Data Compression
Course syllabus

Basic information

<table>
<thead>
<tr>
<th>Program of study</th>
<th>Applied Computing in Engineering and Science (Master’s Degree)</th>
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</thead>
<tbody>
<tr>
<td>Semester</td>
<td>Third (Year 2 Fall Semester)</td>
</tr>
<tr>
<td>Course credits</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>Language</td>
<td>English level B1 / Intermediate</td>
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<tr>
<td></td>
<td>(European Framework of Reference of Communicative Skills)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>B. Sc. degree in Mathematics, Physics or Computer Science</td>
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Course Instructor

Alexey Kytmanov, Ph. D. in Mathematics, D. Sc. (Dr. Habil.) in Applied Mathematics, Professor, Head of Applied Mathematics and Computer Security department, Siberian Federal University
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Course description

The course provides an overview of classical and modern techniques and algorithms of various types data compression. It covers statistical and dictionary methods, lossless and lossy compression algorithms in graphics, video and audio compression.

Outline of content

1. Introduction to Information Theory: Entropy, Information Value, Data Redundancy.
5. Image Compression: Discrete Cosine Transform, JPEG.
7. Video Compression: Motion Compensation, Temporal and Spatial Prediction. MPEG and H.264.

Learning outcomes

Upon the successful completing the course student will be able to:
- define compression; understand compression as an example of representation;
- understand the idea of lossless and lossy compression;
- understand the most common file formats for image, sound and video;
- distinguish the basic techniques of lossless compression.

**Course assessment**

Note: Assessments subject to change. Below there is a tentative version of assessments. The final version will appear prior to start of the course.

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Number</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Lab Assignments</td>
<td>3</td>
<td>60%</td>
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<tr>
<td>Midterm</td>
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<tr>
<td>Final</td>
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<td>20%</td>
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**Reading**


**Other Resources**

The Data Compression Library — Source Code