

# Information Theory

Lecture notes 2016-2017

## Introduction

# Organization

## Professors:

- ▶ Lectures: Nicolae Cleju
- ▶ Laboratories: Nicolae Cleju

## Grades

- ▶ Final grade =  $0.6 \text{ Exam} + 0.2 \text{ Lab} + 0.2 \text{ Homeworks}$

## Time schedule

- ▶ 14 weeks of lectures (3h each)
- ▶ 14 weeks of laboratories (2h each)
- ▶ Office hours: Friday 13:00 - 15:00 (best by appointment)

# Course structure

1. Chapter I: Discrete Information Sources
2. Chapter II: Discrete Transmission Channels
3. Chapter III: Source Coding
4. Chapter IV: Channel Coding

1. ***Elements of Information Theory*, Valeriu Munteanu, Daniela Tarniceriu, Ed. CERM I 2007**
2. *Elements of Information Theory*, Thomas M. Cover, Joy A. Thomas, 2nd Edition, Wiley 2006
3. *Transmisia si codarea informatiei*, lectures at ETTI (Romanian)
4. *Information and Coding Theory*, Gareth A. Jones, J. Mary Jones, Springer 2000

Review: probabilities

# Basic notions of probability

- ▶ Distribution (probability mass function)
- ▶ Discrete distribution
- ▶ Alphabet
- ▶ Random variable = the outcome of a random experiment
- ▶ Logarithm function
- ▶ Exponential function
- ▶ Average of some values



# Basic properties

- ▶ Two independent events:

$$p(A \cap B) = p(A) \cdot p(B)$$