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Report

2.3.5 Revised content of 3 courses

Project info	
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Title of deliverable	D2.1.4 Revised content of 3 courses
WP leader	THOWL: Martin Oldenburg
Task leader	Ratnaweera (NMBU) & Wang (QUT)
Author(s)	Ratnaweera (NMBU) & Wang (QUT)
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Dissemination level	Public

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1 Revised course contents

1.1 Big Data for integrated Climate Change & Water management

1. Introduction to Big Data processing and analytics:
   What is Big Data, AI and machine learning, data cleaning and mining, possibilities and threats

2. Big Data tools:
   - Introduction to ML, supervised, unsupervised, reinforcement learning, hypothesis (models) spaces, examples of ML applications
   - Probability theory and concepts for ML, axioms of probability, conditional probability, Bayes theorem, maximum likelihood estimation, maximum a posteriori estimation
   - Introduction to AI, definitions and history of AI. Intelligent Agents: Problem formulation, goals, constraints environment and actors/agents.
   - Game theory: Selecting an optimal strategy in games using adversarial search techniques. Constraint Satisfaction Problems: Solving problems by finding acceptable solutions under constraints: Problem formulation and solving techniques.

3. Big Data applications in the water sector:
   Big Data in climate change models relevant for water sector; Process surveillance and process control with virtual sensors, forecasting effluents, process control algorithms with feed-forward/feed-back controls.

4. Planning with Big Data:
   Problem formulation construction of goal achieving plans: theory and practice. Planning and acting in the real world: schedules and resources, hierarchical planning, nondeterministic domains, multi-agent planning. Philosophical foundations of AI: Weak AI, strong AI, implications to dualism and consciousness

5. Visualization with Big Data:
   The need and tools (examples) for visualization of Big Data based analytics; User interfaces with access limitations

6. Ethics and AI:
   Integrating ethics to AI systems, accountability and interpretability of AI systems. Regulatory Framework of AI: Existing regulatory frameworks and legal issues arising from AI applications

1.2 Integrated Water Resources Management under Climate Change

1. Water resources and consumptive use (ILO 1)
   Hydrological cycle, Assessment of water availability, water quality, Value of water, Water utilization and sectoral demands. Socio-economic and environmental dimensions of water resources, Recycling and reuse

2. Impact of climate change on water resources (ILO 2)
   Climate variability and climate change, CC drivers and CC projections, CC mitigation and adaptation, Impact of climate change and adaptation in water sector

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3. IWRM challenges under climate change (ILO 3,4)
   IWRM concepts, Supply and demand management, Management of shared water resources, Impact of climate change and adaptation in water sector, Climate resilience, Catchment management, Gender in IWRM, Sustainable solutions at regional/local levels

4. Water governance (ILO 5)

Water policy and national goals, Legislation and regulations, Legislations and their implementation, Institutions, Public participation

1.3 Stormwater Management with Low Impact Development and Non-conventional Water Reuse

1. Urban stormwater and impacts [ILO 1]
   Hydrologic processes in urban catchments, Stormwater quantity and quality, impacts of urban stormwater -causes of the impacts, Changes under the climate change.

2. Overview of urban stormwater management [ILO 1, 2]
   Urban stormwater management, Stormwater control index system, Water sensitive urban design, Measurements for urban stormwater management, Conventional water reuse.

3. Introduction of low impact development for urban stormwater control [ILO 3]
   Concept of Low Impact Development (LID), Types and impacts of LID in urban stormwater management, Deployment of LID in urban water systems, Relationship between LID and non-conventional reuse.

4. Applications of big data and software in LID of urban stormwater control [ILO 4]
   Big data and IT tools, Case study applications, Stormwater Management Models (E.g. SWMM of US-EPA), Model for urban stormwater improvement conceptualization (E.g. MUSIC of eWater - Australia).

5. Integrated management strategies [ILO 5]
   Risk assessment of urban stormwater, technical standards on sustainable stormwater management, Regulations on stormwater management, planning, case studies.

1.4 Content of lecture materials after revision

Course	PPT slides	Supporting text	Lab/Practical excersies
BigData & CC			
IWRM under CCI			
Stormwater management			

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