

**MatRIC** Centre for Research,  
Innovation and Coordination  
of Mathematics Teaching



Centre of  
Excellence in  
Education

# University level mathematics teaching course

**An induction course for recently appointed university/university  
college mathematics teachers arranged by MatRIC/University of  
Agder in collaboration with the Norwegian University of Science  
and Technology (NTNU)**



UNIVERSITY OF AGDER

In collaboration



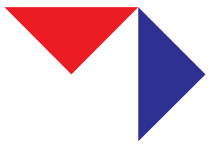
**NTNU – Trondheim**  
Norwegian University of  
Science and Technology



Norwegian University  
of Life Sciences



**Matematikkensenteret**  
Nasjonalt senter for matematikk i opplæringen



### About the Course

The course is designed to address many of the challenges mathematics teachers (and learners) face: for example very large classes, students gathered from diverse programmes, students' (lack of) motivation and more. The course will be taught by highly experienced university level mathematics teachers from Norway and abroad. Sessions will focus on innovative approaches to teaching, learning and assessing mathematics, and relevant research results that can inform and contribute towards the improvement of students' performance in the subject.

Course language: presentations and discussions will take place in English.

### The course will be held in three sessions face-face sessions and one video conference

Session 1: Gardermoen, 26-27 September 2017, two days-one night.

Session 1A: Video conference

Session 2: Kristiansand (UiA), 9-10 April 2018, two days-one night

Session 3: Trondheim (NTNU), mid-June 2018, one day (one night to enable early start)

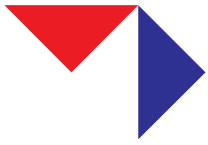
Participants will be expected to undertake course related work between sessions and prepare a portfolio composed of material and reports from this activity.

A certificate of participation will be provided for all who complete the course satisfactorily (participation and portfolio). We hope this certificate, along with the course description, may be used in partial fulfillment of the requirements of many universities and university colleges for teaching staff to undertake professional development in university pedagogy.

**Cost:** The course and participants' travel and accommodation will be covered by MatRIC, Centre for Research, Innovation and Coordination of Mathematics Teaching.

**For enquiries about the course contact:**

**MatRIC Project Manager:** [lillian.egelandsaa@uia.no](mailto:lillian.egelandsaa@uia.no)



## Session 1: 26-27 September 2017

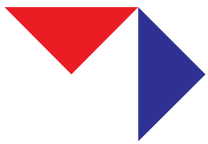
Day 1 26 September	
10:00-10:20	Welcome Introductions About the course
10:20-12:00	Elementary exposition of teaching and learning theory. (presentation & discussion) FR, HA, SG
12:00-12:45	Lunch
12:45-14:15	Making mathematics relevant Burkhard Alpers
14:15-14:30	Break
14:30-16:00	Task design – goals for tasks, creating tasks, managing activity. André Heck + Burkhard Alpers
16:00-16:15	Break
16:15-17:45	Task design – practical activity
17:45-18:30	Conversations with course tutors about possible course tasks and portfolio
Day 2 27 September	
09:00-10:15	Managing problem solving classes André Heck
10:15-10:45	Break
10:45-12:00	Managing problem solving classes (continued) André Heck
12:00-12:45	Lunch
12:45-13:30	Setting a video task
13:30-13:45	Break
13:45-14:30	Teaching large groups Lisa Lorentzen
14:30-14:45	Break
14:45-15:45	Transition from school to university FR, SG
15:45-16:00	Review or day 1 & 2 – close.

