University of Gdańsk

Subject card

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| Subject name and code | Hydrological Modelling - laboratory classes, PG_00201425 | | |
| Field of study | Water Management and Protection of Water Resources | | |
| Date of commencement of studies | October 2027 | Academic year of realisation of subject | 2028/2029 |
| Education level | Bachelor's studies | Subject group | Obligatory subject group in the field of study<br>Subject group related to practical vocational preparation |
| Mode of study | full-time studies | Mode of delivery | at the university |
| Year of study | 2 | Language of instruction | Polish |
| Semester of study | 3 | ECTS credits | 3.0 |
| Learning profile | practical | Assessment form | credit |
| Conducting unit | Department of Hydrology -> Faculty of Oceanography and Geography -> Rector | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | Patrycja Mikos-Studnicka | |
| | Teachers | | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 0.0 | 0.0 | 30.0 | 0.0 | 0.0 | 30 |

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 |
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| Number of study hours | 30 | 2.0 | 43.0 | 75 |

**Subject objectives**

To learn the basic methods of hydrological analysis and forecasting methods. To be able to preprocess hydrological data used for model calibration. Learning the principles of calibration of simple hydrological models ( statistical, numerical).
This course prepares the student for independent modeling of basic hydrological processes.

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
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| | [GWOZWL3-W04] research techniques, methods and tools currently used in water management and the protection of water resources, in both the natural and social sciences, including basic statistical and IT tools enabling the description, modelling and interpretation of data concerning phenomena and processes occurring in the aquatic environment, as well as tools for describing relationships within socio-ecological systems. | K_W04 Correct mathematical notation of hydrological processes with their interpretation | [SW5] implementation of a problem task |
| | [GWOZWL3-W01] in advanced basic biological, physical and chemical processes and phenomena, as well as analyzes their mutual relations and course in relation to natural environment and socio-ecological systems. | K_W01 Correct analysis of hydrological phenomena and relations between available data | [SW5] implementation of a problem task |
| | [GWOZWL3-U08] use basic mathematical and statistical methods to analyze data and describe phenomena and processes occurring in the environment, as well as methods of information technology to assess the risk of threats to the of the environment, especially the hydrosphere. | K_U08, use and appropriately apply the basic methods of mathematical hydrological modeling (statistical, physical, genetic or empirical) to elucidate a mathematical description of the phenomenon or process under study, together with the ability to assess the risk of hydrological hazards | [SU5] implementation of a problem task |
| | [GWOZWL3-K05] take responsibility for the safety of his own work and that of others, dealing with emergencies, exercising caution in the laboratory and in the field, responsibility for entrusted equipment and apparatus. | K_K05, is ready to take responsibility for social obligations and initiate actions resulting from his work, especially in the public interest | [SK5] implementation of a problem task |
| | [GWOZWL3-K08] engage in professional work in preparation or implementation of projects for the benefit of society. | K_K08 is ready to implement with the preparation of projects for the benefit of the public resulting from the results of the conducted hydrological modeling, in particular for the benefit of the public | [SK5] implementation of a problem task |
| | [GWOZWL3-U02] select and independently apply basic research techniques and tools, with adhering to established analytical procedures in the field of environmental research in water management, adequately to the considered research problem. | K-U02 - is able to evaluate, select and apply the method of hydrological modeling to the described process, in accordance with the established methodology of procedures | [SU5] implementation of a problem task |
| | [GWOZWL3-U03] observe and describe the changes taking place in water management and predict further directions of its development as well as conduct a critical analysis of case studies of problems of water management and protection of water resources in terms of impact on ecological, social and economic systems; natural valorization and assessment of quality of the environment. | K_U03, carry out a critical analysis of the data and information at hand and the methods that can be applied to a given study of a hydrological phenomenon | [SU5] implementation of a problem task |
| | [GWOZWL3-U05] formulate opinions on basic environmental engineering issues, and explain and justify the necessity of land reclamation and construction of hydrotechnical facilities. | K_U05, present and justify the basic need for hydrotechnical and environmental engineering works resulting from the modeling carried out | [SU5] implementation of a problem task |

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| Subject contents | 1. Statistical evaluation of hydrological forecast results<br><br>2. Simple catchment runoff model<br><br>3. Rainfall-runoff model (HEC-HMS)<br><br>4. Flow curve construction, capacity analysis<br><br>5. Flood wave transformation model (HEC-RAS)<br><br>6. Calculation of water levels with a specified probability of exceedance |
| Prerequisites and co-requisites | |

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| implementation of the problem task | 51.0% | 100.0% |

**Recommended reading**

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| Basic literature | Ozga-Zielińska M., Brzeziński J., 1994, Hydrologia stosowana, Wyd. Naukowe PWN, Warszawa.<br>Soczyńska U., 1995, Modelowanie systemów naturalnych, WGSR UW, Warszawa.<br>Soczyńska U. (red.), 1997, Hydrologia dynamiczna, Wyd. Naukowe PWN, Warszawa<br>Byczkowski A., 1999. Hydrologia, t. 1 i 2, Wydawnictwo SGGW<br><br>Gąsiorowski D., Szymkiewicz R., 2016. Podstawy hydrologii dynamicznej. Wydawnictwa Naukowo Techniczne,<br><br>Warszawa.<br>Banasik K., 2009, Wyznaczanie wezbrań powodziowych w małych zlewniach zurbanizowanych, SGGW, Warszawa |
| Supplementary literature | Lesson plans (provided to students for selected exercises).<br><br>Sztobryn M., (red.) i in.. 2010. Metodyka obliczania poziomów wody, o określonym prawdopodobieństwie wystąpienia, w ujściowych odcinkach rzek wpadających do Bałtyku. Gdynia BPH. 2010. zatwierdzona przez KZGW<br><br>Bajkiewicz-Grabowska E., Mikulski Z., 2008. Hydrologia ogólna, Wyd. Naukowe PWN.<br><br>HEC family software documentation available on the website: http://www.hec.usace.army.mil/publications/pub_download.html |
| eResources addresses | |

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| Example issues/ example questions/ tasks being completed | |
| Work placement | Not applicable |

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