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

**Name of university:** Borys Grinchenko Kyiv University (BGKU)

**Contact person:** Yuriy Mazhuga, y.mazhuha@kubg.edu.ua

|  |  |
| --- | --- |
| Pedagogic case: | * Inquiry-based introduction for different modules 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 theoretical foundation of Algebra and Geometry
* ICT tools will be used to let student understand deeply and clearly how to explore different mathematical tasks
* Rough planning: design February-March 2019, development February-April 2019,

implementation February-May 2019. |
| Aim of pedagogic case | * To include inquiry-based activity into learning and teaching selected topics in Algebra and Geometry.
* 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  | * Numeric expressions
* Equation with one variable
* System of two equations with two variables
* Inequality with one variable
* Functions
* Graphs of functions
* Geometric shapes
 |
| 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 courseCourse namePlace of teaching units | * A one-semester modules in a modular program.
* Title is: Mathematics and methods of teaching
 |

|  |  |
| --- | --- |
| Learners profileorientation, year, age, prior knowledge, other such as math anxiety, special needs, .. | * Primary education students
* First year students
* High school mathematics background
* Mathematics is not an attractive subject for a large number of students and many want to see applications
 |
| Organisation of specific course study credits/hours, location, group size | * 8 credit course: 3 EC for mathematics part, 5 EC for methods of teaching part (which is also meant to be inquiry-oriented according to the co-teacher)
* 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
* Number of students: 48
 |
| Expected learning outcomes | The student should be able to:* use basic concepts and operations in Algebra and Geometry
* solve equations and inequalities with one variable
* solve systems of two equations with two variables
* determine type of functions
* build the graphs of functions
* determine the geometric shapes
* find the length, area, volume and other values
* effective use of available software tools for visual imagination.
 |
| Envisioned use of digital technology | * Systems for classroom survey (Mentimeter, Kahoot)
* GeoGebra, Go-Lab
 |
| Planning of tasks | * Analysis of available materials on Algebra and Geometry
* Discussion with colleagues who are mathematicians and mathematics educators
* Creation of the course team
* Design of activities for inquiry-based teaching
* Including new forms of activity into existing teaching program
* Monitoring the process
* 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
* Getting feedback from students (polls, interviews)
 |
| Names of persons involved  | * Yuriy Mazhuga
* Lyudmila Romanenko
* Student assistant in the mathematics part of the course
 |
| Course: | Mathematics and methods of teaching, 2nd module “Theoretical foundation for the study of algebraic material” and 3rd module “Elements of geometry” |
| Learning objectives | Within framework of these modules, students should be able to:* solve mathematical problems in the areas listed in the contents
* work independently;
* organize the material of the module to support own learning;
* construct clear, logical arguments.
 |
| Learning contents | * Introduction to Algebra and Geometry
* Basic concepts and operations in Algebra and Geometry
* Equations and inequalities
* Systems of equations
* Functions
* Graphs of functions
* Geometric shapes
* Length, area, volume and other values.
 |
| teaching /learning activities | * Lectures, seminars, practical work, independent work with materials of the course, obligatory and non-obligatory assignments.
 |
| Media | * Personal computers
* Mobile phones for classroom engagement during the lectures and practical work
* 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
* Written or oral exam.
 |
| **Instructor role** | * Developing the modules content (inquiry-based tasks/problems)
* Encouraging students’ activity and discussion
* Monitoring learning process/progress and providing support and feedback.
 |
| **Student roles**  | * Active participation in learning during the lectures, seminars and independent studies
* Engaging in inquiry-based mathematics tasks
* Reasoning methods of solution and discussing ideas with peers/tutors
* Reflecting on their learning.
 |