# MatRIC Calculus Conference 2019 Program

## **TUESDAY**

09:00 – 10:30 Welcome, Conference Opening and Plenary I (room: B2 003)					
David Tall (video)					
11:00 12:30 Brainstorming discussion groups					
Room	Room F1.018 (EN) F1.023 (IM) F1.021 (TD)				
KUUIII		<b>B</b>	C		
Chair	Pat Thompson	D Lux Kidron	Rolf Bighlar		
Scribe (*)	Flena Nardi	Iohn Monaghan	Tommy Drevfus		
Scribe ()	$12.30 - 13.30 I_{1}$	unch (The Canteen - Lilletuns	tova)		
	<u>12:30 13:30 – 1</u>	5:00 Paper presentations	1074)		
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)		
	Α	B	C		
Chair	Charlotte Derouet	Sepideh Stewart	Laurent Vivier		
	Herbst, Patricio;	Biza, Irene	Clark, Kathleen M.		
	Shultz, Mollee	Calculus as a discursive	Examining students'		
	How professional	bridge for Algebra,	secondary-tertiary		
	obligations can help	Geometry and Analysis:	transition: Influences of		
	understand decisions in	The case of tangent line	history, disposition, and		
	the teaching of calculus		disciplinary		
	across institutional		engagement		
	contexts				
	Jennings, Michael;	Kontorovich, Igor';	Hagman, Jessica Ellis		
	Goos, Merrilyn;	Herbert, Rowan; Yoon,	A vision for the future		
	Adams, Peter	Caroline	of college calculus		
	Teacher and lecturer	Students resolve a	_		
	perspectives on	commognitive conflict			
	secondary school	between colloquial and			
	students' understanding	calculus discourses on			
	of the limit definition of	steepness			
	the derivative				
	Pinto, Alon	Swidan, Osama	Törner, Günter		
	Towards transition-	Construction of the	The 'Signature' of a		
	oriented pedagogies in	mathematical meaning of the	Teaching Unit –		
	university calculus	function-derivative	Calculus' as the 'Heart'		
	courses	digital artifacts	Introductory		
		digital artifacts	Mathematical Courses		
	15.0	0 – 15·30 Coffee break			
	15:30 - 17:	00 Paper discussion groups			
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)		
	Α	В	C		
Chair	Charlotte Derouet	Sepideh Stewart	Laurent Vivier		
Reactor	Rogier Bos	Alejandro González-	Tommy Dreyfus		
		Martín			
Scribe	Courtney Simmons	Niels Grønbæk	Olov Viirman		

(\*)

- The **Chair** will ensure things run to time and that all participants have an opportunity to contribute.
- The **Reactor** will:
  - read the relevant papers before the conference
  - attend the relevant paper presentation and take notes about each paper
  - present an opening summary of the 3 papers, note similarities and differences and suggest areas for discussion in the Paper discussion groups session (about 5 minutes).
- The **Scribe** will make an electronic record of the main contributions in the discussion group (approximately 500 words), name the file according to the naming convention below and send it, as soon as possible after the meeting, to Ninni Marie Hogstad (<u>ninni.m.hogstad@uia.no</u>) to put on the conference website. The record should include the name of the discussion group but does not need to include the names of the participants. The scribes will also give a short (about 15 minute) report on the session they scribed for during the report sessions on Friday.

