



Subject card

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|---|--|--|--|-------------------------------------|--|------------|-----|
| Subject name and code | Numerical modelling in biomedical engineering, PG_00057492 | | | | | | |
| Field of study | Mechanical and Medical Engineering | | | | | | |
| Date of commencement of studies | February 2023 | | Academic year of realisation of subject | | 2023/2024 | | |
| Education level | second-cycle studies | | Subject group | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 1 | | Language of instruction | | Polish | | |
| Semester of study | 2 | | ECTS credits | | 5.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | prof. dr hab. inż. Wojciech Witkowski | | | | |
| | Teachers | | prof. dr hab. inż. Wojciech Witkowski dr inż. Karol Daszkiewicz | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 0.0 | 0.0 | 30.0 | 0.0 | 60 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 60 | | 10.0 | | 55.0 | 125 |
| Subject objectives | Introduction to finite element method modelling of selected anatomical structures | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | [K7_U04] He/she can use programming-communicative techniques concerning to the scope of engineering tasks | | student is able to define correctly the model in the FEM environment, student can carry out advanced analytics numerical analysis of selected anatomical structures in the nonlinear range and at a basic level is able to apply computational techniques together with the critical analysis of the results of calculations | | [SU1] Assessment of task fulfilment | | |
| | [K7_K01] He/she is aware to acquire the knowledge through the whole life, is able to inspire and to organize to teach himself/herself and others in cooperation and in leading position | | The student is aware of the importance of lifelong learning, can inspire and manage the process of teaching and self-teaching, the group co-operating, playing different group roles | | [SK5] Assessment of ability to solve problems that arise in practice | | |
| | [K7_W08] He/she broad knowledge related to understand social, economic, legal, ecological and other outer techniques conditions of engineering activities in mechanical-medical engineering | | The student is given the enhanced fundamentals necessary to understand the social, economic, legal, ecological and other, non-technical needs in engineering activity in mechanical-medical engineering | | [SW1] Assessment of factual knowledge | | |
| | [K7_U06] He/she uses analytical engineering, numerical and experimental methods to state and solve the tasks | | student is able to use advanced FEM codes | | [SU1] Assessment of task fulfilment | | |
| Subject contents | Introduction to nonlinear continuum mechanics. Selected problems in nonlinear finite element method (FEM) modeling. Selected problems of constitutive relations in biomechanics. Presentation of finite element method biomechanical models in commercial FEM systems. Case studies in FEM modelling and in imaging of anatomical structures of human body | | | | | | |

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| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Project | 0.0% | 50.0% |
| | Lecture | 0.0% | 50.0% |
| Recommended reading | Basic literature | FEBio Theory Manual FEBio User Manual | |
| | Supplementary literature | RAKOWSKI G., KACPRZYK Z.: Metody elementów skończonych w mechanice konstrukcji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1993 | |
| | eResources addresses | Podstawowe https://help.febio.org/docs/FEBioUser-4-1/UM41.html - FEBio User Manual https://help.febio.org/docs/FEBioTheory-4-1/TM41.html - FEBio Theory Manual Adresy na platformie eNauczenie: | |
| Example issues/ example questions/ tasks being completed | | | |
| Work placement | Not applicable | | |