

Hydroinformatics for Decision Support				WSE/HI11 HIFRM		
1 – 20 July 2013				5 ECTS Credit Points		
Mentor:	A. Jonoski					
Tuition form & study load:	Topic	Contact hours			Study load [hrs]	Examination/ weight
		<i>Lecture</i>	<i>Exercise</i>	<i>Work shop</i>		
	System analysis in water resources	8	6	6	42	Assignments (35%)
	Decision support systems	6	4	4	30	Assignments (30%)
	Software technologies for integration	4	10	10	42	Assignments (20%)
Integration of weather prediction and water models	8		2	26	Assignments (15%)	
	(total contact hours 68)				Total 140	
Pre-requisites:	Hydrological and hydraulic modelling concepts, basic programming skills					
Learning objectives:	<p>On completion of this module the participants are able to:</p> <ol style="list-style-type: none"> 1. Understand the role of system analysis in water resources planning and management 2. Formulate and solve water resources problems as optimisation problems 3. Distinguish and properly use different types of decision support methods for water problems 4. Build simple software applications that integrate data and models, both as stand-alone and Internet-based 5. Understand the potential of newly available data sources (e.g. remote sensing, web resources, data generated from climate and meteorological models) in advanced integrated modelling and decision support 					
Content:	<p>Systems analysis in water resources, D.P. Loucks (Cornell University) Definition and role of systems analysis in engineering planning; Basic concepts; Multi-objective models and the concept of trade-offs between conflicting objectives; Development and use of static and dynamic stochastic simulation models of river systems.; Introduction to decision support systems and geographic information systems and their use; Exercises in multipurpose integrated river basin (or regional) water resources management modelling</p> <p>Decision support systems, A. Jonoski (IHE) and I. Popescu (IHE) Introduction to decision making process; objectives and alternatives. Optimisation in decision support (single and multi-objective). Multi-attribute decision methods and tools: formulation of decision matrix, generating and using weights, compensatory and non-compensatory decision methods. Introduction to mDSS4 decision support software; exercises and assignments with case studies implemented in mDSS4</p> <p>Software technologies for integration, A. Jonoski (IHE), L. Alfonso (IHE), A. Almoradie (IHE) Introduction to methods and tools for software integration of models and data: file conversions exercises. Object-oriented integration approaches. Software integration across networks: Client-server programming, Web protocols, Technologies for integrating distributed resources: web-interfaces technologies; creating web-based applications with assignment exercise.</p> <p>Integration of weather prediction and water models, S.J. van Andel (IHE), A.H. Lobbrecht (IHE) Approaches and methods for integration of weather models with hydrologic and hydraulic models. Integration of remote sensing data. Downscaling and upscaling issues.</p>					
Course materials:	<p>D.P. Loucks: <i>Lecture Notes on Water Resource Systems Modelling: Its Role in Planning and Management</i> (chapters 2, 3, 4, 10 and 11)</p> <p>A. Jonoski: <i>Introduction to Decision Making and Decision Support Systems</i> (PowerPoint Slides)</p> <p>A. Jonoski: <i>Software Technologies for Integration</i> (PowerPoint Slides)</p>					