

Course title: Knot Theory

Institute/Division: Institute of Mathematics, Faculty of Physics,
Mathematics and Computer Science

Course code: F2-KT

Erasmus subject code: 11.1 Mathematics

Number of contact hours: 45 hours

Course duration: 1 semester

ECTS credits: 6

Course description:

This course is an elementary introduction to knot theory for undergraduate students in Mathematics, Computer Science, Physics or Engineering with no previous knowledge of the subject.

Topics covered include: the elementary knot moves, the equivalence of knots, links, regular diagrams, knot tables, fundamental global and local problems of knot theory, the Reidemeister moves, the minimum number of crossing points, the bridge number, the unknotting number, the linking number, the coloring number of a knot, the Alexander polynomial, the Jones polynomial, braids, knots and braids, Alexander's theorem, Markov's theorem, DNA and knots.

Literature:

- [1] C. C. Adams, *The Knot Book*, American Mathematical Society, 2004.
- [2] M. Chiodo, *An Introduction to Braid Theory*, 2005.
- [3] P. R. Cromwell, *Knots and Links*, Dover Publications, 2008.
- [4] R. H. Crowell & R. Fox, *Introduction to Knot Theory*, Springer-Verlag, 1977.
- [5] L. H. Kauffman, *Knots and Physics*, World Scientific, 1991.
- [6] L. H. Kauffman, *Formal Knot Theory*, Dover Publications, 2006.
- [7] L. H. Kauffman, *Introductory Lectures on Knot Theory*, WSP, Singapore, 2011.
- [8] A. Kawachi, *A Survey of Knot Theory*, Birkhauser Verlag, 1996.
- [9] W. B. R. Lickorish, *An Introduction to Knot Theory*, Springer-Verlag, 2012.
- [10] C. Livingston, *Knot Theory*, Mathematical Association of America Textbooks, 1996.
- [11] V. Manturov, *Knot Theory*, Chapman & Hall/CRC, 2004.
- [12] D. Rolfsen, *Knots and Links*, American Mathematical Society, 2003.

Course type: lectures (30 hours), problem sessions (15 hours)

Assessment method: project presentations, final exam project

Prerequisites: at least one college level math course

Primary target group: majors in Computer Science, Mathematics, Physics or Engineering

Lecturer: Maciej Zakarczemny, PhD

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