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| **Course code** |  |
| **Type and description** | EC – Elective Course |
| **ECTS credit** | 1 |
| **Course name** | 2D Materials: Guide to the Flatlands |
| **Course name in Polish** | Materiały 2D |
| **Language of instruction** | English |
| **Course level** | 8 PRK |
| **Course coordinator**  | dr hab. inż. Łukasz Kołodziejczyk |
| **Course instructors** | dr hab. inż. Łukasz Kołodziejczyk |
| **Delivery methods and course duration** |

|  | **Lecture** | **Tutorials** | **Laboratory** | **Project** | **Seminar** | **Other** | **Total of teaching hours during semester** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Contact hours | 0 | 0 | 0 | 15 | 0 | 0 | 15 |
| E-learning | No | No | No | No | No | No |  |
| Assessment criteria (weightage) |  |  |  | 100% |  | 0,00 |  |

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| **Course objective** | The aim of the course is to enable students to acquire knowledge in the synthesis, structure and properties of 2D materials, as well as the possibility of their up-scaling and new applications. |
| **Learning outcomes** | After completing the course PhD student will be able to:1. is able to list and describe the basic groups of 2D materials considering their synthesis methods, structure and properties;2. knows various techniques for surface modification of selected 2D materials;3. knows research methods to characterize selected properties of 2D materials.W4, U4, K1 |
| **Assessment methods** | Outcomes 1-3 – presentation (with discussion) The final grade for the course consists of 100% of the presentation grade. |
| **Prerequisites** | Basic knowledge of physics and chemistry. |
| **Course content with delivery methods** | Project covering topics in the field:Graphene and its derivatives. Hexagonal boron nitride (h-BN). Transition metal dichalcogenides (TMDC). Transition metal oxides. Phosphorene. Xene phases. 2D metal carbides and nitrides: MAX and MXene phases. Methods of synthesis of 2D materials: top-down and bottom-up. Characterization of 2D materials and their heterostructures. Properties and applications of 2D materials. |
| **Basic reference materials** | Documents available on websites and scientific articles related to the course content. |
| **Other reference materials** | 1. Anasori, B., & Gogotsi, Y. (Eds.). (2019). 2D Metal Carbides and Nitrides (MXenes). Springer. ISBN: 978-3-030-19025-5. doi:10.1007/978-3-030-19026-22. Banks, C.E., & Brownson, D.A.C. (Eds.). (2017). 2D MATERIALS: Characterization, Produc-tion and Applications (1st ed.). CRC Press. ISBN 978-1498747394. doi:10.1201/97813151520423. Tiwari A. & Syväjärvi M. (Eds.). (2016). Advanced 2D Materials. Scrivener Publishing & Wiley. ISBN: 978-1-119-24249-94. Avouris P., Heinz T.F. & Low T. (Eds.). (2017). 2D Materials: Properties and Devices. Cam-bridge University Press. ISBN: 978-1316681619. doi: 10.1017/9781316681619 |
| **Average student workload outside classroom** | 15h |
| **Comments** |  |
| **Last update** | May 2023 |