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| <b>(1.) Course Title: INFPHD407 Software Testing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Credits: 6</b> |
| <b>Course Classification: Optional</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |
| <b>Theoretical or Practical Nature of the Course, 60% theory, 40% practice.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |
| <b>Type of Class: lecture 2 hours/week</b> in the given semester,<br><i>(If the course is not (only) taught in Hungarian, then <b>the language: English</b>)</i><br><b>Additional (specific) methods and characteristics<sup>2</sup></b> used in delivering the knowledge: none                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |
| <b>Assessment Method</b> (Exam / Midterm Grade / <b>Other<sup>3</sup></b> ): Exam or Essay<br><b>Additional (specific) methods<sup>4</sup></b> applied in knowledge assessment <i>(if any)</i> :none                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |
| <b>Course Placement</b> in Curriculum (Semester Number): any                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |
| Prerequisites <i>(if any)</i> : None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |
| <b>Course Description: A concise yet informative description of the knowledge</b> to be acquired.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |
| 1.1. Introduction<br>1.2. Fundamentals of software testing, terminology<br>1.2.1. The testing challenge<br>1.2.2. Economics of testing<br>1.2.3. General testing principles<br>1.2.4. Fundamental test process<br>1.2.5. The psychology of testing<br>1.3. Testing throughout the software life cycle<br>1.3.1. Software development models and connections to testing<br>1.3.2. Test levels. Test types<br>1.3.4. Testing related to changes.<br>1.4. Static techniques<br>1.4.1. Static techniques and the test process<br>1.4.2. Review process<br>1.4.3. Static analysis by tools<br>2.1. Test design techniques<br>2.1.1. Categories of test design techniques<br>2.1.2. Specification-based or black-box techniques<br>2.1.2.1. EP, BVA, Domain testing<br>2.1.2.2. Decision tables and cause-and effect graphing<br>2.1.2.3. All-pairs and combinative testing,<br>2.1.2.4. State transition testing, FSM, EFSM, Action-state testing<br>2.1.2.5. Use-case testing<br>2.1.3. Structure-based or white-box techniques<br>2.1.3.1. Statement testing.<br>2.1.3.2. Decision testing, Branch testing<br>2.1.3.3. Condition testing, MC/DC<br>2.1.3.4. Path Testing, Cyclomatic complexity and testing<br>2.1.5. Experience-based techniques<br>3.1. Test management<br>3.1.1. IEEE 829 Software Test Documents<br>3.1.2. Risk and testing<br>3.1.3. Test organization. Independence, roles, tasks |                   |

- 3.1.4. Test policy, test strategy and test approach
- 3.1.5. Test planning and estimation
- 3.1.6. Test process monitoring and control
- 3.1.7. Incident management
- 3.1.8. Configuration management
- 3.2. Tool support for testing
  - 3.2.1. Types of test tools
  - 3.2.2. Effective use of tools: potential benefits and risks
  - 3.2.3. Introducing a tool into an organization

## 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).

- D. Graham, E.V. Veenendaal, I. Evans, R. Black: Foundations of Software Testing, Thomson, 2007.
- Forgács, István - Kovács, Attila: Modern Software Testing Techniques - A Practical Guide for Developers and Testers Apress, 2023
- Forgács, Kovács: Practical Test Design: Selection of Traditional and Automated Test Design Techniques, BCS, 2019.

## 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.<sup>1</sup>
- 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.

<sup>1</sup>**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.

<sup>2</sup> e.g. case studies, role play, thematic presentations, etc.

<sup>3</sup> e.g. continuous debriefing, mid-year report

<sup>4</sup> 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. Kovács Attila, professor, DSc**

**Instructor(s) involved in teaching the course** (if any) (name, position, academic degree): none