

S-88.205: Video Signal Processing

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**Signal Processing Laboratory
HUT**

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Course Organization

- **The goal is to learn basic concepts in Video Signal Processing, in particular, video coding, different standards in the field, key application areas as well as get to know some future directions in standardization.**
- **Lectures: 2 hours every week, classroom H302, Wednesdays 12-14 (noon-2pm)**
- **Excercises: Separate assignment sets will be handed out**
- **Course material:**
 - **Y. Shi, H. Sun, *Image and Video Compression for Multimedia Engineering*, CRC Press, 2000, 480 p.**
 - **Separate tutorial papers on JPEG-2000, Motion Estimation, MPEG-4, MPEG-7**
 - **IEEE video lecture on video signal processors**
- **Other useful material**
 - **Bhaskaran, V., Konstantinides, K., *Image and Video Compression Standards*, 2nd Edition, Kluwer.**
 - **Tekalp, A.M., *Video Signal Processing*, Prentice-Hall, 1995**
 - **Books on Digital Image Processing: Gonzales & Woods, Jain**
 - **Practical issues: Jack, *Video Demystified***
 - **Different video/image processing related www-sites.**
- **Requirements: passing the final exam, completing the assignments.**

Course outline

- **Introduction: Recap of basics in image processing, applications of video signal processing, requirements for a video signal processing system.**
- **Lossless compression: Huffman coding, arithmetic coding**
- **Transforms: Unitary transforms, KLT, Discrete Cosine Transform, Wavelet transform, lapped transforms**
- **Lossy still image coding: JPEG, JPEG-2000**
- **Video signal processing basics**
- **Motion estimation**
- **MPEG-1, MPEG-2, ITU standards**
- **Future trends: MPEG-4 and MPEG-7, coding of video objects**
- **Implementation issues: processing requirements, architectures, video signal processors, hardware.**