

Module title: Programming Paradigms

Module ID	Workload	Credits	Semester	Frequency of Offering	Duration
MI11	150 h	5	1	yearly	1 semester

Workload	Attendance	Preparation and Follow-Up	Private Study	Preparation for Exam and Exam	Total
S	30 h / 2 SWS	15 h	45 h	10 h	
P	15 h / 1 SWS	45 h			
Total	45 h / 3 SWS	60 h	45 h	10 h	150 h

1 **Scheduled Group Size:** S: 15 students, P: 15 students

2 **Subject Knowledge / Skills**

The objective target of this module is the acquisition of basic knowledge of the most prominent current programming paradigms. In addition to substantial basic knowledge in imperative and object oriented programming, students will gain a good understanding in the areas of functional and logic programming.

The students are able to compare different approaches to programming and are able to identify and name commonalities and differences between programming languages. They know and understand the conditions under which a specific programming paradigm is applicable and are able to specify the limits of at least four different programming paradigms. They have gained insight into the historical development of programming languages and are able to recognise these concepts in new programming languages.

3 **Content / Syllabus**

Introduction to programming and programming languages

A short history of programming languages

The concept of infinity

A short introduction to the theory of computation

Imperative programming

Modular programming with functions and procedures

Divide and Conquer as a basic programming concept

Example languages: Python

Object oriented programming

Basic concepts: classes, objects, inheritance, polymorphism

Programming with interfaces

Aggregation and composition

Design patterns

Example languages: C# and Java

Functional programming

Mathematical Notation: Lambda calculus and currying

Higher order functions

Comprehension and memoization

Example languages: F# and Scheme

