MatRIC Centre for Research, Innovation and Coordination of Mathematics Teaching

UNIVERSITY OF BERGEN

The Learning and Teaching of Calculus Across Disciplines
5-9 June 2023, Bergen (Norway)
https://matriccalconf2.sciencesconf.org

Monday, 15 May 2023

Dear conference presenter / attendee,

*We are pleased to write to you with an update on conference details, our **Third Announcement**, following the Second Announcement on April 22.*

Informal pre-conference proceedings

You can now find these on the website and are also attached to the email through which you are receiving this announcement. We kindly ask that you read these in preparation for the conference. There are two ways to see the table of contents. In Adobe Reader or Acrobat, select the Bookmarks tab. In Preview (Mac), select View/Table of Contents.

Conference schedule

Here is the latest version of the conference schedule. Paper presentations will be up to 20m, followed by 15m discussion. The programme of the paper presentations will be available on the website at least a week prior to the conference.

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9.00	Opening 9h – 10h30	Plenary 2 Vosskamp (Economics) 9h – 10h30	Plenary 4 Faulkner (Engineering) 9h – 10h30	Paper presentations Session 4 9h – 10h30	Discussion group DGC 9h – 10h30
9.15					
9.30					
9.45					
10.00					
10.15					
10.30	Break 10h30 – 11h	Break 10h30 – 11h	Break 10h30 – 11h	Break 10h30 – 11h	Break 10h30 – 11h
10.45					
11.00	Paper presentations Session 1 11h – 12h15	Paper presentations Session 2 11h – 12h15	Paper presentations Session 3 11h – 12h15	Paper presentations Session 5 11h – 12h15	Session on collaborations 11h – 12h15
11.15					
11.30					
11.45					
12.00					
12.15	Lunch 12h15 – 13h45	Lunch 12h15 – 13h45	Lunch 12h15 – 13h45	Lunch 12h15 – 13h45	Lunch 12h15 – 13h45
12.30					
12.45					
13.00					
13.15					
13.30					
13.45	Plenary 1 Díaz Eaton (Biology) 13h45 – 15h15	Plenary 3 Towns (Chemistry) 13h45 – 15h15	Plenary 5 White Brahmia (Physics) 13h45 – 15h15	Discussion group DGA 13h45 – 15h15	Reports from discussion groups Looking ahead Conclusions 13h45 – 15h
14.00					
14.15					
14.30					
14.45					
15.00					
15.15	Break 15h15 – 15h45	Break 15h15 – 15h45	Break 15h15 – 15h45	Break 15h15 – 15h45	
15.30					
15.45	Brainstorm session BR1 15h45 – 17h	Brainstorm session BR2 15h45 – 17h	Brainstorm session BR3 15h45 – 17h	Discussion group DGB 15h45 – 17h15	
16.00					
16.15					
16.30					
16.45					
17.00					

***Conference Excursion**: Tuesday from 17:30*
***Conference Dinner**: Thursday, from 19:00*

Information about the plenary speakers

Drafts of the plenary talks are included in the *informal pre-conference proceedings*. You can find brief biographical information about the five plenary speakers at https://matriccalcconf2.sciencesconf.org/resource/page/id/7.

Discussion Groups and Brainstorm Sessions

Very provisionally, here is a list of the questions and themes we would like to address during the interactive sessions of the conference (Brainstorm Sessions 1, 2 and 3; Discussion Groups A, B and C). We anticipate ongoing exchanges amongst participants, including lunch and other breaks. We also see the Brainstorm Sessions as opportunities to gather our thoughts on presentations so far (BR1 on Monday; BR2 on Tuesday; BR3 on Wednesday). We envisage addressing three different questions for discussion in each DG session in three parallel groups, one for each question (A, B) and across the three questions (C). The questions in DGA are rather concrete, those in DGB more abstract and those in DGC are future oriented. Examples of questions for DGA, DGB and DGC follow.

DGA *(based on a critical incident as a starter)*
A1. What roles (and/or forms) do the notions of derivative (+ differentials) and rate of change play in different disciplines? When do the disciplines introduce concepts/techniques from multi-variable calculus? Are there parallels between the disciplines? Are there epistemological differences? Are there incompatibilities? How (and what) technologies, digital and other, are used in the disciplines?
A2. What role do numerical approaches and approximation play in the various disciplines? Are there parallels between the disciplines? Are there epistemological differences? Are there incompatibilities? How (and what) technologies, digital and other, are used in the disciplines?
A3. What roles (and/or forms) do the notions of integration and differential equations play in different disciplines? Are there parallels between the disciplines? Are there epistemological differences? Are there incompatibilities? How (and what) technologies, digital and other, are used in the disciplines?

DGB
B1. How do students reason about calculus concepts? Is that reasoning compatible with the expectations of the teachers from the disciplines / the teachers who are mathematicians? [Chunkiness as well as discrete data might play a role here.]
B2. How do professionals think with calculus in the various disciplines? What are problems and issues in the disciplines that drive calculus learning (including epistemology); Are these similar across the disciplines? How is calculus used to conceptualize phenomena in the disciplines?
B3. How do professionals of the other disciplines use and reason with technology? What are the problems and issues in the disciplines that require the use of technology and calculus notions? Does technology 'hide' the notions from calculus? How do calculus notions help interpret results provided by technology?

DGC
In three parallel groups, we discuss how to make calculus courses useful and engaging for students in different disciplines, how to go beyond "one size fits all" approaches to calculus course design and how to deliver these courses. Here are some indicative questions:

- What ideas/problems in your discipline necessitate calculus and how could they find their expression in a calculus course?
- What ways of reasoning can be left out of a calculus course as a consequence of disciplinary characteristics?
- How might the standard ordering of a calculus course be changed, e.g. introducing the derived function before looking at the limit of secants or considering the option that integration is introduced before differentiation?
- To what extent (and how) should disciplinary conceptions play a role when teaching calculus?
- How can thinking about calculus concepts from different disciplines enrich each other?
- How can we support instructors in delivering such courses?

Meeting point on Monday 5 June, from 8am

Please come to
Realfagsbygget (Science Building), University of Bergen, Allegaten 41, Auditorium 1
for registration (from 8am) and for the opening session (at 9am):
https://www.google.com/maps/search/Realfagbygget,+Bergen+Allegaten+41/@60.3849882,5.327146,17z

There is a small number of **places available for registration** for colleagues interested in participating in the conference. Registration will remain open **until Sunday 21 May, 23:59, Norway time**. Share this information as you deem appropriate and contact Elisabeth Rasmussen at elisabeth.rasmussen@uia.no if you are having difficulties with finding accommodation.

We look forward to seeing you in Bergen very soon!
Best wishes,
The Programme Committee and the Local Organising Committee