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DRM&FSE MPS CURRICULA MODEL AND COURSE SPECIFICATION

Programme name	Disaster Risk Management and Fire Safety
Higher education institution where the programme is being executed (University/Faculty)	Faculty of Technical Sciences, University of Novi Sad
Educational-scientific field	Interdisciplinary -Industrial Engineering and Management, Civil Engineering, Environmental Engineering
Type of studies	Master Academic Studies
Study scope, expressed in ECTS	60
Academic degree, abbreviation	Master in Disaster Risk Management and Fire Safety, M.Dis.Ris.Managem.Fir.Saf.
Study length	1 year
Future course implementation starting year	2018
Planned number of students to be enrolled in this programme	32
Programme language	Serbian, English

Introduction

The study programme of the graduate academic studies in Disaster Risk Management and Fire Safety presents the continuation of the undergraduate academic studies of Risk and Fire Protection Management at the Faculty of Technical Sciences, University of Novi Sad.

Engineering and technical disciplines are incorporated into the realization of the curriculum of the undergraduate and graduate academic studies of Disaster Risk Management and Fire Safety, thus representing a highly multidisciplinary and interdisciplinary programme. In the realization of the programme, curriculums in architecture, civil engineering, electrical engineering, mechanical engineering, management, design and in basic scientific disciplines of mathematics, chemistry, physics and others are studied, thus completing the multidisciplinary image of the study programme.

The Graduate Master Programme of Disaster Risk Management and Fire Safety should enable students within the elected study group to additionally generalize and widen their knowledge based on the understanding of the basic principles of different fields in the Risk and Fire Protection Management, to master additional professional knowledge for the realization of the contemporary technical systems, to acquire ability to integrate knowledge which is to be applied in each specific case and introduced in the research, individual and creative work during the realization of the study programme.

Programme Structure and Capacity

The name of the study programme is Disaster Risk Management and Fire Safety. The acquired academic title is Master in Disaster Risk Management and Fire Safety. The outcome of the studying process is the knowledge which enables students to use professional literature, apply knowledge to the problems which occur in the profession, and enables the continuation of the studies if students decide so.

The study programme prerequisites for the enrolment are completed undergraduate studies with at least 240 ECTS and the passed enrolment examination. The course consists of lectures and practice. During the teaching process, students are referred to the independent research and the emphasis is



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placed on his personal involvement in the teaching process. During the lectures theory is presented using the adequate didactic tools, but students are also presented with the research trends in the specific field. During practice, which accompanies lectures, students work on the specific designing problems or research topics dealing with the field of study, thus coming to direct contact with the matter being taught. Practice gives additional explanation of the matter being taught during the lectures. Practice may be auditory, laboratory, computer or computing. Part of the Practice may be carried out in the companies or other institutions. Experimental laboratories for Safety at Work are equipped with necessary standard instruments (pH meter, conduct meter, calorimeter, automatic and analytical scales, automatic burettes and other small laboratory equipment) and highly sophisticated equipment such as: mobile gas chromatograph for the in-city quantification of pollutants. Student obligations during the Practice may include writing of the term papers and homework assignments, project assignments, term and graphic papers while each student activity during the teaching process is monitored and evaluated according to the rules adopted at the Faculty level. The number of obtained credits is presented according to the unique methodology and it represents the workload per student. Each course is worth certain number of ECTS credits, and the studies are completed when the student fulfills all obligations predicted by the study programme and collects at least 60 ECTS in the process.

Graduates` Competencies

Graduate students of the graduate academic studies in Disaster Risk Management and Fire Safety are competent and qualified to solve complex, multidisciplinary problems in the theory and practice. The competences include, above all, the development of the ability for critical thinking, ability of problem analysis, solution synthesis, behavior prediction of the chosen solution with the clear idea of good and bad sides of the chosen solution. Qualifications that indicate the end of the graduate academic studies acquire students:

- who have demonstrated systematic knowledge and understanding in the field of risk and fire protection management that complements the knowledge gained at the undergraduate academic studies, being the basis for developing critical thinking and application of knowledge;
- who are able to apply knowledge in solving problems in the new or unknown environment;
- who have the ability to integrate knowledge, solve complex problems and make decisions based on the available information taking into consideration social and ethical responsibilities related to the application of their knowledge and judgments;
- who are able to clearly and unambiguously transfer knowledge and the way of making conclusions to the professional and wider public;
- who possess the ability to continue the studies in the way they independently choose.

