GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | , PG_00056106 | | |
| Field of study | Mechanical and Medical Engineering | | |
| Date of commencement of studies | October 2021 | Academic year of realisation of subject | 2023/2024 |
| Education level | first-cycle studies | Subject group | |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | Polish<br>- |
| Semester of study | 6 | ECTS credits | 4.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Zakład Maszyn Przepływowych -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | prof. dr hab. inż. Krzysztof Tesch | |
| | Teachers | prof. dr hab. inż. Krzysztof Tesch | |

Lesson types and methods of instruction

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 0.0 | 15.0 | 0.0 | 0.0 | 45 |

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 | 45 | 0.0 | 0.0 | 45 |

Subject objectives

The aim of the course is to familiarise students with the CFD methods applied to the modelling of thermal-fluid processes in medicine

Learning outcomes

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_W09] he/she has basic knowledge related to numerical methods and engineering software used to analyze, model and design a given mechanical system | The student has elementary knowledge of numerical methods or basic knowledge of computer programs used in the analysis and simulation of mechanical systems and in the design process. | [SW1] Assessment of factual knowledge |
| [K6_U05] he/she is able to use analytic and modelling methods to formulate and solve engineering tasks related to the mechanical-medical area | The student is able to use analytical, simulation and computer methods to formulate and solve engineering tasks in the field of mechanical-medical engineering | [SU1] Assessment of task fulfilment |
| [K6_U08] he/she is able to assess whether proposed methods and tools can be used in practice to solve simple engineering task related to machine design, manufacturing and utilization | Students will be able to assess the suitability of routine methods and tools for solving a simple engineering task of a practical nature in the design, manufacture and operation of machinery and select and apply the appropriate method and tools. | [SU3] Assessment of ability to use knowledge gained from the subject |
| [K6_U03] he/she is able to use information-communication skills to solve typical engineering tasks related to design, production and utilization | Students will be able to use information and communication technology appropriate to the performance of tasks typical of engineering activity, in the field of design, manufacture and operation of machinery. | [SU2] Assessment of ability to analyse information |

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| Subject contents | LECTURES Basics of CFD. Problem of properly defined boundary conditions and basics of turbulence modelling. Basic features of computational fluid dynamics solvers, mesh generators, convergence criteria and results analysis<br><br>PRACTICAL EXERCISES In the computer laboratory classes, the various modelling steps will be performed using a commercial programme as an example: generation of meshes for selected geometries, correct definition of the computational model and selection of computational parameters, visualisation and interpretation of results |
| Prerequisites and co-requisites | Basics of thermodynamics and fluid mechanics. |
| Assessment methods and criteria | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Practical exercise | 100.0% | 100.0% |

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| Recommended reading | Basic literature | 1. Tesch K. Mechanika płynów, Wyd. PG 2014<br><br>2. Tesch K. Numeryczna mechanika płynów, Wyd. PG 2021 |
| | Supplementary literature | Fletcher C.A.J. Computational Techniques for Fluid Dynamics |
| | eResources addresses | Adresy na platformie eNauczanie:<br>Procesy cieplno-przepływowe w medycynie, W/L, IMM, sem. 5, letni 23/24 (PG_00056106) - Moodle ID: 36703<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36703 |
| Example issues/ example questions/ tasks being completed | 1. Conservation equations<br><br>2. Boundary conditions<br><br>3. Dimensionless numbers<br><br>4. Turbulence | |
| Work placement | Not applicable | |

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