

Topological Methods in Nonlinear Analysis

Objectives: The presentation of some basic results at the heart of nonlinear analysis.

Prerequisites: Special topics in functional analysis, real and complex analysis, partial differential equations.

Syllabus

1. Background. Elements of Functional Analysis. Differential Calculus in Banach Spaces.
2. Fixed Point Existence Theory.
3. Degree Theory. Brouwer Degree. Leray-Schauder Degree.
4. The Krasnoselskii-Rabinowitz Bifurcation Theorem. Applications to PDE.

Bibliography

1. H. W. Alt, *Lineare Funktionalanalysis*, Springer-Lehrbuch, Berlin, 1992.
2. R. F. Brown, *A Topological Introduction to Nonlinear Analysis*, 2nd edition, Birkhäuser, Basel, 2004.
3. C.P. Niculescu, *Special Topics in Functional Analysis*, Universitaria Press, Craiova, 2005.
4. E. Zeidler, *Nonlinear Functional Analysis and Its Applications: Fixed point Theorems*, Springer-Verlag, 1986.

Instructor: Constantin P. Niculescu