<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>PD – elective course from a different discipline</td></tr>
<tr><td>ECTS credits</td><td>1</td></tr>
<tr><td>Course name</td><td>Advanced Analytical Methods</td></tr>
<tr><td>Course name in Polish</td><td>Zaawansowane Metody Analityczne</td></tr>
<tr><td>Language of instruction</td><td>English</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>dr hab.inż. Anna Albrecht, prof. uczelni</td></tr>
<tr><td>Course instructors</td><td>prof. dr hab. inż. Dariusz Bieliński, dr hab.inż. Anna Albrecht, prof uczelni, prof. dr hab. inż. Piotr Paneth, dr hab. inż. Piotr Szajerski, dr n. med. Alicja K. Olejnik, dr hab. inż. Sławomir Kadłubowski, prof. uczelni, dr. hab. Beata Łuszczynska, prof. uczelni</td></tr>
<tr><td>Delivery methods and course duration</td><td>
<table>
<tr><th></th><th>Lecture</th><th>Tutorials</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Other</th><th>Total of teaching hours during semester</th></tr>
<tr><td>Contact hours</td><td>15</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>15</td></tr>
<tr><td>E-learning</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td></td></tr>
<tr><td>Assessment criteria (weightage)</td><td>1.0</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td></td></tr>
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<tr><td>Course objective</td><td>The aim of the course is to enable students to acquire knowledge in the field of modern analysis of various chemical substances, materials or technological processes from the point of view of the chemical composition, physical structure, properties or monitoring their processing or exploitation.
Students get acquainted with advanced analytical methods and their possible applications to solve problems related to various scientific disciplines, also enabling an interdisciplinary approach.</td></tr>
<tr><td>Learning outcomes</td><td>A PhD student after completing the course can:
1. characterize the relationship between structure and properties of materials - effects W1, W3, U3, K2
2. choose appropriate methods to determine the selected materials - effects W1, W3, U3
3. propose appropriate methods to monitor processing and exploitation of materials - effects W1, W3, U3</td></tr>
<tr><td>Assessment methods</td><td>Verification methods of learning outcomes
Effects: W1, W3, U3, K2 will be verified by written tests</td></tr>
<tr><td>Prerequisites</td><td>none</td></tr>
<tr><td>Course content with delivery methods</td><td>LECTURE
-Introduction to material chemistry, structure, technology, and engineering.
-Principles of chemical and structural analysis of materials (polymeric, inorganic, or organic) and their components.
-Surface and bulk properties of materials
-Materials composition,
-Degradation and aging properties of various materials
-Thermal properties of the materials
- Isotope composition of materials
- Biocompatibility of materials

-Different analytical techniques and their applications will be described and discussed among them:

- Raman, IR or Fluorescent or Nuclear Magnetic Resonance Spectroscopy allowing to study advanced properties of materials.
-Chromatographic techniques.
-Microscopy,
-Analytical techniques allowing to identify the material composition</td></tr>
<tr><td>Basic reference materials</td><td>1. Tutor’s materials.
2. Metody fizyczne badań polimerów. W. Przygocki, PWN, Warszawa 1990.
3. Palność polimerów i materiałów polimerowych. G. Janowska, W. Przygocki, A. Włochowicz, WNT, Warszawa 2007.
4. Mechanical Properties of Polymers and Composites. R.F. Landel, L.E. Nielsen, CRC Press 1993.
5. Surface Analysis Methods in Materials Science. O’Connor J., Sexton B., Smart R. eds., Springer 2003.</td></tr>
<tr><td>Other reference materials</td><td>current scientific articles, given by the lecturer</td></tr>
<tr><td>Average student workload outside classroom</td><td>15 hrs</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>Last update</td><td>2022-01-27</td></tr>
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