#### Study programme(s): Mathematics (M3)

Level: bachelor

**Course title:** Fourier analysis

Lecturer: Nenad M. Teofanov

Status: elective

**ECTS**: 5

Requirements: Analysis 1

### Learning objectives

Introduction to theoretical foundations of applied analysis and basic properties of orthonormal bases and frames. Understanding of the notion of analysis and synthesis of a signal. Application of the theory to digital signal processing.

### Learning outcomes

Students are expected to learn theoretical foundations and practical applications of certain parts of contemporary mathematical analysis. Student should obtain knowledge and become capable of doing research in possible applications of mathematical analysis tools.

### **Syllabus**

Theoretical instruction

Hilbert spaces, orthonormal bases and frames. Fourier series and its convergence properties. Fourier transform and inverse Fourier transform with applications.

### Practical instruction

Illustration of theoretical results with examples. Wavelets as examples of orthonormal bases and Gabor systems as examples of frames. Wavelet transform and short-time Fourier transform. Application to differential equations. Seminar papers of theoretical and practical contents (optionally).

# Literature

Nenad Teofanov – Predavanja iz primenjene analize, Zavod za udzbenike, Beograd, 2011.

Weekly teaching load				Other:
Lectures: 2	Exercises: 2	Other forms of teaching:	Student research:	

# **Teaching methodology**

Presentations of theoretical basics with comments.

Introduction to applications of the accepted theory through making and presenting seminar papers.

Grading (maximum number of points 100)				
Pre-exam obligations	points	Final exam	points	
Colloquia	50	Oral exam	50	