

COURSE TITLE: Technology in Mathematics Education

COURSE DESCRIPTION: This course aims to address contemporary, international research on how people teach and learn mathematics with digital technologies. Ongoing research on math education, teacher practice, curriculum studies, and pedagogy is uncovering the complexity associated with learning and teaching within dynamic learning environments. Integrating three disciplines – cognitive psychology, computer science, and education – provides a framework to study technology's cognitive and social affordances in mathematics classrooms. This framework can be used to understand several genres of teaching and learning, including knowledge representation, knowledge diffusion, learning-on-demand, and embodiment. They are amplified and augmented with technological advancements, such as dynamic visualisation tools, computer simulations, collaboratories, networked databases, hand-held devices, and virtual reality, with growing importance based on applications' evidence in educational contexts. Therefore, the focus of the course will be developing teaching strategies for technology's integration and implementation through case studies and project-based activities.

LEARNING OBJECTIVES:

By the end of the course:

- KNOWLEDGE AND UNDERSTANDING: students will know how to integrate technology into Maths Teaching practices, recognise which suitable pedagogical design adopts, and blend content knowledge into methodology frameworks.
- APPLYING KNOWLEDGE AND UNDERSTANDING: students will be able to plan, prepare and realise learning sequences in Maths teaching at different levels of instruction.
- MAKING JUDGMENTS: students will be able to consider the implications digital technology has for students, teaching practice, curriculum development, and educational contexts through analyses of many technology-enhanced learning experiences, and they will reflect upon your learning pathways throughout the course.
- COMMUNICATION SKILLS: Students will be able to adapt Maths content knowledge by using ICT in Mathematics Education.
- LEARNING SKILLS: Students will be able to evaluate how, to what extent, when and where to include the use of ICT in Maths learning sequences.

PRE-REQUISITES:

Linear Algebra, Fundamentals of Mathematical Analysis

CONTENTS AND EXTENSIVE PROGRAM:

- 1) Main theoretical frameworks about the research in Technology in Mathematics Education

- 2) Hints concerning Pedagogical Content Knowledge in Maths Teaching (CO-ACTIVE) and Content Knowledge for Maths Teaching: definition of Tasks of Teaching for Integrated ICT in Maths learning
- 3) Digital learning environment: Geogebra, Desmos, Excel, Scratch (Maths-coding), PHET-maths, Gizmo-maths, Visual 3D.
- 4) Project learning activities laboratory-based: exercises and examples on ICT integration.

FINAL EXAMINATION:

Preparation of a Maths learning sequence integrating the use of one learning environment described into the teaching process.

Discussion of the course contents (specifically referring to research references).

REFERENCE TEXT:

Research articles