

# Programme Specifications

## Premaster’s Computing – PMIT

Version 3.0 January 2025

### Progression Degrees

MSc Applied Data Science & Analytics
MSc Applied Computer Science
MSc Computer Science - Cyber Security
MSc Computer Science - Big Data & AI
MSc Data Science – Business Analytics
MSc Data Science – Digital Health

### Foundation Overview

Duration	1 Semesters (14 teaching weeks)
Occurrence	October, April
Total teaching hours face to face	322
Total study hours	378
Language	English

### Premaster’s Modules

	Modules	Codes
1	Advanced English language and Academic skills	PG01
2	Advanced Maths	PG05
3	Principles of Programming and Software Engineering	PG06
4	German language and culture	GL01 GL02*

\*German conversation – optional after progression

<b>Name of Module/ Modultitel:</b> <i>Advanced English Language and Academic Skills</i>					
<b>Course Information/ Kursinformationen</b>	<b>Frequency of delivery/ Häufigkeit des Angebots</b>	<b>Length/ Dauer</b>	<b>Language/ Sprache</b>	<b>ECTS points/ ECTS-Punkte</b>	<b>Study hours/ Studentische Arbeitsbelastung</b>
PG01 Advanced English Language and Academic Skills	Annually	1 Semester	English		Total study hours: 300 Taught hours: 168 Self-study: 132
<b>Module Leader/ Modulverantwortliche(r)/ Lehrende</b>	<b>Credits/ Leistungspunkte</b>	<b>Assessment/ Prüfungsform</b>		<b>Teaching mode and methods/ Lehr- und Lernformen</b>	<b>Weighting/ Prüfungsleistung</b>
		<ol style="list-style-type: none"> <li>1. Written Assessment (report (1000 words))</li> <li>2. Formative assessment: Reflection on Academic Writing Skills</li> <li>3. Group Presentation and Seminar Discussion (10 mins each)</li> <li>4. Examination covering academic reading and listening skills (2hrs)</li> </ol>		Lectures, Seminars, Tutorials, Group work	<ol style="list-style-type: none"> <li>1. Course work 40%</li> <li>2. Course work 40%</li> <li>3. Exam 20%</li> </ol>
<b>Module Description/ Constructive Alignment</b>					
<p>This module has been designed to help students develop their academic literacy and communication skills in preparation for undergraduate study and to understand the institutional culture, practices, norms and expectations of German higher education in an international academic context and community. It will enable students to develop academic research and communication skills using contemporary resources and raise students' English language levels to the required entry point for undergraduate entry. It also aims to provide students with understanding of the range of methodologies and a solid grounding for the research skills required in undergraduate study. By encouraging students to share this knowledge in an open class forum (small group tutorial presentations), the module also aims to develop and encourage the use of presentation skills in academic and professional-facing contexts.</p> <p>At the end of this Module, students will have developed transferable and portable skills of effective and professional communication to support their ongoing study as well as providing a basis to foster career and life-building skills. The module utilises several practical activities to allow candidates to develop these essential skills. Assignments for each of the four skills of academic reading, writing, speaking and listening are included to confirm that students meet the appropriate exit threshold in English language proficiency.</p>					
<b>Intended Learning Outcomes – Ability to act /transferrable skills / Handlungskompetenz</b>					
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Demonstrate an ability to communicate effectively, both orally and in writing, qualitative and quantitative information at an appropriate level</li> <li>• Embed the importance of self-study and reliance. This involves cultivating and developing a responsibility within each student to take responsibility for their own learning, initiative, effective time-management and self-discipline within the academic and professional environments</li> </ul>					

