

MATERIALS SCIENCE MA(S)TERS

developing a new master's degree

REPORT FROM THE SEMINAR NEEDS AND BARRIERS IN DIDACTICS OF MATERIALS ENGINEERING



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Contents

Description and objectives of the seminar.....	3
Seminar Experts.....	4
General conclusions	5
Attachments	9



Description and objectives of the seminar

On May 12, 2022, the International Seminar on "Needs and barriers in didactics of materials science and engineering" was held at the Faculty of Science and Technology of the University of Silesia in Katowice. This event was carried out as part of the project "Materials Science Ma(s)ters - developing a new master's degree" co-financed by the European Union under the Erasmus + KA220 HED program (Foundation for the Development of the Education System - National Agency of the Erasmus + Program and the European Solidarity Corps). Project partners of the University of Silesia in Katowice (Poland) are Afyon Kocatepe University (Turkey), University of Žilina (Slovakia), Ivan Franko National University of Lviv (Ukraine).

The hosts of the event organized at the University Campus in Chorzów was a team of scientists from the Institute of Materials Engineering, consisting of Dr. Joanna Maszybrocka, Dr. hab. Małgorzata Karolus, prof. UŚ, dr Magdalena Szklarska, dr hab. Tomasz Goryczka, prof. UŚ and mgr Joanna Stelmaszak and mgr Patrycja Wajda-Mierzwa.



The subject of the seminar concerned mainly the problems and limitations related to educating students in the field of Materials Science from the perspective of Polish and European universities and the industry's expectations towards university graduates. The seminar was held in a stationary form at the seat of the Faculty of Science and Technology of the University of Silesia in Katowice and online on the ZOOM platform.

Seminar Experts

The role of Experts was presented by representatives of Polish and foreign universities and industry representatives from companies (attached Seminar Program).

Poland - 5 universities and 2 industry representatives:

Warsaw University of Technology, AGH University of Science and Technology, Silesian University of Technology, Lublin University of Technology, Częstochowa University of Technology,
Łukasiewicz Research Network - Kraków Technological Institute and Labsoft-Bruker (Poland).

Ukraine - 2 universities and the Ukrainian Academy of Science:

Ivan Franko National University of Lviv, Lviv Polytechnic National University,
Karpenko Physico-Mechanical Institute of the NAS of Ukraine

Turkey - 1 industry representative: Mimar Sinan Engineers Association

Slovakia - 1 university and 2 industry representatives:

University of Žilina

Danfoss Power Solutions a.s. and Schaeffler Kysuce, spol.s r.o.

The seminar attracted a lot of interest. The lectures were attended by: stationary 62 participants from Poland, Slovakia, Turkey and Ukraine and 65 participants connected online from Algeria, the Czech Republic, Pakistan, Poland, Finland, Canada and Great Britain. We trust that inspiring lectures, interesting discussions and backstage talks gave rise to further fruitful cooperation, which will lead to the development of a new, interdisciplinary master's program in materials engineering, responding to the needs of the modern economy, labor market and society.

General conclusions

The analysis of the lectures presented during the Seminar allowed for drawing general conclusions describing the present condition of Materials Science and Engineering in Poland and partner countries as well as the prospects for activities aimed at increasing interest in science and technology.

1. The downward trend in the number of candidates for studies in Material Engineering has been observed for several years at all Polish and foreign universities and amounts to an average of 25-35%. The first decrease in the number of candidates falls in 2013 and the second clear moment is in 2017. The decline in interest in science and technology is commonly observed in Poland, Europe and the world. Therefore, universities are taking steps to improve this situation. After analyzing the examples presented by the Experts and analyzing the situation at their home universities, it can be noticed that despite some program differences resulting from the specificity of universities or specializations, corrective actions are carried out using the same tools and cover the same directions.
2. Actions taken at various universities to attract more candidates:
 - undertaking popularization and advertising activities for Materials Engineering and science and technology - organizing Open Days, Science Picnics, etc.
 - cooperation with primary and secondary schools: workshops, shows,

- popularization of science: participation in festivals, e.g. ŚFN, Industriada, etc.
- organizing and conducting thematic competitions and Olympiads for schools.

3. Support for students:

- conducting certified training,
- cooperation with students: Science Clubs, grants and student projects,
- student exchange: ERASMUS, COST, MOST etc.
- material and psychological support,
- facilities for people with disabilities.