Students are enabled to design projects, organize and manage risks and fire protection. During their education, students acquire knowledge to independently plan and carry out experiments of statistical data processing as well as to define and make adequate conclusions.

A student with master`s degree in Risk and Fire Protection Management acquires special competence to sustainably use and protect the natural resources of the Republic of Serbia in accordance with the principles of sustainable development.

Study Programme Structure

***S – Semester (1-winter/2-summer)**

***CS – Course status (M- mandatory/ E- elective)**



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No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
01.	Protection and Rescue Plans	1	M	Laban Đ. Mirjana	3
Course content/structure:					
<p>The course objective is to acquire necessary knowledge for protection and rescue of people under the circumstances of natural disasters, catastrophic events and fire.</p> <p>Organization and the methods of alarming the people in case of natural disaster and natural catastrophe (earthquakes, floods, landslides). Technical-technological accidents (dangerous substances, terrorism) and bigger fires (in the open, in the facilities, on reservoirs of flammable liquids, on transportation vehicles, in industrial plants). Phenomena, concept and organization of the rescue of people, material goods and cultural property. Protective and rescue measures. Preventive measures. Needs and possibilities of the protection of people, material goods and environment from the consequences of catastrophic events. Protective facilities. Methodology of planning the needs for shelters. Maintenance of shelters. The concept and objective of people evacuation, place of evacuation, time of evacuation, elements of evacuation. Planning and designing the plans of evacuation. Rescue from the rubble. Power, means and equipment for the protection from rubble. Planning and protection from earthquakes and landslides. Planning the flood defense and rescue. Protective and rescue measures from natural disasters: wind, snow, hail, ionizing radiation, and chemical contamination. Protective and rescue measures from fire in the open space-wood fire. Protective and rescue equipment.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
02.	Integrated Natural Disaster Risk Management	1	M	Popov M. Srđan, Ćosić I. Đorđe	4
Course content/structure:					
<p>Integrated disaster management activities (mitigation, preparedness, response, and recovery), National legislation and disaster mitigation strategies, EU legislation and disaster mitigation strategies, methods and tools for integrated risk management. Simulation. Optimization. Multiobjective analysis. Advanced techniques used in risk management. Challenges: Climate change and Population growth and migrations.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
03.	Assessment of Damaged Structures	1	M	Malešev M. Mirjana, Radonjanin S. Vlastimir, Kočetov-Mišulić Đ. Tatjana	4
Course content/structure:					
<p>Acquiring knowledge about basic types of structure damage after catastrophic events and fire, as well as about methodologies and methods for the assessment of the actual state and safety of the damaged structures. Destructive and non-destructive methods of examination (equipment, procedures, application possibilities). Classification and manifestation of damage on the structures after catastrophic event (fire, earthquakes, explosions, floods, overload, etc.). Examination methodology and assessment of the structure. Technical regulations. Examples of examination and damage assessment of the structures.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
04.	Constructions works management in settlement reconstruction	1	M	Trivunić R. Milan, Jakšić D. Željko	3
Course content/structure:					



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Acquired theoretical and applied knowledge enables the planning, selection and implementation of appropriate remediation measures, development of plans and programs for rehabilitation, and coordination and management of rehabilitation activities. Training for the planning of preventive measures to reduce the risk from the effects of catastrophic events, making plans (with the necessary resources - machinery, manpower) to mitigate the effects of catastrophic events, study on the organization and method of implementation of measures to mitigate the effects of catastrophic events (to save lives and help people in need, clearing and reconstruction and rehabilitation of buildings and infrastructure - establishing an organization to build on the reconstruction of the destroyed areas, ranging from the choice of appropriate locations, selection of building materials and machinery, quality designers, contractors and supervision). The structure and content of recovery plans by the current building regulations with an overview of repair measures buildings and terrain. Bill of Quantities of work. Construction machinery and its application. Price cost of construction machinery. The technology works clearing (subject to possible catastrophic events), and repair damage to buildings and infrastructure. Planning. Planning methods (CPM, Gantt charts). Treatment plans on a computer. Conditions for execution of works on clearing and rehabilitation. Temporary facilities. Organizational structure and organization of the clearing and rehabilitation. Manage the implementation of the planned measures.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
05.	Crisis Management	1	E	Pečujlija D. Mladen	4

Course content/structure:

Students will be able to completely understand natural and technical hazards, vulnerability and catastrophic risks; they will develop ability to analyze risks, threats and possibilities, and also to create and implement solutions. Students will master techniques for risk reduction against catastrophes and for their management, including abilities to manage emergency situations and ensure business continuity in those situations. Students will develop mapping skills through practical work using geo-information systems.

