

# Izbrana poglavja iz numerične matematike:

## Splines over triangulations

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The construction of splines over triangulations is one of the fundamental topics in computer aided geometric design (CAGD) that has numerous applications in numerical approximation theory and the theory of finite elements for solving PDEs.

The course will cover the following contents:

- local representation of splines in the Bernstein–Bézier form,
- Bernstein–Bézier methods for smooth joints of polynomials over triangles,
- dimension of spline spaces over triangulations,
- construction of splines over macro-triangles,
- B-spline techniques for splines over triangulations,
- interpolation problems and quasi-interpolation methods,
- splines over triangulations in the finite element method and isogeometric analysis.

The course will be given by lectures and assessed by theoretical exam and project-oriented work comprising the study of content related problems, their presentation and computer implementation.

### Literature

- [1] A. Buffa, G. Sangalli. *IsoGeometric Analysis: A New Paradigm in the Numerical Approximation of PDEs*. Springer, 2016.
- [2] P. G. Ciarlet. *The Finite Element Method for Elliptic Problems*. SIAM, 2002.
- [3] G. Farin. *Curves and Surfaces for CAGD, A Practical Guide, Fifth Edition*. Morgan Kaufmann Publishers, 2002.
- [4] G. Farin, J. Hoschek. *Handbook of Computer Aided Geometric Design*. North-Holland, 2002.
- [5] M.-J. Lai, L. L. Schumaker. *Spline Functions on Triangulations*. Cambridge University Press, 2007.
- [6] H. Prautzsch, W. Boehm, M. Paluszny. *Bézier and B-Spline Techniques*. Springer, 2002.