<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>Elective Course</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Introduction to metamaterials</td></tr>
<tr><td>Course name in Polish</td><td>Wprowadzenie do metamateriałów</td></tr>
<tr><td>Language of instruction</td><td>Angielski</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>dr hab. inż. Sławomir Hausman, prof. uczelni</td></tr>
<tr><td>Course instructors</td><td>dr hab. inż. Sławomir Hausman, prof. uczelni, dr inż. Łukasz Jopek</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>15</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></td><td></td><td></td><td>1</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course objective</td><td>Metamaterials are one of the most important emerging technologies due to their unusual electromagnetic (also optical and mechanical) properties with diverse potential applications. The aim of the course is to ensure that the student is acquainted with the idea, physical principles and design methodology of example metamaterials and frequency selective surfaces for radio frequencies.</td></tr>
<tr><td>Learning outcomes</td><td>After the completion of the course, the students should be able to:
1. Clasify metamaterials/metasurfaces – W4
2. Describe the operation of specific metamaterials/metasurfaces – W4
3. Analyze the operation of example metamaterials/metasurfaces with commercial software – U4.
4. Design simple metamaterial/metasurface structures with commercial software – U4, K1
5. Propose manufacturing methods – U4, K1</td></tr>
<tr><td>Assessment methods</td><td>Learning outcomes 1-5 – Oral presentation and discussion of the project work.</td></tr>
<tr><td>Prerequisites</td><td>Basic knowledge of electromagnetics</td></tr>
<tr><td>Course content with delivery methods</td><td>Introduction to the topic based on lecture notes and other references:
1. History of metamaterials
2. Classification of metamaterials
3. Electromagnetic metamaterials and metasurfaces
4. Computer simulation of metamaterials
5. Design and fabrication of metamaterials (e.g. 3D printing) and metasurfaces
Project work:
Computer simulation of an example metasurface or gradient dielectric material.</td></tr>
<tr><td>Basic reference materials</td><td>1. Sławomir Hausman, Lecture notes “Introduction to metamaterials”
1. Tong, Xingcun Colin Tong,Functional Metamaterials and Metadevices, Springer, 2018
2. Filippo Capolino, Theory and Phenomena of Metamaterials, CRC Press, 2009
3. http://leeexplore.ieee.org</td></tr>
<tr><td>Other reference materials</td><td></td></tr>
</table>

Average student workload outside classroom	10h
Comments	
Last update	07.02.2022