

MATH SUPPORT CENTRE AT TECHNICAL UNIVERSITY OF OSTRAVA

35.1 INTRODUCTION

Mathematics should be necessary part of equipment of each technical engineer. It does not depend on the faculty, branch or type of study or on technical subjects which our students will need in further studies, good knowledge of mathematical principles will definitely be useful during their studies and professional work. However, our first-year students are recruited from different types of secondary schools. Students from grammar schools (Czech *gymnázium*) are usually well prepared for further studies on technical university, while students from different types of high technical schools have less lessons of mathematics during their studies on secondary school and therefore their level of knowledge is often insufficient. First year on our technical university is then complicated for them, even almost impossible to pass, although they are interested in their branch of study and they would like to fulfil our requirements. Easily we could say, that we teach our first-year students basic principles of differential and integral calculus, differential equations and linear algebra, but there are also students that still have problems with logarithms or trigonometrical functions. Similar situation arises with students of life-long learning courses which are many years behind their secondary school and their knowledge of mathematics is usually poor. Therefore, the main goal of our task was to overcome gaps between knowledge from different types of secondary schools and level of mathematics needed for successful study at Technical University of Ostrava.

35.2 MATH SUPPORT CENTRE

The Math Support Centre was established at Technical University of Ostrava in October of 2016. The idea of the support centre is based on Sigma Network system [1] that was created to solve similar problem in England around 1990. After almost twenty years from small support centres Sigma Network have become professional association

of representatives from across the regions of England and Wales that helps students to develop confidence, knowledge, skills and understanding in relation to mathematics and statistics. We were also inspired by our colleagues from Norwegian University of Agder [2]. They established similar centres in both of their campuses Kristiansand and Grimstad, which we visited personally. We have seen operation of their support centres and also number of students they teach every week. Their main problem was to bring the students to the support centre [3], [4]. However, when they find their way there, they were satisfied and they started to return and use the centre repeatedly. Furthermore, during last year there were established similar centres in Czech Republic as well. The first one is located at Faculty of Economics and Administration at Masaryk University in Brno [5] and is covered by Department of Applied Mathematics and Informatics, the second one at Tomas Bata University in Zlín [6].

35.2.1 The principles of education in Support Centre

The main characteristic of the support centre is that we don't teach - in the classical meaning of the word. We could better say, that we lead consultations in an informal study atmosphere - out of the class. Students come to support centre with problems from the lectures, regular lessons or their individual projects. Our tutor will not solve the problem, but he tries to be a guide that helps with an advice. He tries to lead students by questions, by other tasks or by explanations how the algorithms work. Our goal is that students solve their problems by themselves. We believe that with active independent approach, students will learn much more, than if we just say them how their problem should be solved. We try to learn them to work effectively and to approach new topic single-handed. Without such approach the overcoming of gaps in knowledge from four years of study at secondary school while also studying the first year at technical university is almost impossible. Our approach can be easily described by famous quotation of Benjamin Franklin: "Tell me and I forget. Teach me and I may remember. Involve me and I learn."

Students appreciate that they may ask any question that relate to mathematics. We have understandings for students who don't remember even elementary knowledge from secondary school. We try to teach them how to handle such unpleasant situation. We also welcome when they come to Math Support Centre in groups. Collective work is much more effective, it accelerates the learning process and is also more entertaining than solitary fight with mathematical snares. There are students that started to visit Math Support Centre periodically. They come after their regular lecture to let explain the term which wasn't fully understood. Obviously, the most frequent visits are before the exam to clarify something that students are not sure in.

35.2.2 Running of Math Support Centre

At the beginning, it was necessary to get students to know about existence of Math Support Centre and the meaning why it is here. Few weeks before the official opening we

made an advertisement on every math lecture on each faculty. We also explained to students what would be the role of Math Support Centre and the difference between classical lecture and the consultations in Math Support Centre. We used screens at the entrances on faculties of our technical university and university web pages for advertisement and we also tried to use social networks for propagation of Math Support Centre. Our own Facebook page is still added by new supporters every week until now. Finally, we made official opening of Math Support Centre with leading members of our university and department including a small lecture concerning the importance of mathematics for technical engineers and containing some easy proofs of well-known mathematical theorems.



Fig. 35.1 a) From the opening of MSC. b) Consultation at MSC.

Source: own elaboration

The consultations in Math Support Centre are mostly lead by employees of Department of Mathematics and Descriptive Geometry, but we also have our first student tutor. The timetable is flexible and we adjust on the basis of students requests. Although we have aimed our propagation on first-year students, we also started to consult other topics. The distribution of 143 consultations we made during two months of the winter semester and five weeks of following examination time is shown at Tab. 35.1. It is divided with respect to subjects we regularly teach.

