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| Course title: | Green molecules from biomass valorisation |
| Institute/Division: | FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY |
| Number of contact hours: | 45 hours Exam. (15h lectures, 30h laboratories) |
| Course duration: | 1 semester (6 th semester of regular I cycle studies - spring) |
| ETCS credits: | 3 |

Course description: The lecture reviews the biomass diversity and sustainability, highlighting their role in the global green molecule production balance. The basics of Polish, European and worldwide legislation regulating the production, properties and distribution of green molecules will be given together with the most typical classification based on the physical state (lignocellulosic, oil biomass); biomass sugars for non-fuel applications, the analysis and comparison of potential raw-materials and production technologies, as well as the perspectives for further development will be discussed. The laboratories consist of exercises on green molecules (carboxylic acids e.g. lactic or levulinic acid) production and characterization, chromatographic analysis of the carboxylic acids and sugars.

Education effects :

- knowledge: student knows the most important types of biomass; knows the methods of biomass separation and recognize their critical properties; is familiar with existing methods of biomass valorisation
- skills: student can synthesize various types of biomass and characterize them in respect of current EU standards; knows how to prepare high-quality research report from performed laboratory exercises
- social: student is able to work independently and in the group both at the laboratories and during preparation of the report; understand the reason of fulfilling the green molecules from biomass

Literature: [1] **Izabela Czekaj**, Natalia Sobuś, book: Nano-design of zeolite-based catalysts for selective conversion of biomass into chemicals, Cracow Technical University printing house, Cracow 2018, ISBN: 978-83-7242-785-4.

[2] Dmitry Murzin, Olga Simakova Biomass Sugars for Non-Fuel Applications, Royal Society of Chemistry, ISBN: 978-1-78262-113-3.

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| Assessment method: | Final test, completing the laboratories (presence and delivering of reports from each performed exercise) |
| Prerequisites: | Basic knowledge in organic chemistry and technology. |
| Primary target group: | Students from all specialties |

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| Lecturer: | dr hab. inż. I. Czekaj, prof. PK, dr inż. Natalia Sobuś |
| Contact person: | dr hab. inż. I. Czekaj, prof. PK, izabela.czekaj@pk.edu.pl |
| Deadline for application: | 15 th of January |
| Remarks: | The course is selectable |