<ul style="list-style-type: none"> <li>• Demonstrate awareness of the need to function as reflective autonomous learners in a variety of environments, work in teams in a variety of roles, forming, leading, building, problem solving and consolidating, and manage time and tasks effectively</li> <li>• Display an understanding of the concept of continuous improvement and objectivity in relation to an individual’s academic performance</li> </ul>
<b>Intended Learning Outcomes - Knowledge and subject specific understanding / Fachkompetenz</b>
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Demonstrate an ability to structure and produce an academic essay or report on a topic relevant to the student’s discipline, including the planning, writing and editing stages of the process</li> <li>• Develop and practise academic writing skills at the sentence, paragraph and discourse levels in appropriate written genres</li> <li>• Be able to construct arguments with supporting evidence to establish a position on an issue</li> <li>• Interpret, summarise and evaluate arguments, assumptions, data and concepts to make justified decisions or draw justified conclusions</li> </ul>
<b>Intended Learning Outcomes – Application and generation of knowledge / Methodenkompetenz</b>
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Search for, select and evaluate sources of information for research, and use appropriate citation and bibliography writing conventions, making full use of library and e-learning search (catalogue and bibliographic) resources</li> <li>• Demonstrate an ability to understand and identify the key themes of a lecture, using appropriate comprehension, notetaking and summary writing skills</li> <li>• Select, read, digest, summarise and synthesise information material in a variety of forms, both qualitative and quantitative (text, numerical data and diagrammatic) and in an appropriate manner to identify and determine key facts/themes and relevance.</li> <li>• Analyse and incorporate appropriate academic sources and data into academic writing</li> <li>• Understand the principles and conventions of academic discourse including using sources correctly and avoiding plagiarism</li> <li>• Proficiently use techniques and technology in the collation, interpretation and presentation of data in oral and written formats</li> <li>• Build examination techniques and skills</li> </ul>
<b>Intended Learning Outcomes – Communication and cooperation / Sozialkompetenz</b>
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Work effectively as a team member and independently</li> <li>• Plan and deliver a formal academic presentation to a group of peers on a topic relevant to the student’s discipline</li> </ul>
<b>Outline Content/ Lerninhalt</b>
<ul style="list-style-type: none"> <li>• <b>Academic writing conventions</b> - preparation for and production of academic written assignments in genres relevant to the discipline of study: argumentation, paragraph structure and cohesion, and introduction and practice of appropriate academic grammar and vocabulary to encourage greater linguistic accuracy.</li> <li>• <b>Referencing &amp; Plagiarism</b> – introduction and practise of referencing techniques and tackling plagiarism and use of AI generated text through paraphrasing, reporting verbs and transition signals</li> <li>• <b>Reading techniques</b> - development of reading strategies including reading for different specific purposes, identifying main points and topic sentences, predicting content of reading passages; note-taking and summarising content and evaluating writers’ purpose and stance</li> </ul>

- **Research skills** – introduction to different methodologies, research design and methods. Data collection and analysis, including uses and application of information technology and Artificial Intelligence (AI).
- **Presentations & Seminars** - Preparation for and planning of academic presentations and participation in seminars: fluency development in spoken academic language, development of verbal and non-verbal communication skills, use of visual aids and techniques of engaging with audience. Developing of interpersonal skills for successful groupwork
- **Listening and note-taking** - developing comprehension skills for listening to authentic lectures and other academic spoken formats. Introduction and development of academic notetaking and summary strategies and skills for listening to lectures
- **Effective Study Techniques** - development of the micro-skills needed for academic writing, including pre-writing, brainstorming, planning, text organisation, editing and rewriting; using drafts and formative peer and tutor feedback to feedforward; selecting and using research from multiple sources in writing; and developing referencing skills.
- **Self-reflection** – helps students to think about feedback provided on their own work and learning where individual improvements can be gained through further study

**Recommended reading/ Empfehlungsliteratur**

Name of Module/ Modultitel: <i>Advanced Maths</i>					
Course Information/ Kursinformationen	Frequency of delivery/ Häufigkeit des Angebots	Length/ Dauer	Language/ Sprache	ECTS points/ ECTS-Punkte	Study hours/ Studentische Arbeitsbelastung
PG05 Advanced Maths	Annually	1 Semester	English		Total study hours: 150 Taught hours: 56 Self-study: 94
Module Leader/ Modulverantwortliche(r)/ Lehrende	Credits/ Leistungspunkte	Assessment/ Prüfungsform		Teaching mode and methods/ Lehr- und Lernformen	Prüfungsleistung
TBC		1. Exam (closed book) (1.5 hours)  2. Final Exam (closed book) (2 hours)		Lectures, Seminars, Tutorials, Student-managed learning	1. Exam: 40% 2. Exam: 60%
Module Description/ Constructive Alignment					
<p>The Advanced Maths module provides students with the knowledge and skills needed to carry out complex mathematical tasks throughout their university studies. This module covers key mathematical concepts including algebra, calculus, linear and non-linear equations, probability, statistics, matrices, and vectors. It explores advanced topics such as trigonometric functions, polynomial division, integration, differentiation, differential equations, and numerical methods.</p>					
Intended Learning Outcomes – Ability to act/ Transferable skills / Handlungskompetenz					
<p>Upon completion of this module, students will be able to:</p> <ul style="list-style-type: none"> <li>work effectively with advanced number systems, equations and formulas. Students will also learn how to apply advanced mathematical principles throughout their other modules, considering a variety of real-world contexts.</li> </ul>					
Intended Learning Outcomes - Knowledge and subject specific understanding / Fachkompetenz					
<p>Upon completion of this module, students will be able to:</p> <ul style="list-style-type: none"> <li>Define principles of number theory, Non-linear equations, Laws of Logarithms, Trigonometric functions, Matrices and Vectors, Differential Equation and Numerical Methods.</li> </ul>					
Intended Learning Outcomes – Application and generation of knowledge / Methodenkompetenz					
<p>Upon completion of this module, students will be able to:</p> <ul style="list-style-type: none"> <li>Apply their mathematical knowledge to solve problems in the areas of number theory, Non-linear equations, Laws of Logarithms, Trigonometric functions, Matrices and Vectors, Differential Equation and Numerical Methods</li> </ul>					