Naming convention: Please name the file "DayCol yourname", where DayCol is the three letter code for the weekday + column in the program, for example TuB, WeA or ThC Yourname is either your first or your family name

## **WEDNESDAY**

09:00 – 10:30 Plenary II (room: B2 003)				
Patrick W. Thompson				
10:20 11:00 Coffee break				
11.00  12.20  Topic discussion groups				
Room     E1 018 (EN)     E1 023 (IM)     E1 021 (TD)				
KUUIII		<b>B</b>	C	
Chair	Flena Nardi	Iohn Monaghan	Tommy Drevfus	
Chui	Transitions and	Networking ATD and ToC	Notions of convergence	
	navigations in Calculus	in conference papers	and limit for different	
	to / across university	in conference pupers	groups of learners	
	and into the workplace		groups of lourners	
	$12.30 - 13.30 L_{1}$	unch (The Canteen - Lilletuns	tova)	
	13:30 - 1	5:00 Paper presentations		
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)	
	Α	В	C	
Chair	Michael Jennings	Igor' Kontorovich	Patricio Herbst	
	Bos, Rogier;	Bang, Henrik; Grønbæk,	Derouet, Charlotte	
	Doorman, Michiel;	Niels; Larsen Claus	Introducing the integral	
	Drijvers, Paul	Teachers' choices of	concept with	
	Supporting the	digital approaches to upper	probability tasks	
	reinvention of slope	secondary calculus		
	<u>Kouropatov, Anatoli;</u>	<u>Mesa, Vilma;</u> Liakos,	Ely, Robert	
	Ovodenko, Regina	Yannis; Boelkins, Matt	Teaching calculus with	
	Construction (and re-	Designing textbooks with	(informal)	
	construction) and	enhanced features to	infinitesimals	
	consolidation of	increase student		
	knowledge about the	interaction and promote		
	inflection point:	instructional change		
	Students confront errors			
	using digital tools			
	Stewart, Sepideh;	Sangwin, Christopher J.	Nilsen, Hans Kristian	
	Reeder, Stacy	The mathematical	First-year engineering	
	Examining unresolved	apprentice: an organising	students' reflections on	
	difficulties with school	principle for teaching	the Fundamental	
	algebra in calculus	calculus in the 21st	Theorem of Calculus	
	15.0	century		
	15:0	0 – 15:30 Coffee break		
D	15:30 - 17:	<b>SUU Paper discussion groups</b>	E1 021 (TD)	
Koom	F1 018 (EN)	F1 023 (JM)	F1 031 (1D)	
Chair	A Michael Laurinez	D Icon' Vontonovich	Datuicic Hawhat	
Chair Deactar	Micnael Jennings	Igor Kontorovicn	Patricio Herbst	
Keactor Souths	Aaron wangberg		A thin a Thomas	
i scripe	Irene Biza	Jessica Hagman	Атпіпа І пота	

### **THURSDAY**

09:00 – 10:30 Plenary III (room: B2 003)				
Rolf Biehler				
The transition from Calculus and to Analysis –				
Conceptual analyses and supporting steps for students				
10:30 – 11:00 Coffee break				
I1:00 – 12:30 Paper presentations   Dearm E1.019 (EN)				
Room	FI 018 (EN)	F1 023 (JM)	FI 031 (1D)	
<u>C1</u> '		B K dll Cl l		
Cnair	Gunter Torner	Katnieen Clark	Anatoli Kouropatov	
	Simmons, Courtney;	Durand-Guerrier,	Feudel, Frank	
	Oventitatively Based	Viviane; Montoya	Required knowledge of	
	Quantitatively Based	Deigadillo, Elizabeth;	ule derivative in	
	Summation: A	<u>vivier, Laurent</u>	from a tauthook	
	appartice of definite	discreteness density	nom a textbook	
	integrals	completeness contaxts	allarysis	
	Thoma Athina	Kidron Im	Conzóloz Mortín	
	<u>Inoma, Auma;</u> Nardi Elona	The dual nature of	<u>Golizalez-Martin</u> ,	
	Linear stability or	reasoning in Calculus	<u>Alejanuro 5.;</u> Hornondos-Comos	
	graphical analysis?	reasoning in Calculus	Cisolo	
	Routines and visual		What happens after	
	mediation in students'		Calculus? Examples of	
	responses to a stability		the use of integrals in	
	of dynamical systems		engineering: the case of	
	exam task		Electromagnetism	
	Wangberg, Aaron:	Monaghan, John	Viirman, Olov:	
	Gire, Elizabeth	The place of limits in	Pettersson, Irina	
	Raising Calculus to the	elementary calculus	What to do when there	
	Surface: Extending	courses	is no formula?	
	derivatives and		Navigating between	
	concepts with multiple		less and more familiar	
	representations		routines in a calculus	
			task for engineering	
			students	
	12:30 – 13:30 Li	unch (The Canteen - Lilletuns	tova)	
	13:30 - 15:	00 Paper discussion groups		
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)	
	Α	В	С	
Chair	Günter Törner	Kathleen Clark	Anatoli Kouropatov	
Reactor	Alon Pinto	Chris Sangwin	Vilma Mesa	
Scribe	Regina Ovodenko	Robert Ely	Hans Kristian Nilsen	
	15:00	0 – 15:30 Coffee break		
	15:30 - 17:	00 Future discussion group	I	
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)	
	Α	В	С	
Chair	Pat Thompson	Ivy Kidron	Rolf Biehler	
Scribe	Elena Nardi	John Monaghan	Tommy Dreyfus	
Room		F1 022 (EN)		
17:10 – 17:40 Meet the editors				

