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Knowledge FOr Resilient soCiEty

K - FORCE

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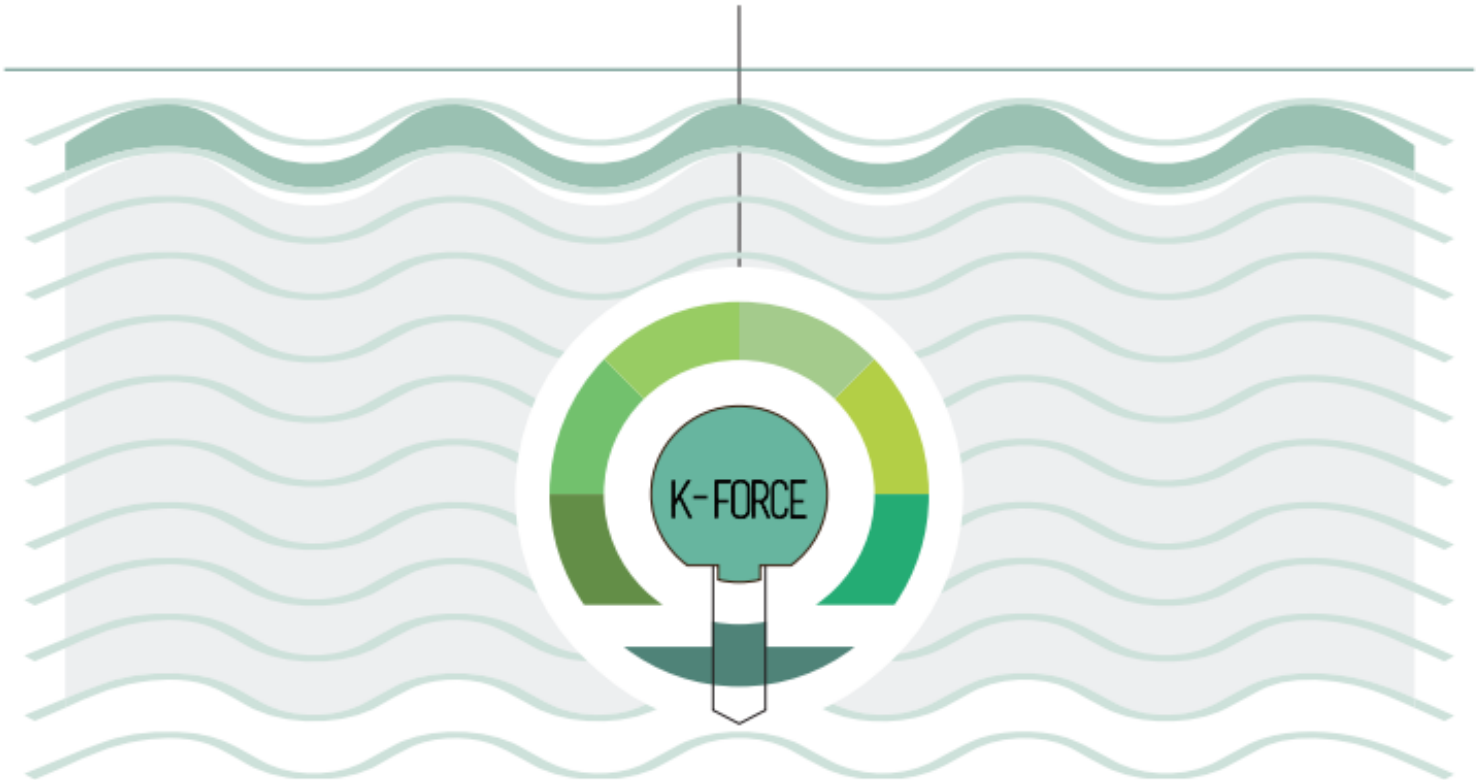

WP1

AN ANALYSIS OF THE DISASTER RISK MANAGEMENT AND FIRE SAFETY ENGINEERING MASTER PROGRAMMES IN EUROPE AND WESTERN BALKAN COUNTRIES

Report on modernized/developed Disaster Risk Management and Fire Safety Engineering Master Programmes Curricula