4. Activities aimed at making the study program more attractive:

- regular modification of the study plan (e.g. every two years).

5. Cooperation with industry and business

- student internships,
- trips, away classes, dual studies,
- implementation of diploma, engineering and master's theses in leading companies,
- the prospect of employing the best students.

6. Proposals for extending the scope of recruitment:

- Information on TV and radio, social media, posters and billboards.

7. Signalized basic problems related to studies in the field of Materials Engineering:

- low recognition of the Faculty of Materials Science and Engineering,
- program differences (candidates recruited from various fields of study),
- low level of basic knowledge of students / candidates about materials, material technologies and research methods,

- overly extensive theoretical subjects,
- varied level of preparation of lecturers for classes,
- graduates of first-cycle studies prefer to start work than second-cycle studies,
- the labor market appreciates representatives of practical professions,
- the belief that studies do not give a profession.

8. Observations and suggestions:

- more and more foreigners choose to study Materials Engineering in English,
- it seems interesting for students to propose the division of study topics into: Bio and Nano and to include the 3D printing methods path in the education program,
- division into industry-related "practical studies" and science-related "theoretical" studies,
- studies in the Bologna system (3 + 2 model) do not work well with regard to technical and scientific subjects requiring not only theoretical knowledge but also practical experience acquired in research and teaching laboratories.

9. Employers (industry representatives) expectations:

- graduation diploma (knowledge, skills and competences),
- ability to make independent decisions,
- ability to work in a team,
- knowledge of foreign languages (obligatory English),
- plan for the future (employees more aware of their possibilities and limitations),
- achievements, passions, motivation.

Summing up, it can be said that both the lectures and backstage talks during and after the Seminar gave us an overview of the current situation in materials engineering in today's education and a good basis for developing a new, interdisciplinary master's program in this field. In addition, the results of surveys



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that were carried out simultaneously at universities and in enterprises will greatly facilitate the preparation of an offer that meets the needs of the modern economy, labor market and society.



Attachments



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Materials Science Ma(s)ters – developing a new master's degree

Needs and barriers in didactics of Materials Science and Engineering

Seminar

12 May 2022

University of Silesia in Katowice, Poland

Seminar Committee

Joanna Maszybrocka, University of Silesia in Katowice, Poland

Małgorzata Karolus, University of Silesia in Katowice, Poland

Magdalena Szklarska, University of Silesia in Katowice, Poland

Tomasz Goryczka, University of Silesia in Katowice, Poland

Şükrü Talaş, Afyon Kocatepe University, Turkey

Lidiya Boichyshyn, Ivan Franko National University of Lviv, Ukraine

Juraj Belan, University of Žilina, Slovakia

Patrycja Wajda – Mierzwa, University of Silesia in Katowice, Poland





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Seminar Programme

9:30-9:40	Opening Ceremony	
	SESSION 1	
9:40-10:00	Agata Dudek	Częstochowa University of Technology, Poland
10:00-10:20	Tomasz Kozieł Piotr Bała	AGH University of Science and Technology, Cracow, Poland
10:20-10:40	Agnieszka Szczotok	Silesian University of Technology, Poland
10:40-11:00	Dariusz Oleszak	Warsaw University of Technology, Poland
11:00-11:20	Krzysztof Pałka	Lublin University of Technology, Poland
11:20-11:35	Katarzyna Marzec (<i>on-line</i>)	Łukasiewicz Research Network – Cracow Institute of Technology, Poland
11:35-11:50	Marek Gnyppek	Labsoft / Bruker, Poland
	LUNCH	
	SESSION 2	
12:45-13:00	Metin Ozgul	Mimar Sinan Engineers Association, Turkey
13:00-13:15	Matej Barlok	Danfoss Power Solutions a.s, Slovakia
13:15-13:30	Milan Kiš	Schaeffler Kysuce, spol. s r.o., Slovakia
13:30-13:45	Ihor Zavaliiy (<i>on-line</i>)	Karpenko Physico-Mechanical Institute of the NAS of Ukraine, Ukraine
13:45-14:00	Stepan Mudry	Ivan Franko National University of Lviv, Ukraine
14:00-14:15	Tetiana Tepla	Lviv Polytechnic National University, Ukraine
14:15-14:30	Oksana Balaban	Lviv Polytechnic National University, Ukraine
14:30-14:45	Closing ceremony	





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