

MSM3P16+4P16 Communication theory

Dr. Deryk Osthus

office hours: Tue 15:00-16:00 and Fri 14:00-15:00

office: 204

email: osthus@maths.bham.ac.uk

url: <http://web.mat.bham.ac.uk/D.Osthus/>

This course comprises of twenty-two lectures and five back-up sessions and gives an introduction to Communication theory. The main aim in this field is to transmit information over some (possibly faulty) communication channel as quickly as possible without introducing ambiguities. Cryptography will also be discussed briefly.

Syllabus

- Noiseless channels (Huffman encoding, bounds on the size of uniquely decipherable codes and bounds on information transmission)
- Noisy channels I: random errors (channel capacity, Shannon's noisy coding theorem)
- Noisy channels II: bounded errors (error correcting codes, linear codes, Hamming codes, bounds on the size of codes)

Assessment

The course is assessed both continually and by final examination. The continuous part of the assessment will be based on your performance on the work handed in from the 5 example sheets and will contribute 20% to your final grade of this half of the module. The final examination will take three hours and contribute 80% to your final grade.

Texts

The following two books are highly recommended.

- Steven Roman, Introduction to coding and information theory, Springer undergraduate texts in Mathematics (classmark QA268)
- Dominic Welsh, Codes and Cryptography, Oxford University Press

The second book is more advanced and goes well beyond the syllabus of the course. There are further related books in the library.