

FIȘA DISCIPLINEI

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|--|----------|---|------------------------|--------------------------|-------------|
| Denumirea disciplinei : | | Advanced Compression Methods | | | |
| Codul disciplinei: | | | | | |
| Domeniul: | | Computer Engineering and Information Technology | | | |
| Specializarea: | | Advanced Computing Systems - master | | | |
| Catedra: | | Computer Science and Automatic Control | | | |
| Facultatea: | | "Hermann Oberth" Faculty of Engineering | | | |
| Universitatea: | | „Lucian Blaga” University of Sibiu | | | |
| Anul de studiu: | 1 | Semestrul | 2 | Tipul de evaluare finală | Exam |
| Regimul disciplinei (DI=obligatorie/ DO=opțională/DF=liber aleasă): | | | DF | Numărul de credite: | 10 |
| Categororia formativă a disciplinei (DF=fundamentală.; DI=ingineresti; DS=specialitate; DC=complementară) | | | | | DI |
| Total ore din planul de învățământ | 4 | | Total ore pe semestru: | 56 | |
| Titularul disciplinei: Assoc. Prof. PhD. Macarie BREAZU | | | | | |

| Numărul total de ore (pe semestru) din planul de învățământ | | | | | |
|---|-----------|----------|-----------|----------|-----------|
| Total ore/ semestru | C | S | L | P | Total |
| | 28 | 0 | 28 | 0 | 56 |

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| Obiective: | |
| Competențe specifice disciplinei | 1. Cunoaștere și înțelegere: <ul style="list-style-type: none"> • knowledge and understanding of general principles of discipline • knowledge and proper operation of discipline-specific advanced concepts • ability to integrate knowledge gained from other areas • ability to integrate specific sources of information |
| | 2. Explicare și interpretare: <ul style="list-style-type: none"> • critical analysis of theoretical models, ideas and traditional approaches • skills to develop a project and complete a report on it • improving teamwork |
| | 3. Instrumental – aplicative: <ul style="list-style-type: none"> • knowledge of and proficiency in state-of-the-art tools • application design on different levels • usage of a variety of strategies, methods, techniques for design, implementation and evaluation |
| | 4. Atitudinale: <ul style="list-style-type: none"> • developing of a positive attitudes towards research • appreciation of teamwork, responsibility for the team’s results • developing of a positive attitude towards (the need for validation of the theoretical aspects by) a practical application • awareness of the need to participate in their own professional and scientific development |

| Conținutul tematic (descriptori) | TEMATICA CURSURILOR | | |
|----------------------------------|--|--|---------|
| | Nr. crt. | Denumirea temei | Nr. ore |
| | 1 | Data compression. Introduction. Classification. History. Image, audio and video formats. | 2 |
| | 2 | Statistical coding. Variable length coding. Arithmetic and Huffman coding. | 2 |
| | 3 | Predictive coding. Lossless and near-lossless coding. JPEG-LS. | 2 |
| | 4 | Principles of audio-video compression: predictive coding, transform-based coding, motion compensation. | 2 |
| | 5 | Vector Quantization. Building dictionaries. Variants. | 2 |
| | 6 | Fractal Image Compression. Speeding-up methods. | 2 |
| | 7 | Subband coding. Wavelet transform. EZW, SPIHT, EBCOT algorithms. | 2 |
| | 8 | Still image compression – JPEG and JPEG2000. | 2 |
| | 9 | H.261 – coding for videoconferencing. Macroblocks. | 2 |
| | 10 | MPEG-1 – coding for digital storage media. Structure. Coding of I, P and B pictures. Motion compensation. | 2 |
| | 11 | MPEG-2 – high quality video coding. Differences to MPEG-1. Scalable and non-scalable modes. | 2 |
| | 12 | H.263 – coding for low bit rate communications. Differences to H.261 and MPEG-1. Advanced motion compensation. Treatment of B pictures. Protection against error. H.26L. | 2 |
| | 13 | Audio coding. Psychoacoustic models. MPEG layer II, III (MP3) and Dolby AC3 audio coding. | 2 |
| 14 | MPEG-4 – content based video coding. Image segmentation. Shape coding. MPEG-7 and MPEG-21 – Content description, search and delivery | 2 | |
| TEMATICA LABORATOARELOR | | | |
| 1. | Implementation of a library of functions needed in compression methods (bit-level file access, transforms, entropic coders, etc.) | 6 | |
| 2. | Implementation of different still image / video / audio coders/decoders | 14 | |
| 3. | Implementation of a RAW format video player and a tool for measuring the error between 2 RAW video files. | 4 | |
| 4. | Evaluation of parameters' influence on video quality using video coding software. | 4 | |

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| Metode de predare / seminarizare | Lectures, explanations, conversations, demonstrations, case studies, exercises, debates |
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| Stabilirea notei finale (procentaje) | - răspunsurile la examen/colocviu (evaluare finală) | 60% |
| | - teste pe parcursul semestrului | |
| | - răspunsurile finale la lucrările practice de laborator | 40% |
| | - activități gen teme/referate/eseuri/traduceri/proiecte etc. | |
| | - teme de control | |
| | - alte activități (precizați)..... | |

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| - TOTAL | 100% |
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Final evaluation will consist in written exam (descriptive subjects and problems).

Cerințe minime pentru nota 5

Minimum grade 5.00 at labs

Minimum grade 4.50 at final exam

Cerințe pentru nota 10

Weighted average grade minimum 9.50

TOTAL ore studiu individual (pe semestru) = 70

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| Bibliografia | <p>Minimală obligatorie:</p> <ol style="list-style-type: none"> 1. David Salomon, "Data Compression: The Complete Reference", Fourth Edition, ISBN 978-1846286025, Springer, 2006 2. Khalid Sayood, "Introduction to Data Compression", Third Edition, ISBN: 978-0126208627, Morgan Kaufmann, 2005 3. Peter Symes, "Digital Video Compression", ISBN 0-07-142487-3, McGraw Hill, 2004 4. Mohammed Ghanbari, "Standard Codecs: Image Compression to Advanced Video Coding", ISBN 0-85296-710-1, The Institute of Electrical Engineers, IEE, London, 2003 <p>Complementară:</p> <ol style="list-style-type: none"> 1. Breazu M., "Tehnici fractale și neuronale în compresia de imagini", Editura Universitatii „Lucian Blaga” din Sibiu, ISBN 973-739-251-5, Sibiu, 2006 |
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Lista materialelor didactice utilizate în procesul de predare:

Course notes, bibliographic list, video projector, Internet access

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| Coordonator de Disciplină | Grad didactic, titlul, prenume, numele | Semnătura |
| | Assoc. Prof. PhD. Macarie BREAZU | |