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

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| **Pedagogic case:** | • Inquiry-based introduction for 1st module "Elements of Mathematical Logic" within the framework of general course in Mathematics for first year students of pedagogical institute |
| **Description** (including temporal scheme for design, development and implementation) | • 1st year students of pedagogical institute learn basic mathematics, and in particular elements of Mathematical Logic<br>• ICT tools will be used to let student understand deeply and clearly how to explore different mathematical tasks<br>• Rough planning:<br>design November-December 2018,<br>development January-March 2019,<br>implementation February-April 2019. |
| **Aim of pedagogic case** | • To include inquiry-based activity into learning and teaching selected topics in Mathematical Logic.<br>• To explore results of this activity with the current group of students, collect data in some forms, and make suggestions to improve this activity in the future. |
| **Mathematical concepts** | • Statements<br>• Logical operations<br>• Predicates<br>• Quantifiers<br>• Theorems, considerations<br>• Deduction, induction |
| **Addressed practice** | • 1st year bachelor's program for students of specialization primary education; an introduction to mathematics in the program building on expectations of what students have learned in their pre-university courses. |
| **Place in specific course**<br>Course name<br>Place of teaching units | • A one-semester module in a modular program.<br>• Title is: Mathematics and methods of teaching |

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| **Learners profile**<br>orientation, year, age, prior knowledge, other such as math anxiety, special needs, .. | • Primary education students<br>• First year students<br>• High school mathematics background<br>• Mathematical content is new to all students<br>• Mathematics is not an attractive subject for a large number of students and many want to see applications |
| **Organisation of specific course**<br>study credits/hours, location, group size | • 8 credit course: 3 EC for mathematics part, 5 EC for methods of teaching part<br>• Course runs on weekly basis from February 2019 up to and including December 2019 as obligatory course: mathematics part takes 10 course weeks in total<br>• Number of students: 48 |
| **Expected learning outcomes** | The student should be able to:<br>• use basic concepts and operations in mathematical logic<br>• determine type of statements and predicates<br>• apply logical operations to statements and predicates<br>• construct deductive and inductive thinking<br>• formulate and prove of theorems. |
| **Envisioned use of digital technology** | • Systems for classroom survey (Menti, Kahoot)<br>• GeoGebra, Go-Lab. |
| **Planning of tasks** | • Analysis of available materials on Mathematical logic<br>• Discussion with colleagues who are mathematicians and mathematics educators<br>• Creation of the course team<br>• Design of activities for inquiry-based teaching<br>• Including new forms of activity into existing teaching program<br>• Monitoring the process<br>• Keeping a record of new tasks/approaches for the current group of students – to include specific details of tasks and approaches, and teacher reflections on the teaching and learning that takes place<br>• Getting feedback from students (polls, interviews). |
| **Names of persons involved** | • Yuriy Mazhuga<br>• Lyudmila Romanenko<br>• Student assistant in the mathematics part of the course |
| **Course:** | Mathematics and methods of teaching, 1st module “Elements of mathematical logic” |
| **Learning objectives** | Within framework of this module, students should be able to:<br>• solve mathematical problems in the areas listed in the contents; |

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| | • work independently;<br>• organize the material of the module to support own learning;<br>• construct clear, logical arguments. |
| **Learning contents** | • Introduction to Mathematical Logic<br>• Mathematical concepts and mathematical sentences<br>• Statements and predicates<br>• Logical operation<br>• Quantifiers<br>• Structure and types of theorems<br>• Deductive thinking, induction<br>• Proof of the truth of statements. |
| **teaching /learning activities** | • Lectures, seminars, practical work, independent work with materials of the course, obligatory and non-obligatory assignments. |
| **Media** | • Personal computers<br>• Mobile phones for classroom engagement during the lectures and practical work<br>• Appropriate software for computing and lecturer-class interaction (Kahoot, Menti, Padlet, GeoGebra, GoLab, SOWISO). |
| **Evaluation** | • Continuous assessment of the student throughout the course: practical tasks, passing tests, homework assignment<br>• Written or oral exam. |
| **Instructor role** | • Developing the module content (inquiry-based tasks/problems)<br>• Encouraging students' activity and discussion<br>• Monitoring learning process/progress and providing support and feedback |
| **Student roles** | • Active participation in learning during the lectures, seminars and independent studies<br>• Engaging in inquiry-based mathematics tasks<br>• Reasoning methods of solution and discussing ideas with peers/tutors<br>• Reflecting on their learning. |