

TEMPLATE FOR COURSE DESCRIPTIONS FOR PHD COURSES, THE HSL FACULTY	
Name	Bokmål: Nynorsk: English: Design and Research in Inquiry based Mathematics Teaching
Course code and level	MAT-8xxx , The administration provides the code
Type of course	PhD-course, which can be taken as a single course
Scope of course	5 ECTS points course
Required / recommended previous knowledge	<p>The course is addressing PhD students and young researchers within the area of mathematics education.</p> <p>It is an advantage but not a requirement for each participant if he or she has opportunities for trying out inquiry based activities in mathematics teaching in practice. It could be in the participants own teaching practice or in collaboration with one or more mathematics teachers. There are no restrictions on the levels of mathematics teaching at which the inquiry based activities can be implemented or related to.</p> <p>The formal requirement for participation is that the applicants should be PhD students or holders of a Norwegian Master's Degree of five years or 3+ 2 years or equivalent for students from other countries.</p> <p>PhD students must upload a document from their university stating that they are registered PhD students. Holders of a Master's Degree must upload a Master's Diploma with Diploma Supplement / English translation of the diploma. Applicants from listed countries must document proficiency in English. To find out if this applies to you see the following list: http://www.nokut.no/Documents/NOKUT/Artikkelbibliotek/Utenlandsk_ utdanning/GSUlista/2016/GSU_list_English_14112016.pdf</p> <p>For more information on accepted English proficiency tests and scores, as well as exemptions from the English proficiency tests, please see the following document: https://uit.no/Content/254419/PhD_EnglishProficiency_100913.pdf</p> <p>-----</p> <p>The course has 16 seats.</p> <p>If the number of applicants exceeds the number of places available on the PhD course, applicants will be ranked from category 1 to 4.</p> <p>Category 1: People admitted to the PhD Program at UiT</p> <p>Category 2: Participants in the Associate Professor Program that fulfil the educational requirements</p> <p>Category 3: Doctoral students from other universities</p> <p><i>Category 4: People with a minimum of a Master's Degree (or equivalent). (A Norwegian Master's Degree of 5 years or 3 (Bachelor Degree) + 2 years (Master's Degree).</i></p>

<p>Course contents</p>	<p>The course is developed and held in relation to the four-year research and developmental project SUM: Coherence through inquiry based mathematics teaching (Sammenheng gjennom Undersøkende Matematikkundervisning) running at ILP UiT in the period 2017-2020.</p> <p>The course addresses the theoretical basis for, the didactical challenges of the practice of teaching as well as methodological aspects of researching the implementation and learning outcomes in relation to inquiry based mathematics teaching.</p> <p>As for the theoretical basis the course addresses the epistemology and educational philosophy behind the term inquiry going back to its roots in the work of John Dewey (1933) and its migration into mathematics teaching practices and curricular reforms of today (Artigue and Blomhøj, 2013). Views from related disciplines are also brought in.</p> <p>As for the practical design of inquiry based mathematics teaching the students are introduced to a 3-phased didactical model for inquiry based lessons and courses in mathematics teaching with specific related didactical challenges. These phases are: (1) Setting the scene for the students' inquiry work; (2) The students' independent (of the teacher) investigative work; (3) Joint reflections and supporting sheared learning of mathematics in class.</p> <p>As the main part of the course the participants shall design, justify, analyze, and possibly tryout in practice of teaching a module of 2-5 lessons following this model for inquiry based mathematics teaching.</p> <p>As for the methodological part the participants will be introduced to methods for constructing and analyzing dialogues between students and between the teacher and one or more students in the different phases of inquiry based courses. Moreover, methods for collaboration between mathematics teachers and a researcher in developmental research project will be presented and discussed.</p>
<p>Learning outcomes</p>	<p>The course has the following learning outcomes:</p> <p>Knowledge The student will gain cutting-edge research based knowledge about:</p> <ul style="list-style-type: none"> • the epistemology behind, justification for and phases of inquiry based mathematics teaching and related didactical challenges • specific cases of motivational and conceptual learning difficulties, which can be addressed through inquiry based activities <p>Skills The student is able to / can:</p> <ul style="list-style-type: none"> • design and justify innovative inquiry based activities for mathematics teaching at a particular level and on a theoretical foundation • construct and analyse dialogues in related to the different phases in inquiry based mathematics lessons/courses <p>Competence</p> <ul style="list-style-type: none"> • The student has the competence to design and analyse inquiry based mathematics teaching activities in relation to his or her research or

