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**Master's theses in the field of hydrotechnical engineering at the Faculty of Civil Engineering (University of Rijeka) - Good practice examples**



Sveučilište  
u Rijeci  
Građevinski  
fakultet

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## History of the Faculty of Civil Engineering of the University of Rijeka

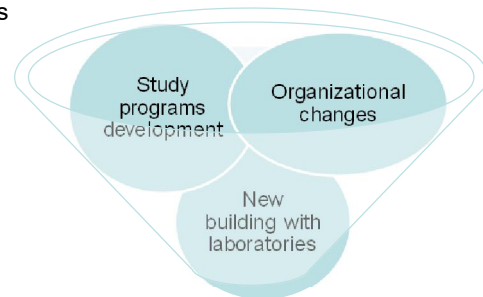


**1976.** - The Faculty of Civil Engineering of the University of Rijeka was established and started with civil engineering studies as an independent institution

**2005.** - Establishment of the Department of Hydrotechnics and Geotechnics

**2011.** - Moving to the new building within the University of Rijeka campus

**2014.** - Establishment of the Hydrotechnical laboratory



**TODAY:**  
**Chair for Hydrotechnics**  
**employs 12 people**

## Types of master's theses in hydrotechnical engineering



- The thesis can be on, practical, theoretical, and scientific topics related by its contents to civil engineering and the offered courses within the study programme
- A part of the master's thesis can be carried out as fieldwork - practical teaching, the student has to prepare the diary of activities carried out at the other institution / firm and that must be related to the master's thesis topic.
- Students may also choose to complete a whole or part of their master's thesis at another domestic or foreign University as part of student ERASMUS or CEEPUS mobility.

### Scientific topics

- creating a civil engineering construction computer model
- numerical modeling of materials and processes in materials
- creating studies related to water management
- topics related to design, analysis and construction of more complex civil engineering structures and systems
- and similar.

### Practical topics

- design of a civil engineering structures
- static and dynamic analysis (calculation) of structures
- analysis of hydraulic structures solutions
- project and project analysis related to urban areas (transportation projects, spatial and spatial planning studies, water management structures in urban areas)
- and similar.

### Theoretical topics

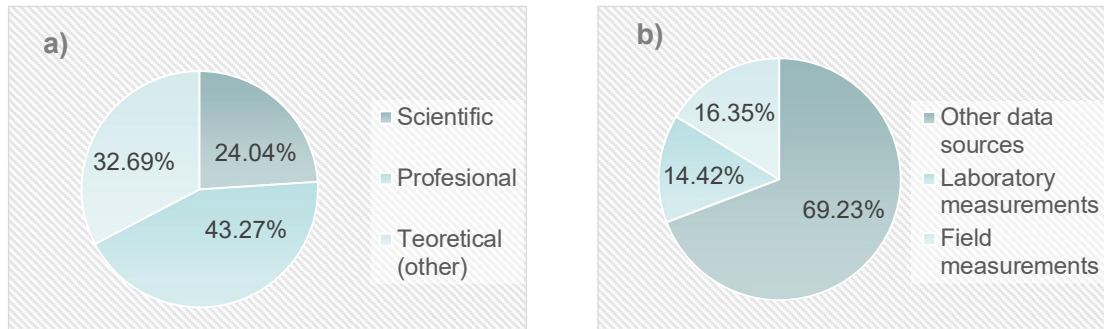
- analysis of a more complex problem which requires additional theoretical processing and presentation of an analytical or a numerical solution procedure.



## Overview of master's theses in hydrotechnical engineering (2015.-2020.)



- 104 master's theses done in the area of hydrotechnical engineering
- Leadership and participation in many domestic and foreign scientific-professional projects as well as professional projects.
- Projects are mostly based on hydrotechnical field measurements, laboratory research, and numerical modeling providing the opportunity to involve students in the research and project work.



Distribution according to: a) master's theses type and b) master's theses data source

## Overview of master's theses in hydrotechnical engineering (2015.-2020.)



- Usage of different computer languages: *MATLAB (MathWorks) and PYTHON*
- up to date with the development of new computer programs: *CloudCompare (EDF R&D, Telecom ParisTech), ArcGIS (Esri), Urbano Hydra (StudioArs), Urbano Canalis (StudioArs) and Bentley WaterCAD (Bentley Systems, Inc.).*



Cooperation with students on their master theses is also visible in **17 scientific** and professional articles that were published in co-authorship of students and teachers in the last six years.

## Examples of master's theses in hydrotechnical engineering



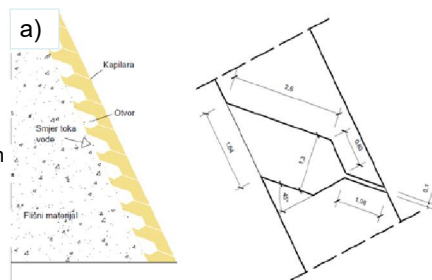
Scientific type of master's thesis

### Conceptual Solution of the Surface Water Drainage from the Slani Potok Catchment (Marko Lettich)

- rewarded with Croatian Waters Award for the best master's thesis for the hydrotechnical engineering and water management area in 2016.
- This thesis proposes the conceptual solution for the surface water drainage from the Slani potok catchment by the usage of the experimental material with specific capillary drainage properties
- The conceptual solution consists of a description of the area in geological and hydrological terms, a review of the current situation, explanations of the conceptual solution that was tested by the physical model in the laboratory, and hydrological-hydraulic calculations.