### Guest presenters

Burkhard Alpers is professor of mathematics at Aalen University, Germany. He teaches mathematics to students on engineering programmes. Until recently he was the Chair of the Mathematics Working Group (MWG) of the European Society for Engineering Education (SEFI). He is Principal Editor of the SEFI-MWG report: A Framework for Mathematics Curricula in Engineering Education <http://www.sefi.be/wp-content/uploads/Competency%20based%20curriculum%20incl%20ads.pdf>

André Heck is Associate Professor at the University of Amsterdam. He has published extensively on the use of digital technology in mathematical modelling and assessment. His PhD dissertation describes several years of activity as he used technology for supporting students learning mathematics through modelling. The dissertation is available at <http://dare.uva.nl/search?identifier=9d669a1c-5cb7-4c91-9712-666f90d4db78>

Lisa Lorentzen is professor emerita at NTNU. She has extensive experience of teaching mathematics to large groups of students. She is author of many scientific papers and textbooks



about mathematics and learning mathematics, for example Kalkulus med én og flere variable, co-authored with Arne Hole and Tom Linsdstrøm, see

<https://www.universitetsforlaget.no/nettbutikk/kalkulus-med-en-og-flere-variable-uf.html>

## Session 2: 3 November, 2017 at University of Oslo

Presentation of videos followed by discussion
Setting action research task for session 2

## Session 3: 9 & 10 April, 2018. In Kristiansand

Monday 9 April	
10:00 – 13:00	Researching mathematics teaching and learning in universities. Chris Rasmussen.
	Workshop task to reflect critically on some scientific issues in RUME.
13:00-14:00	Lunch
14:00-17:30	Participants (4) report from their action research tasks (40+5 minutes per presentation and 30 minutes break).
Tuesday 10 April	
09:00-12:00	Assessing mathematical knowledge, understanding and competencies with STACK. Chris Sangwin  Suggest a practical approach in which participants create tasks in STACK.
12:00-13:00	Lunch
13:00-14:30	Participants (2) report from their action research tasks (40+5 minutes per presentation).
14:30-15:00	Break
15:00-16:00	Setting paper (IMA-TM&A) reading and reporting task – preparation for session 3.

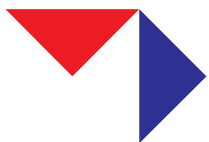
### Guest presenters

**Chris Rasmussen**, Professor of Mathematics Education, Department of Mathematics and Statistics, San Diego State University. He is co-editor in chief of the International Journal of Research in Undergraduate Mathematics Education, see

<http://www.springer.com/education+%26+language/mathematics+education/journal/40753>

**Chris Sangwin**, Chair in Technology Enhanced Science Education, School of Mathematics, The University of Edinburgh, Scotland. He is author of the book 'Computer Aided Assessment of Mathematics' see

<http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199660353.001.0001/acprof-9780199660353>



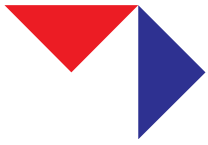
## Session 3 This session will be held at the UiA campus, Kristiansand. June 6, 2018

09:00-09:45	Paper presentations: Niclas & André
09:45-10:00	Break
10:00-12:00	Mathematics support: Michael Grove
13:00-13:00	Lunch
13:00-15:00	Digital approaches to teaching and learning mathematics: Marius Thaulé (NTNU), Per Henrik Hogstad (UiA), Morten Brekke (UiA), &&
15:00-15:15	Break
15:15-16:00	Paper presentations: Marte & Phuong
16:00-16:30	Close & end of course
18:00	Dinner for those staying overnight

### Guest presenters

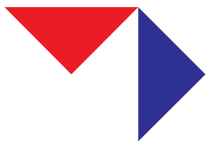
Dr. Michael Grove, University of Birmingham, UK. Michael Grove is a Reader in STEM Education within the School of Mathematics where he teaches mathematics to undergraduate students and researches issues relating to learning and teaching in higher education. He is a National Teaching Fellow, the UK's highest award for teaching and learning within higher education, a Fellow of the Institute of Mathematics and its Applications, and is currently (2016) Honorary Secretary Education Designate for the IMA. Since 2006 he has received grant funding totalling over £26million, including £24million from the Higher Education Funding Councils for national activities in Science, Technology, Engineering and Mathematics. He has also published numerous academic works including research papers, book chapters, books and articles. He is a former Editor of *MSOR Connections*, the learning and teaching journal of the higher education mathematics community, and is currently Editor of the University of Birmingham's teaching and learning journal *Education in Practice*.

