

(1.) Course Title: INFPHD612 Programming Languages (complex exam preparatory)	Credits: 6
Course Classification: Mandatory chosen	
Theoretical or Practical Nature of the Course, 'training character'¹³: 75/25 (credit%)	
Type of Class: practice and number of hours: 2 in the given semester, <i>(If the course is not (only) taught in Hungarian, then the language: English)</i> Additional (specific) methods and characteristics² used in delivering the knowledge <i>(if any):</i> -	
Assessment Method (Exam / Midterm Grade / Other³): practical course mark Additional (specific) methods⁴ applied in knowledge assessment <i>(if any):</i> -	
Course Placement in Curriculum (Semester Number): 3-4	
Prerequisites <i>(if any):</i> -	
Course Description: A concise yet informative description of the knowledge to be acquired.	
The most important basic elements of programming languages: - The development of programming languages, their possible classes, design aspects - Lexical elements of programming languages - Control structures, instructions in programming languages (Assignment, sequence and block instructions, unconditional control transfer, Branch structures, cycle structures, iterators) - Types in programming languages (Type specification, type implementation, type classes, pointer and reference types, type equivalence, type constructions – arrays, direct product, union, set support) - Abstract data types in programming languages - expectations and tools - Subprograms in programming languages (Procedures and functions, parameter passing and receiving methods, overloading, recursion) - Exception handling in programming languages (concept, exception triggering, propagation, handling, specifying, exception classes) - Templates in programming languages (Parameterization with type, subroutine, instantiation, contract principle) - Programming language tools supporting correctness verification - Elements supporting object-oriented programming in programming languages 1. (Classes and objects, object creation, initialization, instance variable, instance method, class variable, class method, inheritance, polymorphism, dynamic binding, reliable redefinition in descendants) - Elements supporting object-oriented programming in programming languages 2. (Multiple inheritance and interfaces)	

- Concurrency in programming languages (Basic concepts, communication models, semaphore, monitor, important language elements)
- Design considerations for program libraries

2-5 Most Important Required and Recommended Literature

List of required and recommended literature (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN).

1. Nyékyné-Gaizler, J. (ed.) et al.: Advanced Programming Languages, 2nd ed, Kiskapu, 2022. ISBN: 978-1984659101
2. Sebesta, R.W.: Concepts of Programming Languages, 12th ed, Addison-Wesley, 2022, ISBN: 978-1292436823
3. Mitchell, J. C.: Concepts in Programming Languages. Cambridge Univ. Press, 2002. ISBN: 978-0521780988
4. Scott, M. L.: Programming Language Pragmatics. 5th ed, Morgan Kaufmann Publishers, 2000. ISBN: 978-0323999663

List of Prescribed Professional Competencies and Competency Elements

(knowledge, skills, etc., KKK Section 8) that the course significantly contributes to developing (highlight the most important ones).

a) Knowledge

- Has a research-level understanding of the general and specific characteristics, major directions, and precisely developed boundaries of the subject area within the discipline, as well as the agreed and debated interrelations.
- Creatively comprehends the interrelations, theories, and conceptual frameworks and terminologies of the given field of study.¹
- Possesses research methodology knowledge necessary for independent research in the given discipline/field.

b) Skills

- Capable of creative analysis of the field, synthesizing comprehensive and specific interrelations with a new perspective, and conducting appropriate evaluative and critical activities.
- Able to apply and further develop the specialized learning and problem-solving methods of the field.
- Can creatively elaborate on the novel, previously unknown practical implications of theoretical issues.

¹**Section 108**, Article 37 of the National Curriculum Act (Nftv.) 37. lesson: a session (lecture, seminar, exercise, consultation) requiring the personal involvement of the instructor to fulfil the academic requirements specified in the curriculum, the duration of which is at least forty-five minutes and not more than sixty minutes.

² e.g. case studies, role play, thematic presentations, etc.

³ e.g. continuous debriefing, mid-year report

⁴ e.g. request for case studies, thematic papers, essays, business, organisational plans, etc.

- Capable of planning and executing new projects, conducting research in the field, and developing new techniques and approaches.
- Able to identify unforeseen professional problems and uncover the detailed theoretical and practical background necessary for their resolution at a research level.
- Can construct and communicate new relations relevant to the field, as well as comprehensive interrelations significant for personal and communal existence.

c) Attitudes

- Represents and further develops the relations that contribute to the process of human self-creation based on the field's characteristics.
- Possesses an interest and learning ability that enable identifying and solving currently unpredictable research problems in the field.
- Demonstrates a firm professional commitment, a continuous dedication to exploring new approaches, and an acceptance of the necessity for persistent effort.

d) Autonomy and Responsibility

- Builds and initiates new knowledge areas with creative independence and proposes new practical solutions.
- Participates in formulating theoretical and practical questions with a leadership role and high-level cooperation.
- Engages as an equal discussion partner with professionals in the field.
- Takes responsibility for raising and addressing new ethical questions concerning theoretical and practical aspects of the profession.

Course responsible (name, position, academic degree): **Dr. Zoltán Porkoláb, habil. associate professor, PhD**

Instructor(s) involved in teaching the course (if any) (name, position, academic degree):
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