. The programme aims to qualify graduates for the top-quality development of computer-assisted solutions to problems, for the efficient and effective management of the problem-solving process, and for the design of the beneficial utilization of solutions, based on methods and techniques from informatics. Above all, this requires sound knowledge and expertise in the field of informatics, but it also demands knowledge about possible fields of application. In informatics, software systems are usually developed in organisations and embedded into social systems. Consequently, additional methodological, social and personal skills are necessary for the successful realisation, introduction, and beneficial utilisation of informatics systems.

(3)   **Qualifications to be gained:** Building on the initial situation, there are four main fields of competence in which students completing the Bachelor's degree programme *Applied Informatics* gain skills and expertise: 1) specialised knowledge in informatics, 2) application skills, 3) individual and team competences, and 4) problem-solving skills. The skills and expertise to be gained are described below in the form of learning outcomes for each field of competence:

  − *Specialised skills in informatics:* By studying a broad range of subjects, students acquire fundamental knowledge and practical skills in applied informatics, software development, mathematics and theoretical informatics, and technical informatics in order to design, implement and test information processing systems. The knowledge and skills can be further developed in the specialist subjects *Artificial Intelligence and Natural Language Processing*, *Software Development* or *System Security*.

  − *Application skills:* By choosing one of the specialist subjects *Interactive Systems*, *Median Informatics*, *Artificial Intelligence and Natural Language Processing* or *Management Information Systems,* students are introduced to an application area of their choice. Depending on their choice of specialist subject, students are able

to explain the basic concepts and methods of the chosen application subject and use appropriate methods and tools for the design and implementation of solutions to application problems. Application skills can also be developed in the technical 'sister disciplines' through the selection of one of the specialist subjects *Mathematics and Statistics* or *Information Technology.*

— *Individual and team competences:* In addition to sound technical knowledge, individual and social skills are of vital importance for the professional success of graduates. The knowledge and expertise gained allows students to research information and process it in academic papers, work and communicate efficiently in teams, lead teams, self-organise and continually update their skills. Proficiency in English is particularly important, and graduates with a degree in Informatics are able to write scientific papers in English and communicate in English. For this purpose, periods abroad are also recommended. Gender knowledge and gender competencies can be acquired by attending courses from the elective subject *Feminist Science / Gender Studies* (Sections 9 and 10).

— *Problem-solving skills:* Especially by means of exercises and project work (including the *Software Internship* and the assigned *Bachelor's thesis*), students acquire and test their ability to analyse complex problems and to develop and implement solutions using methods and tools from the field of informatics, i.e. to design, implement and test large software and information systems. These competences are also acquired in a practical context, either by involving lecturers from industry (business or public administration) or by solving problems from industry as part of the *Software Internship.*

(4) **Professional fields and fields of activity:** The graduates of the Bachelor's degree programme *Applied Informatics* are IT specialists who can specify, plan, implement, manage and evaluate software development projects in small, medium-sized and large companies and institutions, both independently and as part of a team in consultation with clients. They can be employed as software architects, software developers, software testers, as well as managers of these types of projects.

Section 3   Admission Requirements

(1)   The provisions of the UG regarding admission to the Bachelor's degree programme apply.

(2)   Students whose first language is not German are expected to have German language skills at level B2 of the Common European Framework of Reference for Languages (CEFR).

Section 4   Academic Degree

Graduates of this Bachelor's degree programme are awarded the academic title "Bachelor" with the addition "*of Science*" (abbreviated to "*BSc*"). If used, this academic title must follow the name.

Section 5   Structure & Organisation of the Programme/Intended Learning Outcomes

The intended learning outcomes listed in the table below refer to methods that correspond to the current state of the art.

Table 1. Structure of the Bachelor's degree programme *Applied Informatics*

Subject/ Academic achievement		Designation	Intended learning outcomes	ECTS credits
Required Subjects	1	Basics of applied informatics	Following successful completion of the subject, students will be able to: - explain the basic concepts and terminology of computer science, their history and categorisation; - design and implement simple structured and object-based programmes with the help of development tools.	30
	2	Basics of software development	Following successful completion of the subject, students will be able to: - plan, design, implement, test and measure programmes and software systems according to a development process; - explain the basic concepts of logic-based knowledge representations and languages and implement these concepts.	27
	3	Mathematics and theoretical principles	Following successful completion of the subject, students will be able to: - explain the mathematical principles of analysis, linear algebra, stochastics, discrete mathematics and optimisation and apply them to problems in informatics; - explain the theoretical concepts of machines, automata and context-free languages in informatics and apply them in examples.	32
	4	Technical principles and system software	Following successful completion of the subject, students will be able to: - explain the components, organisation and operation of	24