Deliverable 1.3

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Report 1.3 provides curricula and syllabi drafts for DRM&FSE Master Programmes that will be modernized or developed in K-FORCE project's Partner countries - Serbia, Bosnia & Herzegovina and Albania. Proposed modernized or new curricula are aligned with regional needs and NQF/EQF, with agreed common learning outcomes. Partner from University of Novi Sad will modernize existing DRM&FSE master academic programme, while partners from University of Tuzla and University of Banja Luka will develop DRM&FSE master academic programme. Partners from University of Tirana will develop Risk Management master academic programme, Higher Technical School of Professional Studies in Novi Sad- Protection Engineering professional master programme and Epoka University- DRM&FSE professional master programme. Within the report programmes' description, structure and capacity, as well as graduates` competencies are given.

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INTRODUCTION

The overall broader objective to which K-FORCE project contribute is to build a sustainable educational foundation in Disaster Risk Management and Fire Safety Engineering (DRM&FSE) field in Western Balkan Countries (WBC) and ensure national professional resources and regional capacity for resilient society.

K-FORCE members wish to improve the current provision in DRM&FSE education and training, by developing or modernizing programmes for current and future WBC workforce.

Accordingly, one curriculum is modernized:

- Disaster Risk Management and Fire Safety Engineering academic master programme at University of Novi Sad in Serbia,

while five curricula will be developed (in EN, SR, AL, BH) at WBC partner HEIs:

- Disaster Risk Management and Fire Safety Engineering academic master programme at University of Tuzla in Bosnia and Herzegovina;
- Disaster Risk Management – module for academic master programme **Civil Engineering** at University of Banja Luka in Bosnia and Herzegovina;
- Risk Management master academic programme at University of Tirana in Albania;
- Protection Engineering professional master programme at Higher Technical School of Professional Studies in Novi Sad, Serbia;
- Disaster Risk Management and Fire Safety professional master programme at Epoka University in Albania;

Specific syllabi will be dedicated to the vulnerable social groups' safety (disabled people, hospitalised people, poor people living in slums, homeless, elderly people and children) as well as refugees/migrants. EU law and technical standards will also be included in several syllabi.

Implementation of 6 Master Programmes in 3 Western Balkan Countries (Serbia, Bosnia & Herzegovina and Albania) brings important strategic, pedagogic, and practical challenges, particularly when legislative and educational structures differ. The work is demanding and time-consuming and there is need for support in order to be able to create programmes that are well-integrated and have highest quality.

SERBIA

UNIVERSITY OF NOVI SAD

Faculty of Technical Sciences

Novi Sad

Programme name	DISASTER RISK MANAGEMENT AND FIRE SAFETY
Higher education institution where the programme is being executed	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 Disaster Risk Management and Fire Safety 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 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, accompanied by 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 fulfils 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, behaviour 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

No.	Course Name	S[1]	CS[2]	Teacher/s	ECTS
01.	**Protection and Rescue Plans**	1	M	Laban Đ. Mirjana	3
Course content/structure:					
The course objective is to acquire necessary knowledge for protection and rescue of people under the circumstances of natural disasters, catastrophic events and fire. 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.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
02.	**Integrated Natural Disaster Risk Management**	**1**	**M**	**Popov M. Srđan, Ćosić I. Đorđe**	**4**
Course content/structure:					
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. Chalenges: Climate change and Population growth and migrations.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
03.	**Assessment of Damaged Structures**	**1**	**M**	**Malešev M. Mirjana, Radonjanin S. Vlastimir, Kočetov-Mišulić Đ. Tatjana**	**4**
Course content/structure:					

[1] **S – Semester (1-winter/2-summer)**

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

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.

No.	Course Name	S	CS	Teacher/s	ECTS
04.	**Constructions works management in settlement reconstruction**	1	M	Trivunić R. Milan, Jakšić D. Željko	3

Course content/structure:

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 ppropriate 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	CS	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	CS	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.

No.	Course Name	S	CS	Teacher/s	ECTS
07.	**Investigation of Fire and Explosion**	1	E	Radeka Miroslava, Lukić Ivan	3

Course content/structure:

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).

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.

No.	Course Name	S	CS	Teacher/s	ECTS
08.	**The role of media in reducing the risk**	1	E	Beleslin I.	3

Course content/structure:

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.

