Pedagogic case and specific course in which designed tasks and units are used

Name of university: Leibniz Universität Hannover

Contact person: Reinhard Hochmuth

Pedagogic case:	• Teaching discrete mathematics within a mathematics course for third/fourth year mathematics majors and prospective secondary school teachers
Description (including temporal scheme for design, development and implementation)	• We are interested for developments in teaching for these both group of students. We want to introduce problem- and action-oriented tasks in advanced mathematics course to question basic concepts and tools from combinatorics.

Aim	• Critical thinking: Questioning concept, tools, and techniques. • Addressing two different student-cohorts and explore different perspectives to the topic in question • Addressing structural and didactical praxeologies • Creating space for dialogue between these perspectives
Mathematical concepts	• Counting principles • Combinatorics • Algebra • finite mathematics
Addressed practice	• Bachelor programme for mathematics majors, • Master of Education programme
Place in specific course Course name Place of units	• A one-semester course about discrete mathematics • Course name: Discrete Mathematics • (elective) specialization course
Learners profile orientation, year, age, prior knowledge, other such as math anxiety, special needs, ..	• third/fourth year mathematics mayors and prospective secondary school teachers • Prior knowledge: Analysis and linear algebra • Students come from a diversity of backgrounds – some will have studied more of the content than others.
Organisation of specific course study credits/hours, location, group size	• Lecture + tutorial + weekly exercise sheets • Written or oral exam at the end of the course • approx. 30 students. • Course is taught each week, 14-week semester • Each week provides two lectures (90 mins each) and one tutorials (90min). Tutorials allow students to work on set tasks and discuss them. Master or ph.d student are supporting the tutorials.
Expected learning outcomes	• Basic concepts and tools in discrete mathematics. • See: *Aigner, M. (2006). Diskrete Mathematik. Springer*
Envisioned use of digital technology	• employ CAS (Maple)

Planning of tasks	• Performing an a priori analysis of the mathematics in discrete mathematics • Discussion with colleagues who are mathematicians and mathematics educators • Design of action-oriented tasks and inquiry-based teaching • Fitting new forms of activity into existing teaching schedule • Keeping a record of new tasks/approaches for the current cohort – to include specific details of tasks and approaches, and teacher reflections on the teaching and learning that takes place. • Introduction of an inquiry-based section in the exam question for discrete mathematics • Details of how students tackle the discrete mathematics question in the exam.
Names of persons involved	• Reinhard Hochmuth; Christine Bessenrodt
Course:	**Discrete Mathematics**
Learning objectives	• Official description in module catalogue: Depending on the chosen course, advanced knowledge in a field of algebra or basic understanding of discrete mathematics, understanding of relational and operational structures in the field of algebra. Knowledge of basic functions of combinatorics, their methods and applications. Seure mastery of mathematical thinking and argumentation. Students are able to solve specific tasks using appropriate methods.
Learning contents	see above
teaching /learning activities	• Lecture + tutorial + weekly exercise sheets • Written or oral exam at the end of the course • Each week, 14-week semester • Each week provides two lectures (90 mins each) and one tutorials (90min). Tutorials allow students to work on set tasks and discuss them. Master or ph.d student are supporting the tutorials.
Media	• Blackboard + chalk; slides; Maple; Learning Management System
Evaluation	• Written or oral exam
Instructor role	• Development of course content and delivery; Lecturer, presenting course material in lectures; tutor – working with students in tutorials encouraging their own activity and thinking and providing support.

Student roles	• Engaging with the mathematics in both lectures and tutorials. More overt engagment in lectures will be encouraged. More inquiry-based activity in tutorials will be encouraged.