

Discovery Learning: The Pósa Method (DLP)

Syllabus

"Mathematics is not the private affair of a selected few, but the fun of discovering and autonomous thinking is everyone's right."

Lajos Pósa

Instructor

Juhász Péter

Email: peter dot juhasz at bsmeducation dot com

Course Credits

This is a 1.0 credit course. We will meet 3 hours a week for a total of 45 contact hours per semester. (**Note:** 1 contact hour equals 60 minutes.)

Course Description

In this course, you will learn about a unique “Hungarian style” method of discovery learning in mathematics, developed for students aged 12-18. The method is similar to inquiry based learning and is fondly called by many Hungarian mathematicians as the “Pósa method,” named after its developer [Lajos Pósa](#).

This method, which arose out of a long tradition of mathematics education in Hungary, has been implemented in more than 300 weekend and summer mathematics camps for talented students since 1988 (e.g., the [MaMuT](#) camps), as well as in mainstream high school classrooms. (Its long term effects include the success of Hungarian students in various International Mathematical Olympiads.) While the Pósa method was originally developed for gifted students, there are many aspects of the method that can be useful for all students.

On one hand, you will have the opportunity of experiencing mathematics as a student of the Pósa method by playing the role of participants in the math camps. The classes will be very similar to a problem solving seminar done in the style of the Pósa method. The choice of mathematical areas we study will depend on students’ preference and background. Special emphasis will be placed on pursuing paths generated by students’ questions.

On the other hand, you will occasionally play the role of teachers and reflect on this learning experience.

Course Objectives

The aim of this course is to introduce students to the “Pósa method,” designed to guide students to discover mathematical concepts on their own. After finishing this course, participants

- will improve their own problem solving skills;
- will learn what a “good” mathematical problem is (to foster student learning) and how to come up with such problems;
- will have a deeper understanding what a “thread of problems” means;
- will learn how to foster a web of ideas inside the minds of their students, in order to facilitate the discovery process;
- will learn how to give appropriate hints to students;
- will learn to ask helpful follow-up questions after students solve a problem, to deepen their understanding and further stimulate their interest;
- will learn how to work with students with diverse mathematical backgrounds, interests, and abilities.

Sample mathematical topics

- elementary number theory
- proofs of impossibility
- recursive thinking, mathematical induction
- surprising constructions
- two-player games
- special real functions

Note: The actual mathematical content of the course will be adapted to students’ needs, abilities, and interests.

Course requirements

Students can choose between completing course requirements with an educational focus or a mathematical focus. They have until the end of the third week of the semester to make this choice.

Educational focus (this option involves both mathematical and educational components)

- Mid-term exam: This exam will have four mathematical problems. Two of them will be discussed during the previous lessons, students will have to show that they understood the problems and their solutions, and that they can write down the solutions correctly. Two new problems will be very similar to problems we discussed during the lessons. The exam will take 60 minutes. (15%)
- Final exam: This exam is similar in format to the mid-term exam. 6 problems for 90 minutes. (25%)
- Homework: Students will have to complete two homework tasks every week. The first task will be a mathematical problem. The second one will be a short teaching-related essay (at least 250 words). They will have at least six days to complete their work and submit it. It has to be written in LaTeX and students have to submit the pdf files via email. (35%)
- Problem thread: This is the opportunity to implement the Pósa method! In this assignment, students will create their own thread of problems with a common theme in middle school or high school mathematics. By working through the problem set, secondary students should be able to learn mathematical ideas through their own doing of mathematics. (25%)
- Workshop report: Up to two homeworks can be replaced by [workshop reports](#).

Mathematical focus (this option includes mathematical components only)

- Mid-term exam: This exam will have four mathematical problems. Two of them will be discussed during the previous lessons, students will have to show that they understood the problems and their solutions, and that they can write down the solutions correctly. Two new problems will be very similar to problems we discussed during the lessons. The exam will take 60 minutes. (20%)
- Final exam: This exam is similar in format to the mid-term exam. 6 problems for 90 minutes. (30%)
- Homework: Students will have to complete two homework tasks every week. Both tasks will be mathematical problems. They will have at least six days to complete their work and submit it. It has to be written in LaTeX and students have to submit the pdf files via email. (50%)