No.	Course Name	S	CS	Teacher/s	ECTS
09.	**Evacuation calculation and modelling**	2	M	Laban Đ. Mirjana	3

Course content/structure:

Evacuation – basic concepts and definitions, Evacuation decision making and human behavior in fire, Egress strategies, Evacuation stages, Evacuation corridors, Evacuation walking speed, Calculation of evacuation, Computer modeling of evacuation, Evacuation drills, calculation of time, periodical maintenance, Evacuation plans, Calculation occupancy.

No.	Course Name	S	CS	Teacher/s	ECTS
10.	**Design and Maintenance of the Fire Detection Systems**	2	E	Rajs Vladimir	4

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	CS	Teacher/s	ECTS
11.	**Risk Analysis in Decision Making Process**	2	E	Radonjanin Vlastimir, Laban Mirjana	4

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 behaviour during disasters.

No.	Course Name	S	CS	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.

No.	Course Name	S	CS	Teacher/s	ECTS
13.	**Financial resilience to hazards**	2	E	Trivunić Milan, Malešević Erika	4

Course content/structure:

Through the combination of theoretical units and practical case studies students will develope 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 Mehanizm Directive.

No.	Course Name	S	CS	Teacher/s	ECTS
14.	**Professional practice**	2	M	Ćosić Đorđe, Laban Mirjana	3

Course content/structure:

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.

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.

No.	Course Name	S	CS	Teacher/s	ECTS
15.	**Study Research Work on theoretical basis of the master thesis**	2	M	Mentor	10

Course content/structure:

Master Thesis mentor sets the Master Thesis problem and gives it to the student. The student studies the problem, its structure and complexity, and based on the conducted analysis makes conclusions about possible ways of solving it. By studying the literature, the student is introduced to the methods of solving similar problems and to the practice in solving them. Acquiring knowledge about the way, structure and form of report-writing, after conducting analysis and other activities carried out within the given Master Thesis topic.

No.	Course Name	S	CS	Teacher/s	ECTS
16.	**Master Thesis – Elaboration and Defence**	2	M	Mentor	15

Course content/structure:

By writing the Thesis, students gain experience in paper writing which requires problem description, methodology and procedures, and obtained results. Besides, the objective of writing and defending the Master Thesis is to develop student ability to prepare and publically present results of their independent work in the adequate form, as well as to answer the objections and questions related to the given topic.

It is formed individually in accordance with the needs and the field covered by the Bachelor Thesis topic. The student writes Mater Thesis in the written form in agreement with the mentor and in accordance with the standards of the Faculty of Technical Sciences.

During writing the Thesis, mentor can give additional instructions to the student, suggest certain literature and additionally guide him with an objective to create a quality Bachelor Thesis. Within the theoretical part of the Thesis, the student has consultations with the mentor, and with other professors dealing with problems in the field of the Thesis topic, if needed. Within the given topic, the student executes certain measurements, testing, counting, questionnaires and other research, if necessary.

The student prepares and defends the Master Thesis publically in agreement with the mentor and in accordance with the standards.

HIGHER TECHNICAL SCHOOL OF PROFESSIONAL STUDIES IN NOVI SAD

Programme name	PROTECTION ENGINEERING
Higher education institution where the programme is being executed	Higher Education Technical School of Professional Studies in Novi Sad, Serbia
Educational-scientific field	Technical and Technological Science: Environmental Engineering and Occupational Safety
Type of studies	Master professional studies
Study scope, expressed in ECTS	120
Academic degree, abbreviation	Master professional engineer of protection
Study length	2 years
Future course implementation starting year	2018
Planned number of students to be enrolled in this programme	32
Programme language	Serbian, English

Introduction

The master professional study programme of Protection Engineering has clearly defined goals that are in accordance with the goals of the Higher Education Technical School of Professional Studies in Novi Sad.

The purpose of the study programme is to educate students for recognizable and transparent professions and occupations. The goals of the study programme include achieving competencies and academic skills as well as methods for their acquisition.

The goals also include the development of creative abilities and mastering the specific practical skills needed to perform the profession.

Programme Structure and Capacity

The master professional study programme of Protection Engineering is in the educational-scientific field of Environmental protection and safety at work.