			modern computers and networks and implement them in examples; - explain the risks and threats of modern IT systems and apply basic methods to avert these threats.	
	5	Skills expansion	Following successful completion of the subject, students will be able to: - write and present general and short scientific papers in English; - explain basic contexts in the areas of team management, technology impact or law in the field of informatics.	8
	6	Bachelor's thesis and seminar	Following successful completion of the subject, students will be able to: - define, plan, carry out, document and present a task in accordance with the rules of sound engineering work.	14
Guided Electives	7	Specialisation in informatics	Following successful completion of the subject, students will be able to: - explain the basic concepts, methods and tools of the chosen specialisation in informatics; - apply this knowledge independently in the development of simple but non-trivial software systems.	18
	8	Specialisation	Following successful completion of the subject, students will be able to: - explain the basic concepts, methods and tools in the chosen specialisation subject; - describe essential areas of application and independently develop special, non-trivial applications.	12
	9	Supplementary subject	By choosing further courses from subjects 5, 7 and/or 8, students supplement their personal skills, deepen their informatics knowledge or acquire further special qualifications.	6

Open Electives	10		Students acquire further qualifications according to their individual choice.	9
			Total:	*180*

Section 6   Introductory and Orientation Period

(1)   In accordance with Section 66 UG, the introductory and orientation period (StEOP) provides students with an overview of the essential contents of the degree programme and its further progression and provides an objective basis for a personal assessment of their choice of degree programme.

(2)   The introductory and orientation period takes place in the first semester of the degree programme and comprises the following courses totalling 12 ECTS credits: 1.1 *Introduction to Informatics* and 1.2 *Introduction to Structured and Object-based Programming.*

(3)   Before completing the introductory and orientation period in full, students may complete further courses totalling 22 ECTS credits in accordance with Part B, Section 14 (7) of the University Statute. According to Section 66 (3) UG, recognised examinations pursuant to Section 78 UG, other academic achievements, activities and qualifications shall not be included in this calculation.

Section 7   Study-Related Period Abroad/Mobility

(1)   All students of the Bachelor's degree programme are strongly advised to complete a study-related period abroad as part of their studies. Transnational EU, state or university mobility programmes can be used for this purpose. Examinations and other coursework completed as part of a study-related period abroad are recognised in accordance with the provisions of Section 78 UG for examinations and other coursework prescribed in the curriculum. Students are advised to complete such a period of study abroad only once they have completed at least 42 ECTS credits in the prescribed required subjects (including StEOP).

(2)   At the request of regular students who wish to carry out parts of their studies abroad, a preliminary decision shall be issued in advance to determine which of the proposed examinations and other academic achievements can be recognised (Section 78 (5) UG). In any case, interested students are advised to contact the respective competent Programme Director in advance to discuss possible and intended recognition.

Section 8   Types of Courses

(1)   Lectures (Vorlesungen/VO) are courses by which knowledge is transferred by means of talks given by lecturers. The examination takes place as a one-off (written and/or oral) examination.

(2)   Courses with ongoing assessment are courses in which the assessment does not take place in a one-off examination, but on the basis of written and/or oral contributions

by the participants. If, in the framework of a course with ongoing assessment, a seminar paper or a paper requiring a comparable degree of effort is to be written, papers for courses taking place in the winter semester can be handed in up until the following 30 June; papers for courses taking place in the summer semester can be handed in up until 31 January of the following year.

(3) The following courses are subject to ongoing assessment:

a) Lecture with workshop (Vorlesung mit Kurs/VC): This course consists of a lecture component and a workshop component. These have common taught content and are assessed together.

b) Exercise class (Übung/UE): Exercise classes involve carrying out specific tasks and projects in order to consolidate what has been learnt in a lecture.

c) Practical placement (Praktikum/PR): In addition to scientific education and professional education and training, practical work contributes to the practical and professional objectives of the degree programme. A project study is practical work in which small, applied research or development work is carried out in consideration of all necessary work steps, ideally as a team. A written assignment documenting the course of the project and its results is an inherent part of a project study.

d) Seminar (SE): Seminar (Seminar/SE): Seminars are used to reflect upon and discuss special scientific problems and/or work. Students make their own oral and written contributions, whereby written work must exhibit an academic character both in terms of form and content.

