

## **Tárgyleírás**

**Tárgy neve: Theory of programming Pr.**

**Tárgyfelelős neve: Dr. Gregorics Tibor**

**Tárgyfelelős tudományos fokozata: PhD**

**Tárgyfelelős MAB szerinti akkreditációs státusza: AT**

**Az oktatás célja angolul / Aim of the subject:**

### **Knowledge**

- In order to be able to perform their work in an innovative way and do research (when necessary) in their own IT specialisation, they have comprehensive and up-to-date knowledge of general mathematical and computing principles, rules and relationships, particularly – depending on their chosen specialization – in the following areas: formal models and tools in computing science.
- They have comprehensive and up-to-date knowledge and understanding of the general theories, contexts, facts, and the related concepts of IT, particularly – depending on their chosen specialization – in the areas of synthesis and verification.

### **Abilities:**

- They are able to apply their mathematical, computer science and informatics skills in a novel way in order to solve tasks in IT research and development.
- They are able to formalize complex IT tasks, to identify and study their theoretical and practical background and then to solve them.
- They are able to apply their IT skills in a diverse, multidisciplinary professional environment.
- Under professional guidance, they are able to carry out scientific research on their own, and to prepare for further studies at postgraduate level.

### **Attitude:**

- They follow professional and technological developments in their IT field.
- They are committed to critical feedback and evaluation based on self-examination.
- They are committed to lifelong learning, and are open to acquiring new IT competencies.
- They are open to proactive collaboration with IT and other professionals.

### **Autonomy, responsibility:**

- They take responsibility for their professional decisions made in their IT-related activities.

- Regarding mission critical IT systems, they can be entrusted with developing and operational responsibilities that are in accordance with their professional competencies.

### **Az oktatás tartalma angolul / Major topics:**

A relational model of programming. Basic notions of programming: statespace, problem, program function, solution. The syntax and semantics of nondeterministic programs. Partial and total correctness. Weakest precondition. Specification of problems. The notion of loop invariant. Verification rules of program constructs. Verification: a method for proving total correctness of deterministic and nondeterministic programs. Owicki-Gries method for proving the total correctness of parallel programs. Deadlock freedom and interference freedom. Synthesizing correct sequential programs by using the verification rules.

### **A számonkérés és értékelés rendszere angolul / Requirements and evaluation:**

Practice grade (gy5) - midterm and endterm tests with weights 50-50%

### **Irodalom / Literature:**

- K. R. Apt, E.-R. Olderog. Verification of Sequential and Concurrent Program. Springer-Verlag, 1997. ISBN 978-1-84882-744-8
- S. Owicki, D. Gries. An axiomatic proof technique for parallel programs. Acta Inf., 6, pp. 319-340, 1976
- E. W. Dijkstra. A Discipline of Programming. Prentice-Hall, Englewood Cliffs, New York, 1976. ISBN-13: 978-0132158718
- D. Gries, The Science of Programming, Springer, Berlin, 1981. ISBN: 978-1-4612-5983-1