האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Topics in geometric measure theory - 80757

Last update 17-09-2021

HU Credits: *3*

Degree/Cycle: *2nd degree (Master)*

Responsible Department: *Mathematics*

Academic year: *0*

Semester: *1st Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Or Hershkovits*

Coordinator Email: *or.hershkovits@gmail.com*

Coordinator Office Hours:

Teaching Staff:

Dr. Or Hershkovits

Course/Module description:

The motivation for this class is the classical Plateau's problem. Given a k dimensional sub-manifold N in R^n, find a (k+1) dimensional sub-manifold M having the minimal volume among all the sub-manifolds with boundary N.

In order to address this problem, we will develop weakened notions for sub-manifolds (Integral varifold, Integeral currents), which employ the language of measure theory, and study their properties.

At the end of the class, we hope to give the following answer to Plateau's problem: There always exists a weak solution to Plateau's problem. If k&eq;n-2 (i.e. when we search for a hypersurface minimizing volume), the solution is a smooth hypersurface, away from a set of co-dimension 7. In the general case, we will show that the solution is smooth on an open dense set.

Course/Module aims:

Same as in learning outcomes.

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

Ability to prove and apply the theorems presented in the course.

Ability to apply correctly the mathematical methodology in the context of the course.

Acquiring the fundamentals as well as basic familiarity with the field which will assist in the understanding of advanced subjects.

Ability to understanding and explain the subjects taught in the course.

Attendance requirements(%):

Teaching arrangement and method of instruction:

Course/Module Content:
outer measures, Hasudorff measure, densities and covering theorems.

a.e differentiability of Lipschitz functions, BV functions and sets of finite perimeter. area and co-area formulae, and the C^1 Sard theorem.

Rectifiable sets and Rectifiable varifolds: first variation, monotonicity and Sobolev inequalitites.

The Allard regularity theorem.

Integral currents - slicing, compactneess, dimension reduction and optimal regularity in the co-dimension 1 setting.

Required Reading:
No

Additional Reading Material:
Introduction to Geometric measure theory - Leon Simon

Course/Module evaluation:
End of year written/oral examination 0 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 100 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information: