Student Teachers and Modern Mathematics

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We consider it important that students, future mathematics teachers, learn about some modern mathematics topics. Therefore, an optional subject Chapters from Modern Mathematics has been open at Charles University in Prague, the Faculty of Education, in which we focus on the following topics: Tessellations, Polyominoes, Fractal Geometry, the Theory of Games.

However, rather than lecture students, we would like them to get some hand-on experience with these topics (naturally on their level of ability). Therefore, at least the introductions to the topics are done by presenting students with problems they should solve either in class or as a seminar work. Needless to say, the formulation of problems which are on the one hand, sufficiently easy for students to reach some results and on the other hand, sufficiently challenging so that they do not lose interest and feel motivated, is not an easy task. The goal of this contribution is to show our approach to the solution of this task.

The contribution will be organised as a poster and will present illustrations of the way student teachers meet with three topics within the above seminar.

In Fractals, the series of problems focuses on the following issues:

- Constructing fractal curves.
- Determining the lengths of curves.
- Determining the areas of parts limited by the curves.

Following this, the students are assigned some reading to write a seminar work.

In Polyominoes, the problems deal with the following issues:

- Covering the plane and/or some figures by various particular shapes.
- Proving that some figures are not coverable by certain shapes.
- Transferring properties of polyominoes to a triangular and hexagonal grid.
- Solving similar problems with polyominoes in space.

Similarly to Polyominoes, in Tessellations the following problems are solved:

- Covering the plane by various polygons.
- Proving that some polygons cannot be used for covering the plane.

The students are given freedom as to their solving strategies and approaches to the problems. These are discussed during the seminars in groups. The students' solutions to the proposed problems have been collected and analysed. The contribution will include examples of students' work as well as their comments on the topic.

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