### **FRIDAY**

09:00 – 11:00 Plenary panel (room: B2 003)					
From Newton's first to second law: How can curriculum, pedagogy and assessment					
celebrate a more dynamic experience of calculus?					
11:00 – 11:30 Coffee break					
<b>EXAMPLE 1019 (EV)</b>					
Room	F1 018 (EN)	F1 023 (JM)	FI 031 (TD)		
11:30-12:10	A	B	C		
	<u>Herbst, Patricio;</u>	Biza, Irene	Clark, Kathleen		
	Shultz, Mollee	Calculus as a	<b>M.</b>		
	How professional	discursive bridge for	Examining students'		
	obligations can help	Algebra, Geometry and	secondary-tertiary		
	understand	Analysis: The case of	transition:		
	decisions in the	tangent line	Influences of		
	teaching of calculus		history, disposition,		
	across institutional		and disciplinary		
	contexts		engagement		
	<u>Jennings, Michael;</u>	<u>Kontorovich, Igor';</u>	Hagman, Jessica		
	Goos, Merrilyn;	Herbert, Rowan;	Ellis		
	Adams, Peter	Yoon, Caroline	A vision for the		
	Teacher and	Students resolve a	future of college		
	lecturer	commognitive conflict	calculus		
	perspectives on	between colloquial and			
	secondary school	calculus discourses on			
	students'	steepness			
	understanding of				
	the limit definition				
	of the derivative				
	Pinto, Alon	Swidan, Osama	Törner, Günter		
	Towards transition-	Construction of the	The 'Signature' of a		
	oriented pedagogies	mathematical meaning	Teaching Unit –		
	in university	of the function-	'Calculus' as the		
	calculus courses	derivative relationship	'Heart' within		
		using dynamic digital	Standard		
		artifacts	Introductory		
			Mathematical		
			Courses		
Chairs (**)	Rogier, Bos	Alejandro González-	Tommy Dreyfus,		
	Courtney Simmons	Martín,	Olov Viirman		
		Niels Grønbæk			
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)		
12:20-13:00	Α	В	С		
	Bos, Rogier;	Bang, Henrik;	Derouet, Charlotte		
	Doorman, Michiel;	<u>Grønbæk, Niels;</u>	Introducing the		
	Drijvers, Paul	Larsen, Claus	integral concept		
	Supporting the	Teachers' choices of	with probability		
	reinvention of slope	digital approaches to	tasks		
		upper secondary			
		calculus			

