Titolo del corso: Fully nonlinear elliptic equations

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Membro del collegio proponente: Fausto Ferrari

Ore frontali di lezione: 10

Periodo di lezione: January 2025

Settore disciplinare del corso: SSD MATH-03/A- Analisi Matematica,

Tipologia di corso: Avanzato

Modalità di verifica dell'apprendimento: oral exam with 5 exercises each discussing one of the topics as well as homework to fill some steps of the proofs which are not very clear in the book by Caffarelli-Cabré.

Abstract del corso: In this course, we will discuss viscosity solutions to fully nonlinear equations, following the famous book by L. Caffarelli and X. Cabr´e, Fully nonlinear elliptic equations. American Mathematical Society Colloquium Publications, 1995

Programma del corso: The list of content discussed will be:

• Preliminaries: Definition of viscosity solutions, uniform ellipticity, extremal Pucci operators and S class of solutions, Alexandroff-Bakelman-Pucci estimate;

• Weak L ε estimate, Harnack inequality, C α regularity for solutions in the S class (Krylov Safanov theory);

• Uniqueness via Jensen method, C^{1,α} regularity for the homogeneous equation with fixed coefficients and C^{2,α} if the operator is convex/concave (Evans-Krylov theory);

• Study of inhomogeneous equations with variable coefficients: Interior C 1,α for the general case and C 2,α if the operator is convex/concave.

• Discuss the state of the art in the topic.

Jesus expectd to discuss each topic in one lesson of 2h, so the full course would take 5 lessons of 2h each.