DEGREE THEORY WITH APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS

BY

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Abstract: Degree Theory has demonstrated to be a powerful tool in order to look for roots of continuous functions and, nowadays, it is applied to a very large class of analytical and geometrical problems. This course includes some topics on degree theory in Banach spaces. More concretely, we will speak about Brouwer degree in R^n and Leray-Schauder degree in infinite-dimensional spaces. Finally, we will show how this techniques can be applied when looking for solutions for some kind of Ordinary Differential Equations, and how it can be coupled with another standard techniques, with particular emphasis in lower and upper solutions method.

Topics:

1. Motivation: a periodic problem with constant lower and upper solutions.
2. Brouwer degree in R^n: construction of Brouwer degree; properties; typical applications – Brouwer's fixed-point theorem and hairy ball theorem.
3. Leray-Schauder degree in infinite-dimensional spaces: construction of L-S degree; properties; typical applications – Schauder's fixed-point theorem.
4. Application of degree theory to boundary value problems.

Timetable and Location:

1st lecture: 11 March, Monday, 16:30 – 18:00, Sala BES, 4º piso, Ed. do Quelhas;
2nd lecture: 12 March, Tuesday, 16:30 – 18:00, Anfiteatro 1, 4º piso, Ed. Quelhas;
3rd lecture: 18 March, Monday, 16:30 – 18:00, Sala BES, 4º piso, Ed. Quelhas;
4th lecture: 19 March, Tuesday, 16:30 – 18:00, Anfiteatro 1, 4º piso, Ed. Quelhas.

Registration: For registration please send an email message to Prof. Maria do Rosário Grossinho at `mrg@iseg.utl.pt`. There is no registration fee.

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