**Intended Learning Outcomes – Communication and cooperation / Sozialkompetenz**

**Outline Content/ Lerninhalt**

This module covers an introduction to the following:

- Algebra and Calculus
- Linear and Non-Linear equations
- Statistics
- Basic principles of probability
- Polynomial division
- Non-linear equations
- Laws of Logarithms
- Trigonometric functions
- Matrices and Vectors
- Integration and differentiation rules
- Differential Equation
- Numerical Methods

**Recommended reading/ Empfehlungsliteratur**

<b>Name of Module/ Modultitel:</b> <i>Principles of Programming and Software Engineering</i>					
<b>Course Information/ Kursinformationen</b>	<b>Frequency of delivery/ Häufigkeit des Angebots</b>	<b>Length/ Dauer</b>	<b>Language/ Sprache</b>	<b>ECTS points/ ECTS-Punkte</b>	<b>Study hours/ Studentische Arbeitsbelastung</b>
PG06 Principles of Programming and Software Engineering	Annually	1 Semester	English		Total study hours: 150 Taught hours: 56 Self-study: 94
<b>Module Leader/ Modulverantwortliche(r)/ Lehrende</b>	<b>Credits/ Leistungspunkte</b>	<b>Assessment/ Prüfungsform</b>		<b>Teaching mode and methods/ Lehr- und Lernformen</b>	<b>Prüfungsleistung</b>
TBC		<ol style="list-style-type: none"> <li>Exam includes MCQ and Coding (2 hours)</li> <li>Final Application project with a Report of 500 words</li> </ol>		Lecture, Seminar, Student-Managed Learning	<ol style="list-style-type: none"> <li>Exam: 60%</li> <li>Course work: 40%</li> </ol>
<b>Module Description/ Constructive Alignment</b>					
<p>This module has been designed to provide the basis for further study of programming and software engineering. Students will learn basics of programming (Python), delve into more advanced topics and conclude in a final project that integrates all learned skills. Successful completion of this module indicates that students have obtained a good understanding of, and ability to, apply the requisite conceptual programming knowledge and Software development skills. A diverse set of assessments will demonstrate problem-solving skills to consolidate links between knowledge gained in programming and software engineering theory and its practical, real-world contexts.</p>					
<b>Intended Learning Outcomes – Ability to act/ Transferable skills / Handlungskompetenz</b>					
<p>Upon completion of this module, students will be able to demonstrate their ability to apply programming techniques in technology, software engineering and environmental contexts that can serve them well in their future studies and careers.</p>					
<b>Intended Learning Outcomes - Knowledge and subject specific understanding / Fachkompetenz</b>					
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>Recall and describe the key concepts of programming and how it is used and contributes to both the engineering process and solving engineering problems</li> <li>Demonstrate ability to be proficient in version control with Git, understand the software development lifecycle, and be able to design, implement, and test software solutions, culminating in a final project that integrates these skills.</li> </ul>					

<b>Intended Learning Outcomes – Application and generation of knowledge / Methodenkompetenz</b>
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Design and develop software using core programming principles and data structures.</li> <li>• Write and manage effective code with best practices in modular design and debugging.</li> <li>• Use Git for version control and collaborative development.</li> <li>• Apply web development and database knowledge to create functional applications.</li> <li>• Complete a final project that demonstrates integrated skills and practical application.</li> </ul>
<b>Intended Learning Outcomes – Communication and cooperation / Sozialkompetenz</b>
<ul style="list-style-type: none"> <li>• Communicate technical concepts and project progress clearly to team members and stakeholders.</li> <li>• Collaborate effectively in a team setting, utilizing version control systems to manage contributions and resolve conflicts.</li> <li>• Present project work professionally, demonstrating the ability to explain design decisions and technical solutions.</li> </ul>
<b>Outline Content/ Lerninhalt</b>
<ul style="list-style-type: none"> <li>• Introduction and Basics</li> <li>• Control Structures</li> <li>• Functions and Modules</li> <li>• Data Structures</li> <li>• Object-Oriented Programming (OOP)</li> <li>• Introduction to GIT</li> <li>• Software Development Lifecycle (SDLC)</li> <li>• Software Design Principles</li> <li>• Version Control Systems</li> <li>• Testing and Debugging</li> <li>• Web Development Basics</li> <li>• Databases and SQL</li> <li>• Software Engineering Tools and Practices</li> <li>• Final Project and Review</li> </ul>
<b>Recommended reading/ Empfehlungsliteratur</b>



