TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA
PhD Course 2026

"Topological Methods in Dynamical Systems: From Morse Theory to the Conley Index Theory"

SPEAKER/LECTURER: Dahisy Lima *(Universidade Federal do ABC Instituição Federal de Ensino Superior pública e gratuita)*
Site: https://dahisylima.prof.ufabc.edu.br/

Period and schedule: May 14 to June 04 2026

Every Tuesday and Thursday,

Hours: 11:00 - 13:00

Conference Room:

1201 - Dedicated to "R. Dal Passo",

Only May 14 2026 **Conference Room 1101 "C. D'Anton"**

Venue: Dipartimento di Matematica - Tor Vergata:

Via della Ricerca Scientifica, 1 – 00133 - ROMA

The schedule can be modified according to the availability of those interested.

Abstract:

We begin by reviewing the main concepts and results of classical Morse theory, highlighting its role in understanding the topology of manifolds through the critical points of smooth functions. We then introduce the fundamental definitions and key properties of the Conley index, emphasizing its robustness and flexibility in the study of general dynamical systems.

Finally, we discuss Morse decompositions and their associated Morse–Conley inequalities, illustrating how these tools provide deep insights into the structure of invariant sets and the qualitative behaviour of flows. This minicourse provides an introduction to topological methods in dynamical systems, with an emphasis on Conley

Index Theory. Conley theory can be viewed as a far-reaching generalization of Morse theory, extending its applicability beyond gradient-like dynamics.
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