UNIVERSITÀ DI PAVIA

Anno Accademico 2018/2019

FLOOD PROPAGATION AND STRUCTURAL MEASURES FOR FLOOD RISK MITIGATION

Anno immatricolazione	2017/2018
Anno offerta	2018/2019
Normativa	DM270
Dipartimento	DIPARTIMENTO DI INGEGNERIA CIVILE E ARCHITETTURA
Corso di studio	CIVIL ENGINEERING FOR MITIGATION OF RISK FROM NATURAL HAZARDS
Curriculum	Hydrogeological risk assessment and mitigation
Anno di corso	2°
Periodo didattico	Primo Semestre (24/09/2018 - 17/10/2018)
Crediti	12
Lingua insegnamento	

L'insegnamento è suddiviso

507329 - **FLOOD PROPAGATION**

508204 - **STRUCTURAL MEASURES FOR FLOOD RISK MITIGATION**

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Anno Accademico 2018/2019

FLOOD PROPAGATION	
Anno immatricolazione	2017/2018
Anno offerta	2018/2019
Normativa	DM270
SSD	ICAR/02 (COSTRUZIONI IDRAULICHE E MARITTIME E IDROLOGIA)
Dipartimento	DIPARTIMENTO DI INGEGNERIA CIVILE E ARCHITETTURA
Corso di studio	CIVIL ENGINEERING FOR MITIGATION OF RISK FROM NATURAL HAZARDS
Curriculum	Hydrogeological risk assessment and mitigation
Anno di corso	2°
Periodo didattico	Primo Semestre (24/09/2018 - 17/10/2018)
Crediti	6
Ore	48 ore di attività frontale
Lingua insegnamento	iNGLEsE
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	PETACCIA GABRIELLA (titolare) - 6 CFU
Prerequisiti	cONOSCENZE DI IDRAULICA E MECCANICA DEI FLUIDI
Obiettivi formativi	Fornire le conoscenze necessarie all'utilizzo di modelli di propagazione delle piene di moto vario , mono e bidimensionalei. L'ultima parte del corso prevede l'utilizzo del Software ORSADEM
Programma e contenuti	Introduction: steady and unsteady flow, uniform and varied flow, pipe flow vs open channel flow De Sant Venant equations (1d), divergent and non divergent form, supplementary terms and coefficients Initial and boundary conditions Discontinuous solutions: Bores

	Simple wave, Dam break waves Italian Regulations on Dam safety Simplified channel flow equations Numerical solution of the unsteady flow equations (method of characteristics, explicit and implicit finite differences methods, numerical integration schemes: predictor corrector, flux splitting, upwind and downwind; accuracy of the numerical method, stability analysis Shallow water equations (2D) Mesh generation (structured/non structured) Simulation of flow in natural streams (1d vs 2D models, topological and hydraulic discretization, some computational problems in rivers and floodplains, flooded area mapping techniques) Models calibration and data needs Flood wave propagation through hydraulic singularities Introduction to the use of ORSADEM code Case study: analysis of Sella Zerbino dam break (Italy)
Metodi didattici	Lezioni in Aula e esercitazioni in Laboratorio Informatico
Testi di riferimento	V.T. Chow 1959 Open Channel Hydraulics Mac Graw Hill Book , New York J.A. Cunge, F.M. Holly, & A.Vervey, Practical aspects of Computational River Hydraulics. 1980. Pitman Publ. Inc, London K. Mahmood , V.Yevjevich 1975. Unsteady flow in open channel, Water Resources publications, Colorado, 1975. H. Chanson 2004 The Hydraulics of Open Channel Flow: An Introduction, Second Edition, Elsevier Oxford T.W. Sturm. 2001. Open Channel Hydraulics, Mc Graw Hill, Singapore

	ORSADEM reference manual Slides of the course (see Kiro: http://kiro2014.unipv.it/idcd/)
Modalità verifica apprendimento	ESAME ORALE
Altre informazioni	
Obiettivi Agenda 2030 per lo sviluppo sostenibile	$lbl_legenda_sviluppo_sostenibile

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STRUCTURAL MEASURES FOR FLOOD RISK MITIGATION	
Anno immatricolazione	2017/2018
Anno offerta	2018/2019
Normativa	DM270
SSD	ICAR/01 (IDRAULICA)
Dipartimento	DIPARTIMENTO DI INGEGNERIA CIVILE E ARCHITETTURA
Corso di studio	CIVIL ENGINEERING FOR MITIGATION OF RISK FROM NATURAL HAZARDS
Curriculum	Hydrogeological risk assessment and mitigation
Anno di corso	2°
Periodo didattico	Primo Semestre (24/09/2018 - 17/10/2018)
Crediti	6
Ore	51 ore di attività frontale
Lingua insegnamento	English
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	GHILARDI PAOLO (titolare) - 6 CFU
Prerequisiti	Basic knowledge of fluid mechanics or fluid mechanics is required. A knowledge of the main concepts of sediment transport mechanics, slope stability, and groundwater flow is warmly suggested.
Obiettivi formativi	This course describes, analyses and compares many practical solutions for flood risk mitigation, e.g., levees, reservoirs, floodways, tools for river bank protection and for control of local scour, devices for river training, and special design techniques to be applied to buildings in flood prone areas. Design techniques and selection criteria of risk mitigation measures are discussed throughout this course.
Programma e contenuti	1. Geomorphic assessment of natural streams - field investigation, channel stability assessment, computational design methods. 2. River protection - Stream bank erosion, river training and stabilization,

	flow control structures, environmental impacts, channel restoration and rehabilitation 3. Bank protection and stabilization - General principles, Riprap design and placement, Bioengineering countermeasures and erosion control, rock-and-wire mattresses, gabions, sacks, concrete blocks, used tires, soil cement 4. Scour protection at bridges and other structures - countermeasures for contraction scour and for local scour. Riprap design for bridge piers and for bridge abutments; Geotextiles filters; grouted ripraps; concrete armor units. 5. Levees - Levees in flood risk management; functions, forms and failure of levees; physical processes and tools for levee assessment and design. Hydraulic design of levees: surface protection measures, spillways, control of seepage and uplift, hydraulics of overtopping flows, mechanics of overflow erosion, erosion protection 6. Structural measures for reducing flood risk to buildings - Avoidance and resistance design options: site layout, landscaping, drainage, boundary walls and fencing, threshold and floor levels. Flood resilient design and construction: general principles, building materials, foundations, walls, doors and windows, fittings, services.
Metodi didattici	lectures with slides and multimedia. Numerical exercises with discussions on typical case studies, also using numerical tools.
Testi di riferimento	Course notes will be provided during the course.
Modalità verifica apprendimento	Oral examination with discussion on case studies.
Altre informazioni	
Obiettivi Agenda 2030 per lo sviluppo sostenibile	$lbl_legenda_sviluppo_sostenibile