# FSF3628 Viscosity Solutions of Nonlinear Partial Differential Equations 15.0 credits

Viskositetslösningar för icke-linjära partiella differentialekvationer

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

Course syllabus for FSF3628 valid from Autumn 2012

## Grading scale

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## Education cycle

Third cycle

## Specific prerequisites

SF1629 Differential equations and transform methods, SF2709 Integration theory, SF2707 Functional Analysis.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

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# Intended learning outcomes

After the course, the student should have sufficient depth in the field of linear and nonlinear Partial Differential Equations (PDE) to be able to read research articles related to the topics in PDE.

# Course contents

- Classical maximum principle, gradient estimates, Harnack inequality,
- Poisson's equation with H¨older estimates,
- Topics in functional analysis and Sobolev spaces,
- Schauder estimates and classical solutions,
- Tangent paraboloids and second order differentiability,
- Viscosity solutions of elliptic equations,
- Alexandroff estimate and maximum principle,
- Harnack Inequality for viscosity solutions,
- Uniqueness of solutions,
- Concave equations,
- Dirichlet problem.

# Disposition

Lectures, problem solving sessions, and presentation.

# Course literature

D. Gilbarg and N. Trudinger: Elliptic Partial Differential Equa-tions of Second Order, 2nd ed., Springer 1983. Chapter 1-7.
X. Cabre´ and L.A. Caffarelli: Fully Nonlinear Elliptic Equations.

# Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Homeworks, and presentation/oral exam.

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# Other requirements for final grade

Approved homework assignments, and presentation/oral examation

# Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.