	Kouronatov	Mesa Vilma•Liakos	Elv Robert
	<u>Anatoli</u>	Vannis: Boelkins	Teaching calculus
	Ovodenko Regina	Matt	with (informal)
	Construction (and	Designing textbooks	infinitesimals
	re-construction) and	with enhanced features	minicomais
	consolidation of	to increase student	
	knowledge about	interaction and	
	the inflection point:	promote instructional	
	Students confront	change	
	orrors using digital	change	
	tools		
	Stewart, Sepideh;	Sangwin, Christopher	Nilsen, Hans
	Reeder. Stacy	J.	Kristian
	Examining	The mathematical	First-vear
	unresolved	apprentice: an	engineering
	difficulties with	organising principle for	students' reflections
	school algebra in	teaching calculus in the	on the Fundamental
	calculus	21st century	Theorem of
			Calculus
Chairs (**)	Aaron Wangberg,	Frank Feudel,	Osama Swidan,
	Irene Biza	Jessica Hagman	Athina Thoma
1	3:00 – 14:00 Lunch (T	The Canteen - Lilletunstove	a)
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)
14:00- 14:40	Α	В	С
	<u>Simmons,</u>	Durand-Guerrier,	Feudel, Frank
	<u>Courtney;</u>	Viviane; Montoya	Required knowledge
	Oehrtman,	Delgadillo, Elizabeth;	of the derivative in
	Michael	<u>Vivier, Laurent</u>	economics – Results
	Quantitatively	Real exponential in	from a textbook
	<b>Based Summation:</b>	discreteness-density-	analysis
	A framework for	completeness contexts	
	student conception		
	of definite integrals		
	<u>Thoma, Athina;</u>	Kidron, Ivy	González-Martín,
	Nardi, Elena	The dual nature of	<u>Alejandro S.;</u>
	Linear stability or	reasoning in Calculus	Hernandes-Gomes,
	graphical analysis?		Gisela
	Routines and visual		What happens after
	mediation in		Calculus? Examples
	students' responses		of the use of
	to a stability of		integrals in
	dynamical systems		engineering: the
	exam task		case of
			Electromagnetism

	Wangberg, Aaron;	Monaghan, John	Viirman, Olov;
	Gire, Elizabeth	The place of limits in	Pettersson, Irina
	Raising Calculus to	elementary calculus	What to do when
	the Surface:	courses	there is no formula?
	Extending		Navigating between
	derivatives and		less and more
	concepts with		familiar routines for
	multiple		determining velocity
	representations		in a calculus task for
			engineering students
Chairs (**)	Alon Pinto,	Chris Sangwin,	Vilma Mesa,
	Regina Ovodenko	Robert Ely	Hans Kristian
			Nilsen
14:50	– 15:30 Brainstormin	g and Future discussion	groups
Room	F1 018 (EN)	F1 023 (JM)	F1 031 (TD)
			11001(12)
	Α	В	C
	A Pat Thompson and	<b>B</b> Ivy Kidron and John	C Rolf Biehler and
	A Pat Thompson and Elena Nardi jointly	<b>B</b> Ivy Kidron and John Monaghan jointly	C Rolf Biehler and Tommy Dreyfus
	A Pat Thompson and Elena Nardi jointly present the report	<b>B</b> Ivy Kidron and John Monaghan jointly present the report and	C Rolf Biehler and Tommy Dreyfus jointly present the
	A Pat Thompson and Elena Nardi jointly present the report and chair the	<b>B</b> Ivy Kidron and John Monaghan jointly present the report and chair the session.	C Rolf Biehler and Tommy Dreyfus jointly present the report and chair the
	A Pat Thompson and Elena Nardi jointly present the report and chair the session.	B Ivy Kidron and John Monaghan jointly present the report and chair the session.	C Rolf Biehler and Tommy Dreyfus jointly present the report and chair the session.
	A Pat Thompson and Elena Nardi jointly present the report and chair the session. 15:30 C	B Ivy Kidron and John Monaghan jointly present the report and chair the session. offee break	C Rolf Biehler and Tommy Dreyfus jointly present the report and chair the session.
15:45 - 17:00 Plann	A Pat Thompson and Elena Nardi jointly present the report and chair the session. 15:30 C ing for two journal s	B Ivy Kidron and John Monaghan jointly present the report and chair the session. offee break pecial issues (IJRUME <sup>1</sup> ,	C     Rolf Biehler and     Tommy Dreyfus     jointly present the     report and chair the     session.

