

(1.) Course Title: INFPHD035 Comparative analysis of Programming Languages	Credits: 6
Course Classification: Optional	
Theoretical or Practical Nature of the Course, 'training character'¹³: 75/25 (credit%)	
Type of Class: lecture and number of hours: 2/week 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): n/a	
Prerequisites <i>(if any)</i> : n/a	
Course Description: A concise yet informative description of the knowledge to be acquired.	
The aim of the subject is to provide a comparative analysis of the common language elements of different high-level programming languages and an overview of their current development directions. We examine the development of programming languages, characterize their possible classes, and design aspects. This is followed by a discussion of the language elements: the methods of specifying variables and expressions; the basic control structures (sequences of instructions, conditions, and language elements given to support repetitive execution, iterators); the implementation of procedural abstractions, parameter passing and receiving methods, the nesting of program units, the use of global and local variables; an overview of built-in data types, type construction tools (e.g. record, array); the implementation tools of abstract data types; the template (general); the handling of exceptional and error situations; various support options for object-oriented programming and inheritance; issues of correctness proof; support for parallel execution; persistence; design of standard libraries. The task of doctoral students is, on the one hand, to obtain a general overview of each topic, and on the other hand, to delve deeper into a selected topic, beyond the mandatory literature (1.), to collect material on current research, and to report on this in a short presentation.	
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).	
Nyékyné-Gaizler, J. (ed.) et al.: Advanced Programming Languages, 2nd ed, Kiskapu, 2022. ISBN: 978-1984659101 Sebesta, R.W.: Concepts of Programming Languages, 12th ed, Addison-Wesley, 2022, ISBN: 978-1292436823 Mitchell, J. C. : Concepts in Programming Languages. Cambridge Univ. Press, 2002. ISBN: 978-0521780988 Scott, M. L.: Programming Language Pragmatics. 5 th 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.
- 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.

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.

- 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, Associate Professor, PhD**

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