Obuda University John von Neumann Faculty of Informatics			**Institute of Applied Mathematics**	
Name and code: *Geometric and Functional inequalities*			**Credits*:*** *2019/20 year II. semester*	
Subject lecturers: Prof. dr. habil. Alexandru Kristály				
Prerequisites (with code):	Calculus I, II			
Weekly hours:	Lecture:	Seminar.:	Lab. hours:	Consultation:
Way of assessment:				
Course description:				
Goal: to provide an introduction into geometric and functional inequalities arising in Geometric Analysis and Sobolev spaces.				
Course description: isoperimetric inequalities; symmetrisation; optimal mass transport; sharp Sobolev inequalities; influence of curvature.				

Lecture schedule	
Education week	*Topic*
1.	Brunn-Minkowski and isoperimetric inequalities
2.	Optimal mass transport
3.	Monge-Kantorovich problem
4.	Symmetrisation
5.	Inequality of Polya-Szego
6.	Inequality of Hardy-Littlewood-Polya
7.	Sharp Sobolev inequality I: Talenti approach
8.	Hardy inequality
9.	Heisenberg-Pauli-Weyl uncertainty principle
10.	Brezis-Poincare-Vazquez inequality
11.	Sharp Sobolev inequality II: Cordero-Erausquin-Nazaret-Villani approach
12.	Influence of curvature I: negative curvature
13.	Influence of curvature II: positive curvature
14.	Application to elliptic problems (Dirichlet, Schrodinger)

Midterm requirements

Education week	*Topic*

Final grade calculation methods

Achieved result	Grade
89%-100%	excellent (5)
76%-88<%	good (4)
63%-75<%	average (3)
51%-62<%	satisfactory (2)
0%-50<%	failed (1)

2020. 02. 15.

Type of exam
Project presentation & Written exam
Type of replacement
Project presentation
References
Mandatory: 1. Ghoussoub N., Moradifam A., Functional Inequalities: New Perspectives and New Applications, AMS, 2013. 2. Kristály A., Sharp uncertainty principles on Riemannian manifolds: the influence of curvature. J. Math. Pures Appl. (9) 119 (2018), 326–346.
Recommended: 1. Kristály A., Radulescu V., Varga Cs., Variational Principles in Mathematical Physics, Geometry, and Economics, Cambridge University Press, Enciclopedia of Mathematics and its Applications. No 136, 2010. 2. Balogh Z., Kristály A., Sipos K., Geometric inequalities on Heisenberg groups. Calc. Var. Partial Differential Equations 57 (2018), no. 2, Art. 61, 41 pp.