Introduction and structure of the lecture

Signals and codes (SK)

Department of Control and Telematics
Faculty of Transportation Sciences, CTU in Prague

1st lecture

Contents

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What is it all about

Goal of the course:

- To obtain the theoretical and practical knowledge of signals / data and their transfer through an environment.
- To show how are data processed from its origin to their destination in order to be transmitted efficiently (coding, modulation, …)
- Explain basic principles of coding of data (error correction, convolution codes, etc)

- Web: http://its.fd.cvut.cz/courses/signals-and-codes

General information

- **Lecturers**: Petr Bureš (K620), Jan Přikryl (K611)
- **Level**: Master studies
- **Study programe**: Transportation sciences
- **Course**: compulsory for ITS and ID
- **Number of contact academic hours**: 28 (28 classroom, no labs)
- **Additional assignments**: 14 academic hours
- **Credits**: 4
- **ECTS**: 3

Course requirements

- **During the course – to get an assessment**
  - 8 homework assignments (0-½-1 point/homework)
  - 2 small written tests at the lecture (0-½-1 point/test).

  Assessment conditions: attendance ≥ 70% and at least 6 points from assignments and tests.
- **During the exam term – to get final mark**
  - written part (60 points) – those with ≤ 30 fail immediately,
  - oral part (30 points),
  - at most 10 points from the semester.

  Final score: ECTS grading, pass ≥ 50 points

Course requirements

Home assignments

- At the end of a lecture, students will be handed an assignment for the next lecture (next lecture's topic)
- The assignment is individual work and shall be handed in at the beginning of next lecture, their evaluation will be presented to student on the next lecture (evaluation 0, ½, 1)
- Each assignment shall not take more than 1 our to prepare

Tests

- Short test at the beginning of a lecture (same topic as the lecture). Might be in form of a quiz. (evaluation 0, ½, 1)

Recommended literature

Czech course

- Vejražka, František. Signály a soustavy / 4. vyd. Praha: ČVUT, 1996. 243 s. ISBN 80-01-00450-3., In Czech
- Adámek, J. Kódování. SNTL, Praha, 1989, 191 s. In Czech.

English course

- Ziemer, Rodger E.. Principles of communications : systems, modulation, and noise / 5th ed. Hoboken : Wiley, 2002. ix, 637 s. : ISBN 0-471-39253-7.
- Jones G.A., Jones J.M. Information and Coding Theory. Springer Undergraduate Mathematics Series, Springer Verlag, 2000, 210 p.

Other sources – Internet OCW

- http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-450Fall-2006/CourseHome/index.htm (MIT corse)
- http://www.youtube.com/user/nptelhrd#g/c/9567DFCA3A66F299 (IIT Delhi)

Course structure

- This course consists of two parts, first one is signal analysis (Bureš) and second one is coding (Přikryl).

Topics taught in this course:

- Signal and systems, basic signal properties, spectrum representation of a signal, signal interactions, sampling and aliasing of a signal
- Modulation of signals in base and broad band and its applications, parameters of signal
- Principles of digital communication, introduction to codes
- Fixed- and variable-length codes, self-correcting codes, convolution codes, turbo codes, Reed-Solomon codes

Lecture structure

- Lectures are joint with exercises

- 2 academic hours – theory
- 1 academic hour – examples on paper or in MATLAB

Conclusion and contacts

- More and updated information about course and interim results at http://its.fd.cvut.cz/courses/signals-and-codes

Contacts

- Petr Bureš (bures(at)fd.cvut.cz), room K510 or F408
  consultations: on request (e-mail)
- Jan Přikryl (prikryl(at)fd.cvut.cz), room F407
  consultations: Tue 16:00-16:30, We 14:00-15:00