GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Advanced Fluid Mechanics, PG_00062649 | | |
| Field of study | Naval Architecture and Offshore Structures | | |
| Date of commencement of studies | February 2024 | Academic year of realisation of subject | 2024/2025 |
| Education level | second-cycle studies | Subject group | Specialty subject group<br>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<br>polish |
| Semester of study | 2 | ECTS credits | 4.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Paweł Dymarski | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 15.0 | 30.0 | 0.0 | 0.0 | 75 |

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 | 75 | 8.0 | 20.0 | 103 |

**Subject objectives**

Expand the knowledge of fluid mechanics from the bachelor degree. The class covers an expanded scope on the boundary layer, turbulent flow, flow control, aerodynamic wake as well as wind farm scale problems. Basic information on wind turbine aeroacoustics. Laboratory classes on the application of computational fluid dynamics methods.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_W04] Conducts thorough analysis of complex problems, based on credible data and appropriately chosen methods, striving to achieve logical solutions | Student is able to analyze flow problems related to ocean engineering and marine energy. | [SW3] Assessment of knowledge contained in written work and projects |
| [K7_U04] Prepares professional presentations of analysis outcomes persuasively, providing them with profound interpretations to clearly convey their significance | The student prepares presentations of the results of his CFD analyzes and is able to interpret them | [SU5] Assessment of ability to present the results of task<br>[SU4] Assessment of ability to use methods and tools<br>[SU1] Assessment of task fulfilment |
| [K7_U01] Develops innovative strategies to solve complex and dynamic problems by synthesizing information from various sources and utilizing analytical, simulation, and experimental methods, considering environmental variability | Student is able to prepare boundary conditions, computational mesh, determine the time step and other parameters necessary to conduct analyzes in the field of fluid dynamics | [SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |
| [K7_W01] Identifies with a profound understanding the phenomena related to ocean engineering, describing advanced theories and methods for analyzing processes in technical oceanographic systems | The student identifies flow phenomena related to ocean engineering, knows the methods of analysis (computational) of these phenomena | [SW1] Assessment of factual knowledge |

**Subject contents**

Potential flow, flow around cylinder and airfoil, turbulence, boundary layer, laminar-turbulent transition, flow control, aerodynamic wake, fundamentals of atmospheric boundary layer and aerodynamic wake on a wind farm. Basic information on wind turbine aeroacoustics.

**Prerequisites and co-requisites**

Fundamental knowledge on fluid mechanics (bachelor level)

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|---|---|---|---|
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | | 60.0% | 35.0% |
| | | 60.0% | 35.0% |
| | | 60.0% | 30.0% |
| Recommended reading | Basic literature | "Fluid mechanics", Frank White | |
| | Supplementary literature | "Turbulence in Fluids", Marcel Lesieur<br><br>"Numerical Computation of Internal & External Flows", Charles Hirsch | |
| | eResources addresses | Adresy na platformie eNauczanie: | |
| Example issues/ example questions/ tasks being completed | | | |
| Work placement | Not applicable | | |