The study programme ensures the acquisition of competences that are socially justified and useful, complements the knowledge gained in the basic studies and forms the basis for developing critical thinking and applying knowledge in practice. After completing the master studies, students are able to apply knowledge in solving problems in a new unknown environment in wider or multidisciplinary areas within the educational-scientific field of study, to communicate knowledge and method of conclusion to the expert public in a clear and unambiguous manner, and have the ability to continue studies in a way they will choose independently.

The professional master studies have 120 ECTS credits, and the precondition is that the first level of studies of 180 ECTS credits has been previously completed.

The studies last two years or 4 semesters. The curriculum is realized through theoretical (mandatory and elective subjects) and practical teaching. Special emphasis is placed on professional master practice through the courses: Professional Master Practice 1, which is conducted in the second

semester of the master professional studies, lasting 90 hours, and Professional Master Practice 2, completed in the fourth semester of the studies, and lasting also 90 hours. The practice is realized in working organizations dealing with production, service and other activities.

The credit value of each course is expressed in accordance with the rating of the European Credit Transfer System (ECTS), and the studies are completed when the student fulfils all the obligations anticipated by the study programme and collects at least 120 ECTS credits.

The school provides space and technical basis for modern and quality teaching, teaching laboratories for conducting professional and practical classes. The equipment purchased through ERASMUS+ is IT equipment for carrying out teaching activities of demonstration, simulation and information-communication character and should contribute to the improvement of the teaching process. Students will be provided with innovative activities, acquiring new knowledge and developing creative abilities by using advanced and contemporary software programs in solving problems in the field of protection, particularly regarding disasters and fire.

Graduates` Competencies

By mastering this study programme, the student acquires general and subject-specific abilities that are in the function of quality performance of professional and scientific activities in the field of engineering protection.

General abilities:

- analysis, synthesis and forecasting of solutions and consequences;
- mastering of methods, procedures and research processes;
- development of critical and self-critical thinking and approach;
- application of knowledge in practice;
- development of communication skills, as well as cooperation with the social and international environment; and
- building of professional ethics.

Subject-specific abilities:

- basic knowledge and understanding of the discipline of engineering protection;
- solving concrete problems using scientific methods and procedures;
- linking basic knowledge from different fields of their application;
- monitoring and application of novelties in the field of engineering protection;
- development of skills in the use of knowledge in the field of protection engineering;
- use of information and communication technologies in mastering the knowledge of the relevant area;
- design, organization and control of production;
- independent experimentation, statistic processing of results, and conclusion formulation;
- writing papers and presenting results of the work;
- preservation of the environment; and
- economical use of natural resources of the Republic of Serbia, in accordance with the principles of sustainable development.

Study Programme Structure

No.	Course Name	S	CS	Teacher/s	ECTS
01.	Risk management in protection	1	M	Biljana D. Gemovic, Branko M. Savic	10

Course content/structure:

Course objective: To gain theoretical and practical knowledge in risk assessment and its application in the field of security engineering.

Outcome: Use of acquired knowledge through the conduct of protection tasks in the design process, management of technological processes and production, use and maintenance of equipment, with a special emphasis on preventive possibilities.

Content:

Theoretical teaching

The course teaches the methods and procedures for identifying hazards, methods of hazard study, Hazop studies, risk assessment, risk matrix, risk ranking, practical risk assessment methods, and documented assessment, as well as legal bases for risk assessment; standards and their application (ISO 14001, OHSAS 18001).

Practical teaching

Exercises and seminar papers – practical risk assessment in occupational safety and health, environmental protection and fire protection using the discussed methods.

No.	Course Name	S	CS	Teacher/s	ECTS
02.	**Applied risk modelling methods**	1	M	Borislav M. Simendic	10

Course content/structure:

Course objective: To master knowledge for advanced use of mathematical and information technologies, programs for modelling and simulation of catastrophic events and fires.

Outcome: Implementation of mathematical methods and self-realization of a model of accidental situation using software.

Content:

Theoretical teaching

Within the course, theoretical basics in mathematics in the field of probability, statistics and random variables are studied, which will help students use mathematical methods for presenting, processing and analysing various data from the narrow expertise areas. Risk analysis and the role of modelling in the risk analysis process are also studied. Modelling and simulation of characteristic emergency situations are thought using current modelling and simulation software, with the aim of reducing risks with catastrophic consequences.

