

Modelling of hydrological processes
- COURSE SYLLABUS



1.	Course title: <i>Modelling of Hydrological Processes</i>
2.	Lecturer: <i>Prof. dr hab. inż. Jarosław Napiórkowski, dr Emilia Karamuz, dr hab. Michael Nones, prof. PAN, dr hab. inż. Krzysztof Kochanek, prof. PAN, dr hab. inż. Monika Kalinowska, prof. PAN, dr hab. inż. Magdalena Mrokowska, prof. PAN</i>
3.	Field, type and level of studies, year of study: <i>Hydrology, modelling of hydrological processes in rivers and catchments; all years of study</i>
4.	Course character: <i>monographic lecture</i>
5.	Teaching method: <i>Mainly traditional: personal contact during lectures and practical classes. Tutorials and examples.</i>
6.	Language: <i>English or Polish - depending on the audience</i>
7.	Course type and number of hours: <i>Lectures (16 h)</i>
8.	Estimated load of student's independent work: <i>5 h</i>
9.	Total workload and number of ECTS points: <i>16 h, 1 ECTS</i>
10.	Short description and main focus of the course: <i>In this class the doctoral students will gain knowledge of individual processes in the hydrosphere. They will obtain the skills to model hydrological processes in practice, focusing primarily on modelling rainfall-runoff processes at the catchment scale, open channel flow, groundwater flow, transport of sediments and debris and water pollution, including thermal pollution. Additionally, the students will learn about the basics of modelling hydrological extreme phenomena such as heavy rains, floods and droughts. The students will develop the skills to understand and process hydrological data and modelling results, and the techniques behind their interpretation. They will learn the principles of analysis of the uncertainty of hydrological processes. Based on the results of empirical research, the doctoral students will be able to correctly understand and infer the course of processes taking place in the hydrosphere and indicate their causes and environmental effects. Acquiring knowledge of techniques used in modeling hydrological processes and knowledge of current research problems will help the doctoral students to formulate original</i>

	<p>research hypotheses, propose methods of their verification and design the research process. The students will also acquire the skills to appropriate present and publish their research results.</p> <p>Outline of the class:</p> <ul style="list-style-type: none"> • The hydrological cycle - discussion and analysis of individual hydrological processes • Methods of hydrological measurements • Modeling of rainfall-runoff processes, open channel flows and groundwater • Modeling of sediment transport and water pollution in freshwater systems • Modeling of hydrological extreme phenomena • Interpretation of modeling results with uncertainty analysis 						
11.	<p>References:</p> <p>David Maidment "Handbook of Hydrology", 1993, McGraw-Hill Professional Publishing</p>						
12.	<p>Prerequisites:</p> <p>Calculus, statistics, differential equations, probability theory – undergraduate level</p>						
13.	<table border="1"> <tr> <td> <p>Educational outcomes:</p> <p>Knowledge: Students know and understand the hydrological processes and methods of their observations.</p> </td> <td> <p><u>PQF level 8 codes:</u></p> <p>P8S_WG</p> </td> </tr> <tr> <td> <p>Practical Skills: Students are able to perform critical analysis and evaluation of the results of scientific research concerning hydrological processes and their modelling, expert activities and other works of a creative nature and their contribution to knowledge on hydrology. They will be also able to plan and implement their own research or creative work in this field, also in the international community.</p> </td> <td> <p>P8S_UW, P8S_UO</p> </td> </tr> <tr> <td> <p>Social Skills: Students will be ready to critically evaluate the achievements in hydrological sciences, critically evaluate contributions to the development of that field and recognize the value of knowledge in solving cognitive and practical problems in modeling of hydrological processes.</p> </td> <td> <p>P8S_KK</p> </td> </tr> </table>	<p>Educational outcomes:</p> <p>Knowledge: Students know and understand the hydrological processes and methods of their observations.</p>	<p><u>PQF level 8 codes:</u></p> <p>P8S_WG</p>	<p>Practical Skills: Students are able to perform critical analysis and evaluation of the results of scientific research concerning hydrological processes and their modelling, expert activities and other works of a creative nature and their contribution to knowledge on hydrology. They will be also able to plan and implement their own research or creative work in this field, also in the international community.</p>	<p>P8S_UW, P8S_UO</p>	<p>Social Skills: Students will be ready to critically evaluate the achievements in hydrological sciences, critically evaluate contributions to the development of that field and recognize the value of knowledge in solving cognitive and practical problems in modeling of hydrological processes.</p>	<p>P8S_KK</p>
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14.	<p>Evaluation of the educational outcomes:</p> <p>test</p>						
15.	<p>Criteria to complete the course:</p> <p>at least 80% attendance of lectures, participation in the exam and score of the exam more than 60%</p>						
16.	<p>Contact with the lecturer:</p> <p>E-mail: kochanek@igf.edu.pl, IG PAS office room 431 consultation hours Wednesdays from 11:00 to 12:00</p>						