LUND UNIVERSITY
Faculty of Science

Syllabus for the course Advanced course in the Calculus of Variations, NAMA006

Swedish title: Avancerad kurs i variationskalkyl

The course syllabus was confirmed by the Faculty board for graduate studies on 15 February 2016. Third cycle course, 7.5 credits.
This is a translation of the course syllabus approved in Swedish.

Learning outcomes
On completion of the course, the students shall be able to:

- Describe some direct methods in the calculus of variations and give an outline of their proofs. Special attention is given to problems with compactness which arise in the infinite-dimensional context.
- Describe some minimax methods and how index theory can be used to find multiple critical points, and give an outline of the proofs.
- Suggest and apply a suitable method for finding critical points of a given functional.
- Describe some applications in other fields of mathematics, e.g. differential equations or differential geometry.
- Reflect over the strengths and limitations of different variational methods.

Course content
Direct methods. Semi-continuity. Coercivity. Convexity. Constraints. Concentration-compactness. Minimax methods. Index. Mountain pass methods. Applications to differential equations and differential geometry.

Teaching
Teaching consists of lectures, seminars and self-studies.

Assessment
Examination takes the form of an oral exam.

Grading scale
Possible grades are Pass and Fail. For a grade of Pass, the student must pass the oral exam.

Language
If there is at least one participant who doesn't speak Swedish, the course is given in English. Otherwise, the course is given in Swedish or English.

Entry requirements
MATP15 Linear Functional Analysis or equivalent.