<b>Name of Module/ Modultitel:</b> German language and culture					
<b>Course Information/ Kursinformationen</b>	<b>Frequency of delivery/ Häufigkeit des Angebots</b>	<b>Length/ Dauer</b>	<b>Language/ Sprache</b>	<b>ECTS points/ ECTS-Punkte</b>	<b>Study hours/ Studentische Arbeitsbelastung</b>
GL01 (GL02) German language and culture	Semesterly	1 Semester	English/ German		Total study hours: 100 Taught hours: 42 Self-study: 58
<b>Module Leader/ Modulverantwortliche(r)/ Lehrende</b>	<b>Credits/ Leistungspunkte</b>	<b>Assessment/ Prüfungsform</b>		<b>Teaching mode and methods/ Lehr- und Lernformen</b>	<b>Prüfungsleistung</b>
		1. Formative assessments including Reading, Speaking, Listening 2. Oral exam		e.g. Lecture, Seminar, Teaching videos, Role Play, Peer to peer learning	Exam: 100%
<b>Module Description/ Constructive Alignment</b>					
<p>The module is intended for students who have little or no previous knowledge of German and offers an introduction to the language. Teaching methods are based on interactive language development tasks, such as group work and role playing. It also includes the study of texts, oral development work and listening comprehension exercises. Students are asked to consolidate class work by learning vocabulary and structures, and by reading, watching or listening to material in German. Using of a range of learning aids and a variety of media, such as a reference grammar and a bilingual dictionary, students will be able to progress faster in accredited German classes during their future studies.</p>					
<b>Intended Learning Outcomes – Ability to act/ Transferable skills / Handlungskompetenz</b>					
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Enable an elementary level of communicative competence in everyday situations</li> <li>• Develop an awareness of the general social and cultural background of the language</li> </ul>					
<b>Intended Learning Outcomes - Knowledge and subject specific understanding / Fachkompetenz</b>					
<b>Intended Learning Outcomes – Application and generation of knowledge / Methodenkompetenz</b>					
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand the basic grammatical structures of the German language</li> <li>• Read and comprehend simple written and aural texts and extract specific, predictable information related to everyday situations</li> </ul>					

Intnded Learning Outcomes – Communication and cooperation / Sozialkompetenz
<p>Upon completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>• Communicate about a variety of general topics requiring a simple and direct exchange of information on familiar and routine matters</li> <li>• Make progress through developing skills of self-study and application and develop an awareness of the diversity of and sensitivity to German culture</li> </ul>
Outline Content/ Lerninhalt
<p>Grammar (indicative):</p> <ul style="list-style-type: none"> <li>• Alphabet and numbers; word order in sentences, questions &amp; polite Imperatives; conjugation in the present tense</li> <li>• Genders of nouns; def./ indef. articles; adverbs of time</li> <li>• Addressing someone in the du-form; interrogative when?'</li> <li>• Verb haben' + Accusative; possessive pronouns</li> <li>• Objects and their genders; use of possessive pronouns; informal &amp; formal ways of addressing people</li> <li>• Expressing likes &amp; dislikes - gern/lieber; ein/kein; verbs + direct object</li> <li>• The time; the days of the week</li> <li>• Use of modal verbs können', müssen', wollen'; prepositions either followed by the accusative or the dative depending on the context</li> <li>• Adjective endings in front of nouns Es gibt' (There is / are) ... + Accusative; adjectives in attributive/ predicative position</li> <li>• Use of the informal Imperative</li> <li>• Demonstrative adjectives</li> <li>• Prepositions + Dative / Accusative</li> <li>• The months: subordinate clauses introduced by dass'; use of the past tense forms (past tense of haben / sein + past participle of the verb)</li> </ul> <p>Topics (indicative):</p> <ul style="list-style-type: none"> <li>• Overview of German culture and customs</li> <li>• Greeting others and introducing oneself</li> <li>• Talking about today and yesterday</li> <li>• Order Food at Fast Food Restaurant</li> <li>• Dining in Restaurant</li> <li>• Date, Time, and Transportation</li> <li>• Shopping</li> </ul>
Recommended reading/ Empfehlungsliteratur