Tab. 35.1 Number of consultations in MSC during winter semester 2016/2017

	Math 1	Math 2	Math 3	DG	Stat	NM	Σ
winter semester	72	1	11	15	0	0	99
examination time	35	2	2	2	2	1	44

Source: own elaboration

- Math 1 is almost the same for every first-year student on each faculty at winter semester. It consists of differential calculus of functions of one variable, basics of linear algebra and analytical geometry.

- Math 2 is following subject for first-year students at summer semester. It consists of integral calculus of functions of one variable, differential calculus of functions of more than one variable and basics of differential equations. We expect many consultations of this subject at the summer semester of 2017.
- Math 3 varies more based on requests of each faculty. We use it here as a sum of integral calculus of more than one variable (double, triple and line integrals). We also offer surface integrals or basics of theory of series for some branches of studies.
- Descriptive geometry is taught on Faculty of Civil Engineering and Faculty of Mechanical Engineering during first two years of studies.
- Statistics is a special course that is taught on almost every faculty for third-year students.
- Numerical Mathematics is another course that we offer for second and third-year students on faculties of Civil Engineering, Mechanical Engineering, Metallurgy and Materials Engineering.

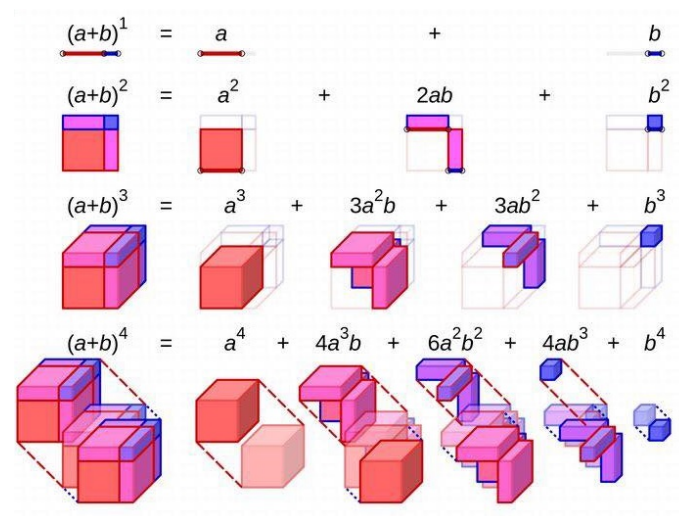


Fig. 35.2 Figure from our Facebook webpage.

Source: <http://www.facebook.com>

CONCLUSION

Few months after establishing Math Support Centre we are happy to say that the concept fulfilled our expectations. It was appreciated by many students. Growing amount of consultations is the best indicator that we are heading on the right way to our goal that students will not be afraid of mathematics. They will use mathematics for solving their problems as a basic tool of a good technical engineer. But we also have higher

goals. We imagine that Math Support Centre could really be some kind of centre of mathematical education at Technical University of Ostrava. We would like to organize interesting lectures concerning mathematics. We could consult with final-years students their technical problems or their thesis. For instance, our students often need help with statistical data processing for their thesis. In such situation Math Support Centre can definitely help.

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MATH SUPPORT CENTRE AT TECHNICAL UNIVERSITY OSTRAVA

Abstract: *The Math Support Centre was established at Technical University of Ostrava in 2016. Its goal is to help students to better understand mathematics in an unformal study atmosphere. The main task of the Support Centre is to overcome gaps between their knowledge from different types of secondary schools and level of mathematics needed for successful study at our Technical University. We also help students with their problems of any type arising within their studies of mathematical subjects.*

Keywords: *mathematics education, math support centre.*

**MATH SUPPORT CENTRE NA VYSOKÉ ŠKOLE BÁŇSKÉ - TECHNICKÉ
UNIVERSITĚ OSTRAVA**

Abstrakt: *Na VŠB-TU Ostrava vzniklo v roce 2016 centrum podpory výuky matematiky, jehož cílem je pomáhat studentům matematice hlouběji porozumět, a to v neformálním studijním prostředí. Hlavním úkolem centra je překlenout rozdíly mezi úrovní znalostí z různých typů středních škol a úrovní, kterou požaduje technická vysoká škola. Pomáháme také studentům všech ročníků s vysvětlením problémů, které při studiu matematických předmětů vznikají.*

Klíčová slova: *výuka matematiky, podpora výuky matematiky.*

Date of submission of the article to the Editor: 04.2017

Date of acceptance of the article by the Editor: 05.2017

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