The course will cover the following units through combination of theoretical lectures and practical projects: Hazards, vulnerability, risk and catastrophe: assessment of hazards (natural and anthropogenic), vulnerability and risk, the characteristics of disasters, their assessment and management. Business continuity and crisis management: the unit for business continuity and planning for crises; framework and procedures for training and organizational preparation for the crisis. Financial planning for national disaster: the economy of catastrophe (local, national, international), financial risk management, catastrophe modeling, insurance and reinsurance through series of case studies from Great Britain, Turkey and small island states in the Caribbean`s. Catastrophe management techniques: methods and techniques used in the catastrophe risk assessment, GPS and GIS mapping for search and rescue actions. Natural disasters: geological, meteorological, biological and technological catastrophes, fast and slow occurring disasters; climate change impact, managing disasters and mitigation. Organizational risk: identification and corporate safety risk management.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
06.	Fire and Explosion Protection due to Electricity	1	E	Juhas T. Anamarija, Pekarić-Nađ M. Neda	4

Course content/structure:

Students are trained to understand and use ``Regulations on general measures for occupational safety due to dangerous effects of electricity in the working facilities, offices and at construction sites``, ``Official Gazette of the Republic of Serbia``, no. 21/89. After completing the course, students also acquire engineering intuition which helps them identify risks and prevent fire and explosion due to electricity.

Coulomb`s law. Electric field. The potential. Voltage. Capacitance. Critical field. Breakdown voltage. Protection against static electricity. Direct current. Kirchhoff laws. Matched load. The maximum power transfer. The magnetic field. Biot-Savart law. Ampere`s law. Magnetic circuits. Faraday`s law of electromagnetic induction. Sinusoidal currents and voltages. Complex power. Symmetrical three-phase systems. Protection against excess current. Technical standards for protection against fire and explosion.



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No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
07.	Investigation of Fire and Explosion	1	E	Radeka M., Lukić I.	3
Course content/structure:					
<p>Acquired theoretical and applied knowledge enables clarification of circumstances which led to fire. Methods of fire investigation. Inspecting fire causes. Analysis of the fire manifestation. (traces of fire outside and inside the space).</p> <p>Manifestation of fire in transportation vehicles. Methods of determining the place of fire origin. Event reconstruction and report elaboration. Application of laboratory methods for fire expertise. Modern information technologies used in investigation and fire expertise.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
08.	The role of media in reducing the risk	1	E	Beleslin I.	3
Course content/structure:					
<p>1.INTRODUCTION - Media as a means of communication; development of media and dominant models of communication throughout history; modern media. - The influence of the media on the public - analysis of different theoretical approaches; the influence of media on defining reality. - Classical and modern media as a factor of prevention and security; international, national, corporate and personal security, security on the Internet - Social Responsibility of Media. 2. FEATURES of media role in terms of increased risk – Specifics of interaction between the media and the public in terms of risk events/situations; Role of public services and commercial media in terms of increased risk; Media as a factor of influence on the prevention, flow and elimination of consequences of risk situations; - Significance of media nomination, classification and risk assessment of events/situations; Characteristics of media forms in the presentation of risk situations; - Basic models of communication with the media in crisis situations. 3. PREVENTION OF RISK THROUGH COMMUNICATION WITH THE MEDIA - The role of the media in growing awareness about the importance of prevention and reduction of risk; - Preparation, processing and distribution of printed, audio, photo, video and mixed media releases. 4. COMMUNICATION WITH THE MEDIA DURING THE CRISIS SITUATIONS - The influence of the media in a human-factor induced crisis, due to natural factors and crises caused by the combined action of natural and human factors; - Basic models and phases of media processing of risk situations (5 basic stages in media processing the crisis) - The causes of inadequate media coverage of events; Example analysis of media processing accident, trouble, emergency, crisis and disaster; - Effect of media in social conflicts and crises. 5. MEDIA AS A FACTOR IN ELIMINATING THE CONSEQUENCES OF CRISIS – Methods of (re)activation of media during the post crisis period.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
09.	Evacuation calculation and modeling	2	M	Laban Đ. Mirjana	3
Course content/structure:					
<p>Students will be able to understand building evacuation processes and apply egress models to simulate movement of people during evacuation. First part of the course is focused on lectures and laboratory exercises. During the second part of the course the students focus on their group assignment, which is presented to colleagues from other groups and professors in the end of course.</p> <p>Basic concepts and definitions of evacuation, Evacuation decision making and human behaviour in fire, Egress strategies, Evacuation stages, Evacuation corridors, Evacuation walking speeds, Calculation of evacuation, Computer modeling of evacuation, Evacuation drills, Evacuation plans and procedures, Occupancy calculation.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
10.	Design and Maintenance of the Fire Detection Systems	2	E	Rajs Vladimir	4