Section 9   Required Subjects

(1) Required subjects are subjects significant to the degree programme and for which examinations must be taken. Students must complete a total of 135 ECTS credits in the required subjects. The semester hours (S.h.) listed are recommendations for the purpose of planning and organising courses.

(2) The courses for the required subjects can be found in the table below:

Table 2: Required subjects and assigned courses

		Course title	Course type	S.h.	ECTS credits
1 Basics of Applied Informatics	1.1	Introduction to Informatics (StEOP courses)	VO + UE	2 + 2	2 + 4
	1.2	Introduction to Structured and Object-based Programming (StEOP courses)	VO + UE	2 + 2	2 + 4
	1.3	Object-based Modelling and Implementation	VO + UE	2 + 2	2 + 4
	1.4	Databases	VO + UE	2 + 2	2 + 4
	1.5	Algorithms and Data Structures	VO + UE	2 + 2	2 + 4
				Total:	*30*
2 Basics of Software Development	2.1	Interactive Systems I	VO + UE	1 + 1	1 + 2
	2.2	Software Engineering I	VO + UE	2 + 2	2 + 4
	2.3	Software Engineering II	VO + UE	2 + 2	2 + 4

	2.4	Logic	VC	2	3
	2.5	Logical Programming	VC	2	3
	2.6	Web Technologies	VO + UE	2 + 2	2 + 4
				Total:	27
3 Mathematics and Theoretical Principles	3.1	Discrete Mathematics	VO + UE	2 + 1	3 + 2
	3.2	Analysis for Informatics	VO + UE	2 + 1	3 + 2
	3.3	Introduction to Theoretical Informatics	VO + UE	2 + 2	2 + 4
	3.4	Stochastics for Engineers	VC	3	5
	3.5	Linear Algebra for Engineers	VO + UE	2.5 + 1	4 + 2
	3.6	Linear Optimisation	VO + UE	2 + 1	3 + 2
				Total:	32
4 Technical Principles and System Software	4.1	Computer Organisation	VO + UE	2 + 2	2 + 4
	4.2	System Security	VO + UE	2 + 2	2 + 4
	4.3	Operating Systems	VO + UE	2 + 2	2 + 4
	4.4	Computer Networks and Network Programming	VO + UE	2 + 2	2 + 4
				Total:	24
5 Skills Expansion	5.1	English for Computing	VC	2	2
	5.2	Presentation and Communication	VC	1	2
	5.3	Introduction to Scientific Work	VC	1	1
	5.4	Choice of one of the following courses: − 5.4.1 course from the elective programme − Feminist Science /Gender Studies − 5.4.2 Effective Management and Teamwork − 5.4.3 Technology Assessment − 5.4.4 Basic Principles of Public and Private Law − 5.4.5 Basic Principles of the Law on Data Processing			3
				Total:	8
6 Bachelor's Thesis and Seminar	6.1	Seminar from Applied Informatics	SE	2	4
	6.2	Software Internship	PR	7	7
	6.3	Bachelor's Thesis as part of the Software Internship			3
				Total:	14

Section 10   Guided Electives

(1)   Guided electives are those subjects that students choose according to the provisions of the curriculum. A total of 36 ECTS credits must be completed in guided electives.

(2)   The (courses assigned to the) guided electives are listed in the table below. The semester hours (S.h.) listed are recommendations for the purpose of planning and organising courses.

Table 3: Guided electives and assigned courses

		Course title	Course type	S.h.	ECTS credits
7 Guided Elective Specialisation in Informatics	7.1 – 7.7	Choice of three of the following paired courses (each worth 6 ECTS credits):			
		− 7.1 Algorithms and Complexity Theory	VO + UE	2 + 2	2 + 4
		− 7.2 App Development	VO + UE	2 + 2	2 + 4
		− 7.3 Computational Linguistics I+II	VC + VC	2 + 2	3 + 3
		− 7.4 Database Technology	VO + UE	2 + 2	2 + 4
		− 7.5 Introduction to Artificial Intelligence I + II	VC + VC	2 + 2	3 + 3
		− 7.6 Distributed Systems	VO + UE	2 + 2	2 + 4
		− 7.7 Management Information Systems	VO + UE	2 + 2	2 + 4
				Total:	**18**
8 Guided Elective Specialisation	8.1 – 8.9	Choice of one of the following specialist subjects, including a choice of courses totalling 12 ECTS credits: − 8.1 Artificial Intelligence and Natural Language Processing − 8.2 Feminist Science /Gender Studies − 8.3 Information Technology and Robotics − 8.4 Interactive Systems − 8.5 Mathematics and Statistics − 8.6 Media Informatics − 8.7 Software Development − 8.8 System Security − 8.9 Management Information Systems			12
				Total:	**12**
9 Guided Elective Supplementary Subject		Selection of further courses amounting to 6 ECTS credits from required subject 5 *Skills Expansion* or/and from the guided electives 7 *Specialisation in Informatics* or/and 8 *Specialisation*			6
				Total:	**6**