	developmental project.
Relevance in the degree program	The course is relevant for all PhD programs within mathematics education and for the professional development for participants following the Associate Professor Program.
Teaching and working methods	<p>The course is organised with two intensive periods of lectures, presentations, discussions and feedback.</p> <p>The first period is four and a half full workdays from August 13-17 2018. The second period is three full workdays and will be held in November or December 2018. The dates are not yet fixed.</p> <p>All activities in these periods will take place at the Campus Mellomvegen, ILP, UiT in Tromsø.</p> <p>In the first period the activities will be lectures based on readings from the course literature list with related exercises and discussions, and group work with supervision on the initial design of inquiry based courses.</p> <p>In the second period the focus will be on the presentations and discussions of the participant inquiry based designs.</p>
Practice	
Quality assurance of the course	The course will be evaluated by a questionnaire to all the participants after the course.
Coursework	The following coursework requirements must be completed and approved in order to take the final exam: 70% lecture and workshops attendance.
Assessment and exam Provide clear information	<p>The exam will consist of:</p> <p>A paper of 15 to 20 pages reporting the design of an inquiry based course of lessons (covering 2-5 lessons) with theoretical based justifications, detailed analyses of some examples of constructed or observed dialogues related to the three different phases, and with reflections on the further development of the course and its possible implementation in a particular practice of mathematics teaching.</p> <p>The paper will be assessed with respect to criteria for papers to be published in journals in mathematics education, e.g. NOMAD.</p> <p>The deadline for handing the paper will be five weeks after the end of the second course period.</p> <p>The exam will be assessed on a Pass/Fail basis.</p>
Retake	Deferred examination is offered four weeks after the deadline if the student is unable to take the final exam due to illness or other exceptional circumstances. Retake is not offered.
Syllabus	<p>Primarily paper from research journals – approximate 200 normal pages in total.</p> <p>The literature list will include but is not restricted to:</p> <p>Artigue, M. (2014). Didactic engineering in mathematics education. In S. Lerman (eds.) <i>Encyclopedia of mathematics education</i> (pp. 159-162). Springer Netherlands.</p>

	<p>Artigue, M. & Blomhøj, M. (2013). Conceptualising inquiry based education in mathematics. <i>ZDM The International Journal on Mathematics Education</i> 45 (6), 798-810.</p> <p>Bjuland, R., & Jaworski, B. (2009). Teachers' perspectives on collaboration with didacticians to create an inquiry community. <i>Research in Mathematics Education</i>, 11(1), 21-38.</p> <p>Dewey, J. (1933). <i>How we think: A restatement of the relation of reflective thinking to the educative process</i>. Boston, MA: Heath.</p> <p>Gay, G. (2013). Teaching to and through cultural diversity. <i>Curriculum Inquiry</i>, 41(1), 48-70.</p> <p>Jaworski, B. (2003). Research practice into/influencing mathematics teaching and learning development: Towards a theoretical framework based on co-learning partnerships. <i>Educational studies in mathematics</i>, 54(2-3), 249-282.</p> <p>ZDM (2013): Implementation of inquiry based learning in day to day teaching. Thematic issue of <i>ZDM The International Journal on Mathematics Education</i> 45 (6).</p>
Language of instruction and examination	All lectures will be in English. The final paper can be in English or Norwegian.