<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>EC - elective subjects from the discipline of Mathematics</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Nonlinear Boundary Value Problems</td></tr>
<tr><td>Course name in Polish</td><td>Nieliniowe zagadnienia brzegowe</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>prof. dr. hab. Bogdan Przeradzki</td></tr>
<tr><td>Course instructors</td><td>prof. dr. hab. Bogdan Przeradzki</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>0</td><td>0</td><td>0</td><td>5</td><td>0</td><td>0</td><td>5</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>no</td></tr>
<tr><td>Assessment criteria (weightage)</td><td>0</td><td>0</td><td>0</td><td>100%</td><td>0</td><td>0</td><td>100%</td></tr>
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<tr><td>Course objective</td><td>1. Acquiring knowledge in topological and variational methods of Nonlinear Analysis.<br><br>2. Acquiring knowledge in applications of metods from point 1 to nonlinear boundary value problems</td></tr>
<tr><td>Learning outcomes</td><td>After the course a student is able to:<br><br>1.prove the existence of solutions to nonlinear boundary value problems by using topological degree– outcomes W1, U2, K1<br><br>2. search for nonnegative solutions to boundary value problems by using Krasnosielskii Theorem– outcomes W2, U1, K1-K3<br><br>3. search solutions to resonant problems for differential equations - outcomes U1, K1-K3<br><br>4. look for solutions to BVPs by using variational methods – outcomes W2, U1, K1-K3</td></tr>
<tr><td>Assessment methods</td><td>Outcomes W1-2, U1-2 – oral exam</td></tr>
<tr><td>Prerequisites</td><td></td></tr>
<tr><td>Course content with delivery methods</td><td>1. Green functions for many differential operators.<br>2. Applications of Brouwer and Leray-Schauder degree theory.<br>3. Sub- and supersolutions for boundary value problems.<br>4. Critical points of functionals - minimum and saddle points and their applications.</td></tr>
<tr><td>Basic reference materials</td><td>1. Lecturer’s materials,</td></tr>
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| | 2. P. Drabek, J. Milota, Methods of Nonlinear Analysis, Birkhauser 2007.<br><br>3.K. Deimling, Nonlinear Functional Analysis, Springer-Verlag 1985. |
| **Other reference materials** | P. Rabinowitz, Minimax Methods In Critical Point Theory with Applications to Differential Equations, AMS, 1986. |
| **Average student workload outside classroom** | 15 h |
| **Comments** | |
| **Last update** | July 2020 |