**Summer School for Mathematics Education**

**Monday 15 August – Thursday 25 August 2022**

**The Summer School is organized by the Freudenthal Institute of the Faculty of Science of Utrecht University.**

***Course number H16***

***Aim of the course:***Bringing participants up-to-date in design and research in the field of mathematics education. Topics will include: curriculum development, revealing and building on talents of students, classroom experiments, context and tools for modelling, assessment, and the use of technology for teaching and learning mathematics.

*Target audience*: Master’s students and PhD students in mathematics education and the education and learning sciences with a strong interest in mathematics education, early childhood and kindergarten teachers, primary and secondary school teachers, teacher educators, curriculum and assessment developers, and researchers. Proficiency in English will be essential for a fruitful participation in the Summer School.

**The following key-words/concepts will appear in several presentations/workshops**

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| Assessment |
| Contexts |
| Design research |
| Embodied cognition |
| Informal-formal |
| Inquiry based learning |
| Mathematizing (horizontal-vertical) |
| Model of → model for (emergent modelling) |
| RME |
| Own productions |
| Problem solving |
| Progressive schematization |

Program

Lectures, workshops, reflections etc. are from Monday until Friday between 09:00 - 17:00. In general, each day provides a program from 9 am to 3 pm followed by group work from 3 pm until 5 pm. At the last day of the summer school groups present their results of the group work in a poster gallery.

During the weekend there are no classes, but activities organized by the central organization of the Summer School.

All classes are in the Buys Ballot building, Princetonplein 5, 3584CC Utrecht, except the opening, which will take place in the **Koningsbergerbuilding (Budapestlaan 4 a-b, 3584 CD Utrecht) .**

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| **Monday 15 August – Opening day, introduction to RME and the content of the summer school (chair Michiel D.)**  Since the 1960s, the theory of Realistic Mathematics Education (RME) has been developed in the Netherlands, and at the Freudenthal Institute in particular. Since that time, RME has become widespread, but was also subject to criticism. You will be introduced to some key ideas in RME, such as mathematization, guided reinvention, didactical phenomenology, and the use of contexts. | | |
| ***time*** | ***Location*** | ***activity*** |
| **09:45-10:30**  **MN** | **Koningsberger-building** | Intake in the Koningsbergerbuilding + coffee & tea |
| **10:30-10:45**  **MN** | **Koningsberger-building** | Opening and welcome by Paul Drijvers, scientific director of the Freudenthal Institute |
| **10:45-11:00**  **MN** | **Koningsberger-building** | Opening and welcome by Michiel Doorman, director of the Summer school Mathematics Education |
| **11:00-12:00** | **Koningsberger-building** | Opening activity and get to now eachother by Michiel Doorman |
| **12:00-13:15** | **Koningsberger­building** | Group photo and lunch in Botanic garden? |
| **13:15-14:30** | **BBG 322** | Lecture "Realistic Mathematics Education (RME) - An introduction" by Paul Drijvers |
| **14:30-15:00** | **BBG 322** | Coffee break |
| **15:00-17:00** | **BBG 322** | Activity "Mathematics game for teams" by Joke Daemen and Michiel Doorman |

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| **Tuesday 16 August – Modelling (chair Dede)** | | |
| ***time*** | ***location*** | ***activity*** |
| **09:00-12:00** | **BBG 322** | Lecture / Working group "Open-ended modelling tasks in Dutch education" by Monica Wijers and Dédé de Haan |
| **12:00-13:00** |  | Lunch |
| **13:00-14:00** | **BBG 322** | Poster presentations "Open-ended modelling task" by participants |
| **14:00-15:15** | **BBG 322** | Lecture / working group "Inquiry and modeling in mathematics education" by Rogier Bos and Janka Medova (on experiences with students and teachers from Slovakia) |
| **15:30-17:00** | **BBG 322** | Introduction Mathcitymap activity by Janka Medova  Afternoon Reflection and Working group by Dede and Michiel D. (collect who is going to present a poster tomorrow as brief presentation of your work) |

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| **Wednesday 17 August – Utrecht tour: math city walk and Utrecht time machine (chair Anna)** | | |
| ***time*** | ***location*** | ***Activity*** |
| **09:00-12:00** | **In the city** | Mathcitymap activity  With Janka Medova, Veronika Bockova, Mark Yannotta |
| **12:00-13:30** |  | Lunch |
| **13:30–14:00** | **BBG 322** | Introduction on RME learning trajectories by Michiel Doorman |
| **14:00-15:30** | **BBG 322** | Mark Yannotta (higher education trajectory - introduction)  + explore textbooks on your working group topic (search for rme principles) |
| **15:30-17:00** | **BBG 322** | Afternoon Reflection and Working group (including a poster session for/by participants – bring your poster!) by Anna and Michiel D. |

