UNIVERSITÀ DEGLI STUDI DI MILANO
DIPARTIMENTO DI MATEMATICA "FEDERIGO ENRIQUES"

The Learning and Teaching of Calculus Across Disciplines 2

16-20 June 2025
Milan, Italy

MATH EXCELLENCE PROJECT

First Announcement

How do biologists, chemists, economists, engineers, and physicists understand and use calculus concepts and reasoning in their disciplines? And what does this imply for the teaching and learning of calculus oriented to scaffold students' learning in these disciplines, with particular attention to modelling and argumentation?

This conference seeks to explore these issues
by bringing specialists from these disciplines and their didactic research together with mathematics educators.

In what ways might ideas and notions from biology, chemistry, economics, engineering, and physics form part of ways of thinking in calculus? How might ideas in calculus be important in these disciplines and their workplace practices, with particular attention to modelling and argumentation? How do experts in these disciplines think with fundamental calculus ideas such as rate of change, accumulation, and differentials? Are there connections and parallels in how experts in these disciplines think about modelling processes involving calculus concepts? What is the role of technologies and simulations in these processes?

How do those who teach mathematics to students in these disciplines need to rethink calculus so as to make it relevant to these processes and ways of thinking? What results from the research in the teaching and learning of other disciplines can be relevant for mathematics educators interested in the didactical aspects related to the use of calculus across disciplines, and how do these impact the teaching and learning of calculus in, and for, these disciplines?

The aim of this conference is to contribute to the reflection on these aspects and to encourage researchers in didactics of mathematics and other disciplines to develop new collaborations and join forces to make significant steps forward. In order to make the dialogue between mathematics and other disciplines deep and authentic, and to encourage the participation of researchers interested in the didactics of these disciplines, we invited scholars with expertise in other disciplines and interdisciplinarity (science and STEM education, mathematics and economics, mathematics for engineering, mathematics and physics education) to become members of the scientific committee (SC) of the conference. The SC will be composed by: Laura Branchetti (Univ. of Milan, Italy), Sibel Erduran (Univ. of Oxford, UK), Frank Feudel (Univ. of Berlin, Germany), Alejandro S. González-Martín (Univ. of Montreal, Canada) and Olivia Levrini (Univ. of Bologna, Italy).

The conference will last five days. It will include plenary activities featuring experts in the interplay between mathematics and other disciplines who are interested in calculus-related didactical issues. These experts will propose critical reflections, research results, and good practices focusing on several dimensions. These dimensions include epistemological and institutional barriers and opportunities, interdisciplinary co-design and co-teaching experiences, task design and teaching practices, students' reasoning, and teacher education. These plenary activities will take place during the first part of the conference. Participants will then attend presentations of contributed papers and work in discussion groups that focus on the general topics of the plenaries with relevance across disciplines and a calculus main theme, like rate of change, accumulation, quantitative reasoning (especially quantification), modelling, use of units and meanings of variables, limits, differentials, integrals and more. Discussion group themes will be agreed on later and be influenced by the papers submitted by participants.

On the final day, participants will focus on achieving the two main aims of the conference:

1. To generate recommendations about the calculus curriculum and examples of prototypical teaching and co-teaching experiences concerning calculus targeted to biology, chemistry, economics, engineering, and physics students in several contexts and courses, that are at the same time relevant and conceptually robust.
2. To define aims for (further) research in the area that is needed to achieve (1) and establish research collaborations accordingly.

In September 2024 a Second announcement will be sent together with the Call for papers, including more information about the venue, the fees, the accommodation, the supporting grants, the registration and the scientific program.