

# Information Theory I

Fall Semester 2017

Prof. Dr. A. Lapidoth

Signal and Information  
Processing Laboratory

Institut für Signal- und  
Informationsverarbeitung



## Topics Fall Semester 2017

<http://www.isi.ee.ethz.ch/teaching/courses/it1.html>

---

- Block Diagram of a Communications System, Entropy, Relative Entropy.
- Concave Functions, Jensen's Inequality, Conditional Entropy, Mutual Information.
- Fano's Inequality, Nonsingular Codes, Uniquely Decodable Codes, Prefix-Free Codes.
- Kraft's Inequality, Shannon and Huffman Codes.
- Shannon's Source Coding Theorem.
- Data Processing Inequality, Log-Sum Inequality, Convexity of Relative Entropy, Typical Sequences, AEP.
- Data Compression and Typicality, Channel Capacity.
- Concavity/Convexity of Mutual Information, Kuhn–Tucker Conditions, (Weakly) Symmetric Channels.
- Block Codes/Encoder/Decoder, Converse of the Channel Coding Theorem, Joint Typicality.
- Channel Coding Theorem (direct part), Source-Channel Separation Theorem.
- Channels with Feedback.
- Strong Typicality.
- Rate-Distortion Theory.
- A Glimpse at Multi-Terminal Information Theory.

*Please note that this list of topics is preliminary and might still change during the semester.*