Obuda University John von Neumann Faculty of Informatics	Institute of Applied Mathematics			
Name and code: *Information and coding theory NMXIK1EMNF* **Credits***: 4* *2022/23 year II. semester*				
Subject lecturers: Marta Takacs				
Prerequisites (with code):	-			
Weekly hours:3	Lecture: 3	Seminar.:	Lab. hours:	Consultation:
Way of assessment:	exam			
Course description:				
Goal: The purpose of this course is to provide a summary of the mathematical foundations of information and code theory and to introduce students to the general rules of code theory, compression and cryptography. During the course, students will have a basic understanding of mathematical coding techniques and will gain proficiency in security issues.				
Course description: The basic principle of information theory. Information and entropy, schema of communication channel. Variable length source code - prefix code, Huffman code. Conditional entropy and mutual information measure. Channel capacity. Bug fix coding. Finite vector spaces and their relationship to coding. Data compression algorithms. Cryptographic Methods - Summaries.				

Lecture schedule	
Education week	*Topic*
1.	Basic concepts of information theory
2.	Information and entropy, Schema of Telecommunication Channel
3.	Variable length source code - prefix code, Huffman code
4.	Conditional entropy and mutual information
5.	Channel Capacity. The basic principle of information theory
6.	1st mid-term exam (online test, if we will have online work schedule)
7.	Error correction coding
8.	Finite vector spaces
9.	Linear Codes (Hamming, Extended and Abbreviated Codes)
10.	Data Compression. Run length compression, LZV
11.	Cryptography, history and algorithms used
12.	2nd mid-term exam (online test, if we will have online work schedule)
13.	Presentation of individual projects
14.	Presentation of individual projects
15.	Additional presentation of projects, midterm exam replacement

Midterm requirements

Education week	Topic	
every week	Consultation time on Ms Teams class, in advance arranged time, furthermore all Mondays afternoon, 18-19. Personally in the room 419, in the period 17.30-18,30, Wednesday	
6th and 12th week	Midterm exams (1st and 2nd) according to the timetable and requirements	
13th, 14th week	Submission and presentation of individual projects/essay according to the timetable and requirements, midterm exam replacement	

Final grade calculation methods

Conditions for obtaining the mid-term signature/ final grade.

The student may only receive the signature if:

- During the semester he / she wrote both midterm exams (maximum score 25 points / midterm exam). Replacement of those exams is possible at a pre-arranged time, in the 14th week of the semester.

- Prepare an essay related to a new published coding or compression algorithm, submit it in the written form to the Moodle system (4-6 pages). The project should be presented as a presentation at the 13/14th week (online and using ppt or other presentation platform – 8-10 slides) (maximum score 15 points).

-The student should prepare / develop homework during the semester, which can be counted towards the end-of-year grade (uploaded it on the Moodle system, maximum score 35 points). In order to complete the signature, the student must have achieved at least 30% of the prerequisites each.

The final grade is calculated as follows:

Midterm exams: 2*25 points, individual project - at best 15 points, uploaded homework at best 35 points.

Final exam (if the offered grade based on the cumulative result during the semester activity is not acceptable for the student or the cumulative points are below 50 points):

oral/written answer from the theoretical background. (at best 50 points, 50% of the whole result)..

Achieved result	Grade
89%-100%, 89-100 points	excellent (5)
76%-88%, 76-88 points	good (4)
63%-75%, 63-75 points	average (3)
51%-62%, 51-62 points	satisfactory (2)
0%-50%, 0-50 points	failed (1)

Type of exam

oral/written

Type of replacement

At the week 14 will be an opportunity for midterm exam and essay presentation replacement. In the absence of midterm exams and project assignment, it will be possible to replace the signature once within the first 10 days of the exam period, at a predetermined date. Anyone who did not appear at midterm exams or at his replacement, did not give up his essay, and was unjustifiably absent from more than half of the lessons, is not entitled to the signature replacement.

References

Mandatory: accessible curriculum, slide series, recommended by class, by subjects on the Moodle system

2023. 02. 13.

Recommended:
Gareth Jones, Mary Jones: Information and Coding Theory, Springer (2002),
ISBN-13: 978-1852336226
Stefan Moser, Po Ming-Chen, Coding and Information Theory, Cambridge Univ. Press (2012),
ISBN-13: 978-1107684577

2023. 02. 13.