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| **Thursday 18 August – Learning trajectories & guided reinvention (chair Michiel)** | | |
| ***time*** | ***location*** | ***activity*** |
| **09:00-12:00** | **BBG 322** | Mark Yannotta continues with learning trajectory in higher education |
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| **12:00-13:00** |  | Lunch |
| **13:00-15:00** | **BBG 322** | Martin Kindt on RME Algebra in secondary education |
| **15:00-16:00** |  | Mara Otten on algebra in primary education |
| **16:00-17:00** | **BBG 322** | Afternoon Working group by Anna and Michiel D. |

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| **Friday 19 August – Assessment and diversity (chair Anna)** | | |
| ***time*** | ***location*** | ***activity*** |
| **09:00-09:15** | **BBG 322** | Assessment and diversity: Introduction – Anna Shvarts |
| **09:15-10:15** | **BBG 322** | Mathematics for the blind – Annemiek van Leendert |
| **10:15-10:30** |  | break |
| **10:30-12:30** | **BBG 322** | Assessment items in digital environments for doing mathematics – Peter Boon |
| **12:30-13:30** |  | Lunch |
| **13:30-14:45** | **BBG 322** | Assessment, what and how by Mieke Abels |
| **14:45-15:00** |  | break |
| **15:00-16:00** | **BBG 322** | Mathematics for life – Willem Uittenbogaard |
| **16:00-17:00** | **BBG 322** | Afternoon reflection by Anna and Michiel D. |

La Vuelta in Utrecht: <https://www.lavueltaholanda.com/en/>

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| **Monday 22 August – Innovative learning environments (chair Anna)** | | |
| ***time*** | ***location*** | ***Activity*** |
| **09:00-10:15** | **BBG 322** | Workshop "Computational Thinking and AR" by Sylvia van Borkulo |
| **10:15-10:30** |  | break |
| **10:30-12:00** | **BBG 322** | Working group Imaginary by Joke Daemen |
| **12:00-13:00** |  | Lunch |
| **13:00-14:30** | **BBG 322** | Working group "Embodied design for mathematics" by Anna Shvarts |
| **14:30-15:00** |  | Refreshments, networking break |
| **15:00 -17:00** | **BBG 322** | Afternoon reflection and work on final group designs  by Anna and Michiel D. |

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| **Tuesday 23 August – Inquiry-based learning, SSIs and intercultural learning  (chair Michiel)**  Inquiry-based learning (IBL) aims to develop and foster inquiring minds and attitudes that are vital for students being able to face and manage uncertain futures. Fundamentally, IBL is based on students adopting an active, questioning approach. Of course you need ‘basic skills’ in the area of mathematics and science, but it is important that students also learn to use those basic skills in new situations. You will practice with one example from IBL in order to get an idea what this means for both students and teachers. Relations and differences between IBL and RME will be discussed. In addition you will focus on the potential of IBL to take the opportunity of diverse and multi-cultural classrooms with a specific focus on the important role of language in the teaching and learning of mathematics. This day in particular is inspired by our work performed in the context of [ICSE](https://icse.eu/). | | |
| ***time*** | ***location*** | ***activity*** |
| **09:00-11:00** | **BBG 322** | Workshop IBL and intercultural learning – Vincent Jonker and Monica Wijers |
| **11:00-11:15** |  | Break |
| **11:15-12:00** | **BBG 322** | IBL lecture – Michiel Doorman |
| **12:00-13:30** |  | Lunch |
| **13:30-15:00** | **BBG 322** | Workshop SSIs – Vincent Jonker and Monica Wijers |
| **15:00-15:30** | **BBG 322** | Break |
| **15:30-17:00** | **BBG 322** | Afternoon Working group by Michiel D. |

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| **Wednesday 24 August – Primary and adult education (chair Michiel V.?)** | | |
| ***time*** | ***location*** | ***activity*** |
| **09:00-10:30** | **BBG 322** | Mathematics education at Dutch primary schools: a journey from answer-getting to problem-solving - Marjolein Kool |
| **10:30-11:00** |  | Break |
| **11:00-12:30** | **BBG 322** | Numeracy is the new buzz word. What is meant by it? by Kees Hoogland |
| **12:30-13:30** |  | Lunch |
| **13:30-15:00** | **BBG 322** | Game play – Ronald Keijzer |
| **15:00-17:00** | **BBG 322** | Afternoon Working group by Michiel V./Michiel D. |

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| **Thursday 25 August - Closing day – and presentations by participants (chair Michiel/Anna)** | | |
| ***time*** | ***location*** | ***activity*** |
| **09:00** |  | Participants return housing keys |
| **09:00-10:00** | **BBG 322** | Final preparations for presentation |
| **10:00-10:30** |  | Refreshments and networking break |
| **10:30–12:00** | **BBG 322** | Lecture Mathematics on the guitar by Rogier Bos |
| **12:00-12:30** | **BBG 322** | Preparing poster gallery + take home message |
| **12:30-15:00** | **BBG 315-317** | Gallery walk, and snacks and lunch |

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| Note:  When you leave your room, please hand in your keys on Friday before 11:00 AM at the Freudenthal Institute.  If you want to drop off your luggage for the day, bring it to the Freudenthal Institute; you can store it there at a safe place. |