



The Hebrew University of Jerusalem

Syllabus

Topics in Geometric Analysis - 80931

Last update 15-10-2024

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Mathematics

Academic year: 2025

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Or Hershkovits

Coordinator Email: Or.Hershckovit@mail.huji.ac.il

Coordinator Office Hours:

Teaching Staff:

Prof. Or HersHKovits

Course/Module description:

The course will concern with elliptic partial differential equation of order two. The guiding problem for the class will be the 19th problem that Hilbert posed in his famous lecture at the beginning of the previous century: Whether solutions to Euler-Lagrange equations with analytic coefficients are analytic themselves. In the class we will develop ideas and estimates which will, eventually, lead us to the resolution of the above problem. We will also see some applications of the method we see to geometry and encounter a few recent results in the field.

Course/Module aims:

Learning outcomes - On successful completion of this module, students should be able to:

At the end of the class, students will be able to begin to read current papers in the field.

Attendance requirements(%):

Teaching arrangement and method of instruction:

Course/Module Content:

1. Maximum principles and their usage (pointwise and ABP)
2. Schauder estimates and existence
3. Sobolev spaces and weak solutions
4. L^p estimates
5. divergence form equations, Nash and Moser iteration. Moser's Harnack inequality.
6. Gradient estimates and Hölder gradient estimates, both interior and up to the boundary.
7. Existence and regularity for quasi-linear elliptic equations.

Required Reading:

none

Additional Reading Material:

1. Gilbarg and Trudinger- elliptic partial differential equations of second order.
2. Han and Lin - Elliptic differential equations

Grading Scheme:

Other 100 %

Additional information: