

## COURSE DESCRIPTION

Course name	Harmonic analysis
Course type	reading course (wrđ)
Supervisor	dr hab. Adam Nowak
ECTS credit allocation	4 – IM PAN Ph. D. program; 6 - recommended for MA programs
Duration	One semester
Number of hours	30
Language	English or Polish, if every participant speaks Polish
Prerequisites	Knowledge of multivariable calculus. Basic knowledge of complex analysis and functional analysis.
Course content	<p>The aim of this course is to present and discuss the following topics in harmonic analysis:</p> <ul style="list-style-type: none"> <li>⤴ Fourier series, Fourier transform</li> <li>⤴ Lorentz spaces, interpolation theorems</li> <li>⤴ Hardy-Littlewood maximal operator</li> <li>⤴ Hilbert transform</li> <li>⤴ singular integrals, Calderón-Zygmund operators</li> <li>⤴ Hardy spaces, BMO</li> <li>⤴ theory of <math>A_p</math> weights</li> <li>⤴ Littlewood-Paley theory, multipliers</li> </ul>
Recommended reading	<ul style="list-style-type: none"> <li>⤴ J. Duoandikoetxea, <i>Fourier Analysis</i>, American Mathematical Society, Providence, 2001</li> <li>⤴ L. Grafakos, <i>Classical Fourier Analysis</i>, Graduate Texts in Mathematics 249, Springer, 2008</li> <li>⤴ L. Grafakos, <i>Modern Fourier Analysis</i>, Graduate Texts in Mathematics 250, Springer, 2009</li> </ul>
Learning outcomes	<p>Knows basic notions and theorems of classical and modern harmonic analysis.</p> <p>Can apply in practice presented theorems. Can point out relations of presented facts with other fields of mathematics.</p> <p>Can use scientific literature, in particular can find and overview source materials. Understands the need of individual systematic work on improving own knowledge and abilities.</p>
Assessment methods and criteria	Lists of exercises and exam
Remarks	