<https://www.birmingham.ac.uk/staff/profiles/mathsgrove-michael.aspx>



## The Course Team

- **Frode Rønning**  
Professor in Mathematics Education at the Norwegian University of Science and Technology
- **Helmer Aslaksen**  
Associate Professor in Mathematics and Mathematics Education at University of Oslo
- **Simon Goodchild**  
Professor of Mathematics Education at University of Agder



## Professional portfolio

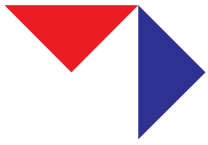
Norway is in the process of introducing the opportunities for 'merit' awards for highly competent teachers in higher education. Where this type of opportunity has been introduced in other countries it is often based upon evidence of successful experience collected in the form of a professional portfolio. Additionally, some universities have complex application processes that require descriptions and evidence of a wide range of professional competencies. In this context it is believed that the development of a professional portfolio is an element of good practice that we want to encourage through this course.

### Description

A structured and organized collection of a range of documentary evidence of professional experiences, successful practice, and developed competencies. Sections in the portfolio may include (the following are examples of categories of content and it is not expected for the purpose of this course that items in all categories will be present):

- Curriculum Vitae with publication list.
- Teaching experiences, courses taught (at different levels) with statistical summaries of students' performance and students' evaluations of the course and teaching. Experience of large lectures, leading group work – discussion, problem solving activity, seminars etc.
- Supervision experience at bachelor, masters and doctoral levels. Names of students supervised and period of supervision, level and title of dissertation, date of award (when completed) and when appropriate grade awarded.
- Teaching development activity (could be news ways to organize students, assess students' performance, approaches to teaching and learning, use of modern technologies), action research reports, award and use of grants to develop teaching.
- Awards for excellence in teaching.
- Administrative activity, committee membership and leadership.
- Positions of responsibility – course leadership, project leadership, department or faculty responsibilities.
- Courses and conferences attended – this would be a complete list whereas the CV might only contain those conferences in which a presentation were made.
- Other professionally relevant activity.

The creation of the portfolio is mainly a task of *collecting* and *organizing* items. The creation of new text just for the portfolio should be *kept to a minimum* and made as notes/memos. This is mainly a private document for your own use, but we will want to see it as part of the assessment related to the course – any highly personal material could be removed at the time of viewing by a group leader.



## Course project

In readiness for the first course meeting we want each course participant to think about an area of their teaching/supervision/presentation activity that she/he would like to develop between the September meeting and the final meeting in June. A written report of this development activity will be required and each participant will be expected to make an oral presentation of their work in the final meeting in June.

We set down here some areas or types of developmental activity to *give an idea* of what is meant by this task. The choice of task will be made after discussion with a group leader.

- Development of video – short mathematics tutorial to support learners, streamed lecture etc.
- Development of computer aided assessment task to assess mathematics.
- Development of mathematics examination questions or other course assessment tasks.
- Development of competence in leading group work, problem solving activity etc.
- Developing of lecturing competence – may involve an experienced colleague to observe and critique.
- Development of use of digital technology (simulation/visualization) to support teaching and/or learning mathematics.

The area chosen should be one in which there is a genuine desire to improve practice, or explore new approaches. It should be possible to work on this within the scope of the assigned workload for the spring semester.

Course participants will have access to a travel allowance of up to 5000 NOK each to support the developmental activity. This may be used to travel to meet an expert in the area of development. (5000 NOK should cover travel expenses within Norway, maybe Scandinavia, if participants need more they are advised to approach their departmental leaders to subsidize the visit). Course tutors can suggest possible experts to visit and in cases where several participants are working on a similar theme we will try to arrange a group visit rather than a number of individual visits. Course tutors will consider other uses of the 5000 NOK but the money may not be used for equipment purchase.