Cracow University of Technology

Course title:	**3D printing technologies in modern applications**
Institute/Division:	Chair of Material Engineering, Faculty of Material Engineering and Physics
Number of contact hours:	30 hours
Course duration:	1 semester
ECTS credits:	6

Course description:

This course gives the knowledge about usage of additive manufacturing technologies in modern applications, such as medical, automotive, building, and space industries. The students received the skills necessary to choose the appropriate additive technology for application and compare the advantages and disadvantages of various 3D printing techniques for polymers, metals, ceramics, and other materials.

Topics covered include:

- Basic concept and definitions of additive techniques.
- Overview of additive methods.
- Construction of devices for additive methods.
- Materials used in additive methods
- Combining methods of 3D scanning and 3D printing
- Application of additive methods in pharmacy, medicine, and tissue engineering
- Application of additive methods for metals, including automotive and machine industries
- Application of additive methods in architecture and buildings
- Application of additive methods in aviation and space industry
- Other modern applications for additive techniques

Literature:

- Marczyk, J.; Ziejewska, C.; Gądek, S.; Korniejenko, K.; Łach, M.; Góra, M.; Kurek, I.; Doğan-Sağlamtimur, N.; Hebda, M.; Szechyńska-Hebda, M. Hybrid Materials Based on Fly Ash, Metakaolin, and Cement for 3D Printing. *Materials* 2021, *14*, 6874.
- Korniejenko, K.; Łach, M.; Chou, S.-Y.; Lin, W.-T.; Cheng, A.; Hebdowska-Krupa, M.; Gądek, S.; Mikuła, J. Mechanical Properties of Short Fiber-Reinforced Geopolymers Made by Casted and 3D Printing Methods: A Comparative Study. *Materials* 2020, *13*, 579.
- Kalaskar, D.M. *3D Printing in Medicine*, Woodhead Publishing, 2017.
- Gibson, I.; Rosen, D.W.; Stucker, B. *Additive Manufacturing Technologies*, Springer, 2017.

Course type:	Lectures (15 hours) + Laboratories (15 hours)
Assessment method:	Attendance, activity, oral presentation, oral exam
Prerequisites:	At least one college level math, physics and chemistry course
Primary target group:	Material Engineering
Lecturer:	Kinga Korniejenko, PhD /Szymon Gądek, MSc
Contact person:	Kinga Korniejenko, e-mail: kinga.korniejenko@pk.edu.pl Szymon Gądek, e-mail: szymon.gadek@pk.edu.pl