(3)   Any surplus in ECTS credits earned in the guided electives can be used for the open electives.

Section 11   Open Electives

(1)   Open electives are those subjects that students can freely choose from the range of courses offered by recognised domestic and foreign universities. Courses completed as a prerequisite to study or to gain general or special eligibility for university admission cannot be used for the open electives.

(2)   Students are required to complete 9 ECTS credits in open electives.

(3)   In line with the qualification profile, students are strongly advised to complete courses not selected in the subject *Skills Expansion* or in the guided elective *Supplementary Subject* as part of the open electives. Furthermore, reference is made to the other courses taught at the University of Klagenfurt in the area of social skills.

(4)   In the case of courses that have been completed at other recognised Austrian or international post-secondary educational institutions, the responsible university body will decide whether recognition as an open elective for the chosen programme of study makes sense academically or with regard to professional activities.

Section 12   Courses with a Limited Number of Participants

(1)   The maximum number of participants permitted on each of the following courses is as follows:

   a) 1.2 UE *Introduction to Structured and Object-based Programming*: 25;

   b) 3.2 UE *Analysis for Informatics*: 25;

   c) 3.5 UE *Linear Algebra for Engineers*: 25;

   d) 5.2 *Presentation and Communication*: 15;

   e) All other courses subject to ongoing assessment: 30.

(2)   If the number of registrations for these courses exceeds the number of places available, admission will take place according to the following procedure:

   a) Students whose curriculum specifies the course in question as a required subject or as a guided elective shall be given preferential admission.

   b) If the number of registrations for a course exceeds the number of places available according to lit. a, students who have already successfully completed courses in the respective subject will be given preference. In addition, the total number of ECTS credits earned in the respective Bachelor's degree programme determines the allocation of places; a higher total means a preferential ranking.

   c) If no clear decision on participation eligibility can be made even after the application of lit. b, the decision between the students concerned is made by drawing lots.

Section 13   Bachelor's Thesis

(1)   Bachelor theses are independently written papers that are to be produced within the framework of courses.

(2)   A Bachelor's thesis must be written within the framework of the course *6.2 Software Internship*. In addition to the course in which it is written, a Bachelor thesis is awarded 3 ECTS credits.

(3)   This Bachelor's thesis is an independent written work to be written according to scientific criteria. It documents and reflects on the software development project carried out in the *Software Internship* according to the rules of sound engineering work, i.e. describes the problem, state of the art and/or research, project planning, design, implementation and testing of the software and discusses project results and experiences in the project.

(4)   Several students may jointly address a topic subject to the approval of the instructor of course 6.2 *Software Internship*, provided that the performance of the individual students can be assessed separately. The provisions of Part B Section 18 (4a) of the Statute apply mutatis mutandis.

(5)   The topic of the Bachelor's thesis shall be stated in the degree certificate.

Section 14   Use of Languages Other than German

(1)   As a rule, courses and examinations are conducted in German. If required, individual courses may be held in English or documents may be provided in English.

(2)   Upon student request and subject to the approval of the course instructor, examinations may be taken in English and the Bachelor's thesis may be written in English.

Section 15   Examination Regulations

(1)   Course examinations for lectures (VO) – preferably in written form – are taken at the end of or after the course as a single examination and cover the course material. The purpose is to assess how successfully students have participated in the course and demonstrate the students' mastery of the knowledge, methods and skills gained in the lecture. In particular, the educational objectives defined in the qualification profile are to be used as a benchmark.

(2)   All other types of course have ongoing assessment; attendance is compulsory. Exercise classes (UE) and practical work (PR) are assessed through accompanying checks and also through written and oral examinations as well as on the basis of practical activities. Students' written and oral contributions (especially seminar work, seminar talks and participation in discussions) are used as a benchmark for assessment in seminars (SE) and research seminars (PV). In a lecture with workshop (VC), the mode of examination is to be determined based on the character of the course and the educational objectives.