Experimental material with specific capillary drainage properties (Lettich, 2016):

- a) Cross section plan and  
b) Laboratory research on HM 145 - Advanced hydrological investigations



## Examples of master's theses in hydrotechnical engineering



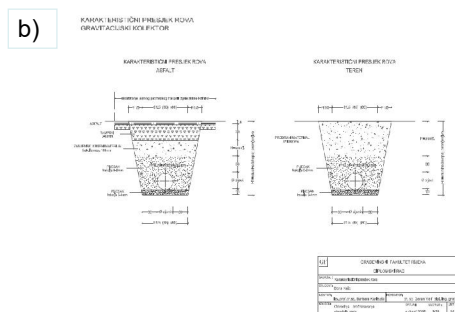
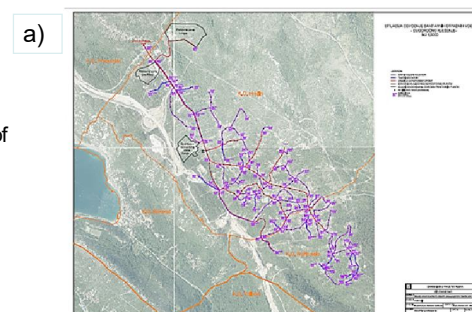
Professional type of master's thesis

### Conceptual Design of Sanitary Wastewater Drainage of the Municipality of Hreljin (Doris Kalc )

- objective was to make a conceptual design for the sanitary wastewater drainage system for the Municipality of Hreljin
- Two solutions for wastewater collection and for wastewater treatment are considered: first stage solution (wastewater collection and treatment on a temporary waste water treatment plant (WWTP) Hreljin) and long-term solution (wastewater collection and treatment on WWTP with submarine discharge in Kostrena).
- The design of the drainage system in this thesis is done using software Urbano Canalis (StudioArs).

Conceptual design for the drainage of sanitary waste water for the Municipality of Hreljin (Kalc, 2015):

- a) collector network plan and  
b) characteristic cross section of the collector



## Examples of master's theses in hydrotechnical engineering

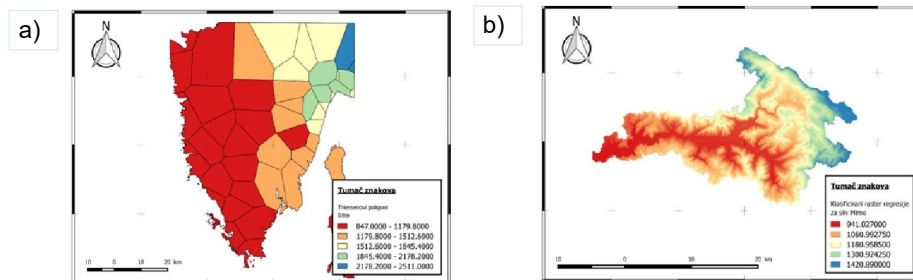


Scientific - professional type of master's thesis

### **Spatial interpolation of the measured precipitation data using multiple linear regression in GIS environment (Davor Šepić)**

- analyses of the precipitation distribution by comparison of different distribution methods within the QGIS software, considering digitalized information about the natural characteristics of the area
- This thesis shows and explains the procedure of how a map of the spatial interpolation of precipitation in the catchment area of the river Mirna and the entire Istrian peninsula is made
- Analysis results showed that the area with the lowest predicted precipitation in the western part of Istria, and the largest predicted precipitation we found on the slopes of mounts Učka and Čičarija

QGIS software precipitation analyses results (Šepić, 2015):  
 a) Thiessen polygon method and  
 b) classified raster of the river Mirna



## Discussion and conclusion



- Enhancement of the teaching, scientific, and professional activities due to moving to new building and laboratories
- Development of the work with students is visible especially in the quality of the master's theses in the last six years as well as in practical and scientific articles that are published in cooperation with students.
- The Chair for Hydrotechnics mentored 04 master's theses (24,04% (25 theses) of all are done as scientific research, 43,27% (45 theses) are done as a professional type and 32,36% (34 theses) are done as theoretical and scientific-practical type)
- The civil engineering industry demands all kinds of a different profiles of civil engineers, therefore is necessary to adapt study programmes and learning outcomes according to the market development and needs and as well to satisfy student's interests and affinities.
- students have a lot of different topics to choose from and if they want to, they can also do their theses through the student ERASMUS or CEEPUS mobility programs in other HE institutions.
- The Faculty of Civil Engineering, University of Rijeka continuously develops in line with the market and science needs







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