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Course content/structure:

Theory lectures:

Designing the project program of fire protection. Designing and building the fire protection system. Legislation and technical regulations for certain types of fire protection systems. Technical defining and dimensioning of the system and its elements. Designing the necessary graphic documentation (situation plan, pipe network with cross sections, fire stations drawing, drawing of basic elements and standard parts and other documents necessary for assembly). Instructions about assembly, test work, investigation and maintenance. Measurement and calculation.

Design of fire protection of typical facilities: protection in the marine and river transport, protection in the air transport, protection of transportation means, storage protection, computer centers, transformers and generators, protection of public facilities, protection in the industry.

Practice:

The Practice is mainly computing and partially performed in the computer center where simulations of stationary fire protection systems are performed on the computers.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
11.	Risk Analysis in Decision Making Process	2	E	Radonjanin Vlastimir, Laban Mirjana	

Course content/structure:

System definition, Systems view of integrated disaster management, System formulation examples, Simulation, System dynamics simulation, Disaster risk management, Source of uncertainty, Conceptual risk definition, Probabilistic approach, Engineering decisions under uncertainty, Decision making and integrated risk management: Individual decision making, Decision making in organizations, Decision making in government, Implementation of system analysis to management of disasters, Human behavior during disasters.

	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
12.	Design and Maintenance of Stationary Fire Extinguishing Systems	2	E	Jocanović T. Mitar, Stipić S. Matija	4

Course content/structure:

Theoretical lectures: Fire fighting water supply: the requirements for fire fighting water, sources, reservoirs and water accumulation, pumping and water transportation. Installations for water supply: sizing and pipe network plan with all belonging elements. Selection and sizing of pumps. Design and dimensioning of the external and internal hydrant network. Design of stationary systems: criteria for system selection. Extinguishing spraying systems – sprinklers. Other systems and contemporary extinguishing equipment. Application of the system depending on the type of facility. System selection. Fundamentals of design. Project assignments. System activation and activating elements. Pipe network. Armature. Nozzles. Carriers. Hydraulic calculation. Calculation of the amount of resources for fire fighting. Instructions for installation, test mode, testing and maintenance. Practice: Practice is mainly computing and partially held in the computer center where the working simulation of stable systems for fire protection is carried out on the computers.



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No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
13.	Financial resilience to hazards	2	E	Trivunić Milan, Malešević Erika	4
Course content/structure:					
<p>Through the combination of theoretical units and practical case studies students will develop knowledge and master techniques and mechanisms that are necessary for building financial resilience to catastrophic events. Introduction, Economic framework, Defining resilience across disciplines, Defining financial resilience to hazards, Financial resilience in the disaster management cycle, Risk assessment, Catastrophic risk modeling for financial solutions, Financial protection: diagnosis, strategy and action plans, Analytical tools for financial decision-making, Disaster risk financing, Financial mechanisms and tools (domestic and international), The importance of disaster risk financing in disaster risk management., EU Civil Protection Mechanism Directive</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
14.	Professional practice	2	M	Ćosić Đorđe, Laban Mirjana	
Course content/structure:					
<p>Training students to apply previously acquired theoretical and professional knowledge to solve specific practical engineering problems in the selected companies or institutions. Introducing students to activities of the selected companies or institutions, ways of doing business, management and the place and role of engineers in their organizational structures.</p> <p>Course content/structure: Formed for each candidate separately, in agreement with the management of companies or institutions, performing professional practice and in accordance with the needs of the profession for which the student is qualified.</p>					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
15.	Study Research Work on theoretical basis of the master thesis	2	M		10
Course content/structure:					
No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
16.	Master Thesis – Elaboration and Defence	2	M		15
Course content/structure:					