(3)   The course instructors must provide students with information about the course objectives, contents, methods and the criteria of course assessment and examinations prior to the start of each semester.

(4)   The Bachelor's degree programme *Applied Informatics* is completed by the following:
   a) the positive assessment of all course examinations in the subjects of the Bachelor's degree programme (Section 5) and
   b) the positive assessment of the Bachelor's thesis (Section 13) as part of the *Software Internship* (Section 9).

(5)   The provisions of the Statute of the University of Klagenfurt, Part B and the Universities Act as amended from time to time apply to the implementation and repetition of examinations.

Section 16   Effective Validity

(1)   This curriculum will enter into force after announcement in the University of Klagenfurt university bulletin as of 1 October 2012 and will apply to all students who commence their Bachelor's degree programme from the 2012/13 winter semester onwards.

(2)   The amendments to the curriculum, published in the University Bulletin of the University of Klagenfurt on 7 June 2017, Issue 19, No. 123.1, enter into force on 1 October 2017.

(3)   The amendments to the curriculum, published in the University Bulletin of the University of Klagenfurt on 5 June 2019,Issue 18, No. 110.3, enter into force on 1 October 2019.

(4)   The non-structural changes to the curriculum, published in the University Bulletin of the University of Klagenfurt on 7 June 2023, Issue 17, No. 108.1, enter into force on 1 October 2023. Students who have commenced their Bachelor's degree programme from the winter semester 2019/20 onwards are subject to the amended curriculum from the point at which it comes into force.

Section 17   Transitional provisions

Students who commenced their Bachelor's degree programme before the winter semester of 2019/20 are entitled to complete their studies in accordance with the regulations previously applicable to them within a period corresponding to the anticipated duration of studies plus two semesters, i.e. by 31 October 2023 at the latest. If the degree programme is not completed within the deadline, then the student is transferred to the amended curriculum for the remainder of the degree programme. Moreover, students are entitled to voluntarily switch to the amended curriculum at any time.

APPENDIX A: Non-binding Recommended Course of Study

1st Semester – Winter

Subject	Course type	ECTS credits	Total
Introduction to Informatics (STEOP)	VO+UE	2+4	
Introduction to Structured and Object-based Programming (STEOP)	VO+UE	2+4	
Discrete Mathematics	VO+UE	5	
English for Computing	VC	2	
Introduction to Scientific Work	VC	1	
Course from required subject *Skills Expansion* (5.4)		3	
Open Electives		5	**28**

2nd Semester – Summer

Subject	Course type	ECTS credits	Total
Object-oriented Modelling and Implementation	VO+UE	2+4	
Databases	VO+UE	2+4	
Algorithms and Data Structures	VO+UE	2+4	
Analysis for Informatics	VO+UE	3+2	
Presentation and Communication	VC	2	
Open Electives		4	**29**

3rd Semester – Winter

Subject	Course type	ECTS credits	Total
Interactive Systems I	VO+UE	1+2	
Software Engineering I	VO+UE	2+4	
Introduction to Theoretical Informatics	VO+UE	2+4	
Stochastics for Engineers	VC	5	
Computer Organisation	VO+UE	2+4	
System Security	VO+UE	2+4	**32**

4th Semester – Summer

Subject	Course type	ECTS credits	Total
Software Engineering II	VO+UE	2+4	
Logic	VC	3	
Linear Algebra for Engineers	VO+UE	4+2	
Operating Systems	VO+UE	2+4	
Courses from guided elective *7 Specialisation*		6	
Course from guided elective *8 Specialisation*		4	**31**

5th Semester – Winter

Subject	Course type	ECTS credits	Total
Logical Programming	VC	3	
Web Technologies	VO+UE	2+4	
Linear Optimisation	VO+UE	3+2	
Computer Networks and Network Programming	VO+UE	2+4	
Course from guided elective *8 Specialisation*		4	
Software Internship	PR	7	**31**

6th Semester – Summer

Subject	Course type	ECTS credits	Total
Seminar from Applied Informatics	SE	4	
Bachelor's Thesis		3	
Courses from guided elective *7 Specialisation*		12	
Course from guided elective *8 Specialisation*		4	
Course from guided elective *9 Supplementary Subject*		6	**29**