Course:	Time-frequency analysis

Course instructors: : Nenad Teofanov

Course type: elective

Credit points ECTS: 12

# Prerequisites: -

# Course objectives:

Introducing basic notions and techniques of the wavelet transform and time-frequency representations. Understanding the basic principles of signal analysis and synthesis and frame theory.

#### Learning outcomes:

Understanding the basic notions and properties of wavelet bases and frame theory with characteristic examples. Adopting the proofs of basic theorems of time-frequency analysis. Mastering analysis and synthesis techniques in classical cases and in modulation spaces.

## **Course description (outline):**

Theoretical classes

Wavelets and multiresolution approximation, Gabor frames and Gabor transform. Modulation spaces. Applications in signal analysis and theory of pseudo-differential operators.

## **References:**

1 K. Gröchenig, K. Foundations of time-frequency analysis. Birkhäuser, Boston, 2001.

2. I. Daubechies, Ten Lectures on Wavelets. SIAM, 1992

3. E. Cordero, L. Rodino, *Time-Frequency Analysis of Operators*. de Gruyter, Boston, 2020.

Active teaching hours: 5	Theoretical classes: 5	Practice classes:		
Methods of teaching:				
Lectures, discussions and regular consultations				
Grading structure (100 points)				
Solving selected homework: 50 points, oral exam: 50 points				