(\*\*)

- Chairs are the two participants who acted as reactors and scribes in the Day 1-3 session in which the papers were discussed.
  - The participant who acted as reactor will summarise and outline themes across papers (10 min).
  - The participant who acted as scribe will report the discussion of the papers (10 min).
- Plenary discussion will follow (20 min).

<sup>&</sup>lt;sup>1</sup> International Journal of Research in Undergraduate Mathematics Education

<sup>&</sup>lt;sup>2</sup> Teaching Mathematics and its Applications

<b>D</b> .	E	D E4 DC	TDC	Tasks		
First name	Family name	Br-Ftr DG	IDG	Chair	Reactor	Scribe
Aaron	Wangberg	С	Α		WeA	
Alejandro S.	González-Martín	А	Α		TuB	
Alon	Pinto	С	A		ThA	
Anatoli	Kouropatov	А	C	ThC		
Athina	Thoma	А	В			WeC
Charlotte	Derouet	В	C	TuA		
Christopher	Sangwin	С	А		ThB	
Courtney	Simmons	А	A			TuA
Elena	Nardi	А	A	DG A		Br-Ftr A
Frank	Feudel	В	C		WeB	
Günter	Törner	С	A	ThA		
Hans Kristian	Nilsen	С	В			ThC
Igor'	Kontorovich	С	В	WeB		
Irene	Biza	В	В			WeA
Ivy	Kidron	В	C	Br-Ftr B		
Jessica	Hagman	А	Α			WeB
John	Monaghan	В	В	DG B		Br-Ftr B
Kathleen	Clark	А	A	ThB		
Laurent	Vivier	В	C	TuC		
Michael	Jennings	С	Α	WeA		
Niels	Grønbæk	В	C			TuB
Ninni Marie	Hogstad	А	A			
Olov	Viirman	В	В			TuC
Osama	Swidan	С	В		WeC	
Pat	Thompson	А	C	Br-Ftr A		
Patricio	Herbst	А	A	WeC		
Regina	Ovodenko	В				ThA
Robert	Ely	В	A			ThB
Rogier	Bos	С	C		TuA	
Rolf	Biehler	С		Br-Ftr C		
Sepideh	Stewart	А	В	TuB		
Tommy	Dreyfus	С	С	DG C	TuC	Br-Ftr C
Vilma	Mesa	В	В		ThC	

#### Assignment to Brainstorming-Future Discussion Groups (Br-Ftr), Topic Discussion Groups (TDG) and Tasks

Naming convention: The paper presentation sessions are named "DayCol", where DayCol is a three letter code, two letters for the weekday and one for the column in this program, for example TuB (for Tuesday column B), WeA or ThC. A: room F1 018, B: room F1 023, C: room F1 031

### Non-presenting participants

First name	Family name	Br-Ftr DG
Farzad	Radmehr	С
Floridona	Tetaj	С
Niclas	Larson	В
Olav	Dovland	В
Pauline	Vos	А
Said	Hadjerrouit	А
Svitlana	Rogovchenko	С
Yuriy	Rogovchenko	В

#### Day 4-only participants

First name	Family name
Heidi M.	Oftedahl
Ragnhild Johanne	Rensaa

#### A: room F1 018, B: room F1 023, C: room F1 031

#### Organizer email

Elisabeth Rasmussen: elisabeth.rasmussen@uia.no

#### WIFI:

Username: bzrqb Password: KdxE

Opening hours, campus Kristiansand Every day: 07:00 - 21:00