ADIN003NABB – Advanced Programming

Spring Semester, Academic Year 2023/2024

Course leader:	Szabina Fodor PhD
Department:	Institute of Data Analytics and Information Systems
Office hours:	
Availability:	
	Email address: szabina.fodor@uni-corvinus.hu
Course type:	Lecture + seminar
Prerequisites:	ADIN002NABB Introduction to Data Science and Programming
Credits:	6
Number of hours per semester	52 hours (1 + 3)
Time of lecture:	TBA
seminar:	TBA

Aims and objectives and description of the course:
The aim of the course is to master the basic procedures of number theory, search and sorting. Another goal is to analyse the need for operations and to learn and test unsolvable problems with a computer in a practical environment. **Course description**

The discussed data structures and algorithms are used in the programming environment already mastered in the "Introduction to Data Science and Programming" course. In addition, a new programming language used in data analysis will be introduced in the frames of the course I. Using the new language, specific mathematical problems already learned in Mathematics I. and Mathematics II. course will be solved and implemented.

Methodology to be used:
The course is a combination of lectures and seminars. In some cases, the two will be combined. Classes are held through exercises that require creative solutions, seminars will tend to expand upon the written material presenting new perspectives and real-world illustrations, through case studies, and group discussions.
Besides the theoretical lectures, case studies, classroom discussions, and group assignments will be provided. Practices will be held in Computer labs. After the discussion of the basic steps, students will solve problems alone or in small groups. They need to present their case study solution at the end of the semester. Distance learning tools (Moodle) are widely used during the course.

Detailed class schedule, 1st – 15th week:

Date of class	Topics to be discussed, readings required for the class
Week 1	Problem solving using algorithms
Week 2	Computability and complexity
Week 3	Data structures: lists, linked lists, queues, stacks
Week 4	Sorting
Week 5	Hashing
Week 6	Binary search trees, balanced binary search trees
Week 7	Spring Break
Week 8	Number theory and Cryptography

Week 9	Tabular data
Week 10	Non-structured data
Week 11	Case study I
Week 12	Case study II
Week 13	Programming in R
Week 14	*Presentation*

Assignments:

The course ends with a "practical grade". **Students will be graded on their achievements throughout the semester.** A major part of the classes will be based on individual or group problem-solving and lab work. Students must participate in computer lab work and group discussions. They must complete a case study and two home assignments during and after classes. Their solutions must be presented verbally or in written form. Students' knowledge will be verified by quizzes and a final term..

Assessment, grading:

50 % from lectures
50 % from seminars

Class participation: Class attendance is mandatory. Participation in lectures is an important part of the process and understanding of the subject, and tutors have the right to make a so-called 'positive attendance sheet'. Attendance of the seminars is compulsory. The acceptable level of absence is ¼ of all lessons (i.e. 3 seminars). In exceptional cases (hospital treatment, permanent illness) provided that the total absence is less than 50%, the tutor can (if he/she so decides) give an opportunity for supplement.
If the student has exceeded the maximally allowed number of absences, only verifiable, official hospital- or treatment center documentation proving hospital treatment or permanent illness shall be accepted.
Students whose absence from the seminars exceeds the maximally allowed 3 occasions (partial seminar attendance is counted as absence), will be given a "not signed" (aláírás megtagadva") grade. Students receiving the "not signed" grade will not have the option of taking either the final or any of the retake examinations but shall have to retake the course in a subsequent semester.
DO NOTE THAT EVERY POINT IS EARNED, NOT NEGOTIATED!

Plagiarism

Any and all statements contained in any assignment or paper that are based upon ideas or words of another must be properly credited to the original author or source. Paraphrasing the ideas or words of another is acceptable so long as the original author or source is cited. DO NOT quote words or expressions from existing works verbatim without designating the passage as a quote and crediting the source. Any student who plagiarizes the work of any other person (author, professor, student, parent, friend, etc.) is committing academic dishonesty and misconduct.
Any student caught committing plagiarism will automatically fail the course.

Compulsory readings:

- T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein (2017): Introduction to Algorithms, MIT Press ISBN: 9780262533058
- Reitz, K., & Schlusser, T. (2016). The Hitchhiker's Guide to Python: Best Practices for Development. O'Reilly Media, Inc. ISBN: 9781491933176
- Good, P. I. (2013). Introduction to statistics through resampling methods and R. John Wiley & Sons. ISBN: 978-1-118-42821-4

Grade Conversion Table for Programs and Courses taught in English

Percentage achieved	*Hungarian Grade*	*ECTS Grade*	*International Grade*	*Explanation*
97-100	**5**	**A**	**A+**	**Excellent**
94-96	**5**	**A**	**A**	**Excellent**
90-93	**5**	**A**	**A-**	**Excellent**
87-89	**5**	**B**	**B+**	**Excellent/Very good**
84-86	**4**	**C**	**B**	**Good**
80-83	**4**	**C**	**B-**	**Good**
77-79	**4**	**C**	**C+**	**Good**
74-76	**3**	**D**	**C**	**Satisfactory**
70-73	**3**	**D**	**C-**	**Satisfactory**
67-69	**3**	**D**	**D+**	**Satisfactory**
64-66	**2**	**D**	**D**	**Low pass/Sufficient**
51-63	**2**	**E**	**D-**	**Low pass/Sufficient**
0-50	**1**	**FX/F**	**F**	**Fail, 0 credit**
	N		**N**	**No grade received, 0 credit**