Practical teaching

Group and individual task preparation from the field of study. Setting up and solving specific tasks in the field of catastrophic events and fire using the programs Pathfinder and PyroSim.

No.	Course Name	S	CS	Teacher/s	ECTS
03.	**Monitoring and control in protection**	1	M	Dragan M. Karabasil, Vesna B. Petrovic	10

Course content/structure:

Course objective: To acquire the knowledge necessary for the implementation of monitoring in the field of protection.

Outcome: Capacity to organize the monitoring service, to develop monitoring plans in accordance with the laws and standards for measuring harmful agents, and analyse the obtained results.

Content:

Theoretical teaching

The place, role and significance of monitoring in the field of protection are studied; Organization of monitoring systems at international, state and local level; Environmental monitoring and environmental monitoring system; Monitoring of phenomena and hazards that can have the characteristics of emergencies: hydrological monitoring (monitoring of water levels and flood forecasts), meteorological monitoring, seismological monitoring, epidemiological monitoring, and monitoring of radiation and chemical contamination.

Practical teaching

Development of theoretical areas on concrete examples through seminar papers. Measurement of individual characteristic parameters of environmental pollution (field work and in the laboratory).

No.	Course Name	S	CS	Teacher/s	ECTS
04.	**Course from elective block 1**	**2**	**E**		**10**

Course content/structure:

See the table below ELECTIVE BLOCK 1.

No.	Course Name	S	CS	Teacher/s	ECTS
05.	**Safety engineering in production processes**	**2**	**M**	**Verica J. Milanko, Sasa B. Spaic**	**8**

Course content/structure:

Course objective: To provide knowledge and develop the skills needed to identify potential hazards and risks in production processes, and acquire scientific knowledge and techniques for effectively designing measures for the safe management of production processes.

Outcome: Capability for engineering analysis of potential hazards in production processes, impact assessment on the immediate and wider community, application of knowledge and skills in practice for the proper choice of methods and measures in terms of safety in order to prevent accidents.

Content:

Theoretical teaching

Selection of elements of significance for hazard assessment, identification and assessment of risk levels. Hazard analysis and protection measures in the production, use, handling, transport and storage of gaseous, liquid and solid materials. Application of organizational and technical-technological measures for protection in production processes to reduce risk to an acceptable level. Methods and methodologies for assessing the effectiveness of applied protection measures. Initiation of the reengineering of technical and technological measures of protection.

Practical teaching

Developing a case study of catastrophic events. Creating plans for managing emergencies.

No.	Course Name	S	CS	Teacher/s	ECTS
06.	**Planning and management in disaster protection**	**2**	**M**	**Branko M. Babic**	**8**

Course content/structure:

Course objective: Introduction of students with modern methods and methodology in solving specific problems in disasters; Training for public communication of research results in publications; Developing critical analysis and deeper study of causes, factors, experiences and concepts of emergency management; Analysis of the protection and rescue system in the Republic of Serbia and in individual countries, as well as the application of control instruments.

Outcome: Acquiring competencies, knowledge and skills that are socially justified and useful, and in accordance with the needs of the development of the state and society and improvement of theoretical and scientific achievements in the field.

Content:

Theoretical teaching

National Security Strategies, Management of the National Security System; The system of protection and rescue of the Republic of Serbia and the surrounding countries, normative and legal regulation; Methodology of assessment and management in disasters; Implementation of the IT system for disaster management; Organizing logistics in disasters; Psychological aspects of disaster – stress; International cooperation and disaster relief.

Practical teaching

Simulation of catastrophic events, selection of methods to resolve events and mitigate consequences – through group work.

No.	Course Name	S	CS	Teacher/s	ECTS
07.	**Professional master practice 1**	**2**	**M**	**All teachers in the study programme**	**4**

Course content/structure:

Course objective: To acquire practical knowledge and to apply acquired knowledge from professional subjects of the first year in a selected work organization. Familiarizing with the specifics of organizing the protection system in the organization.

Outcome: Practical experience in the application of knowledge and skills acquired during the basic studies and the first year of master studies. Acquired knowledge in the functioning of the work organization, and organization, preparation and execution of protection.

Content: Professional master practice 1 is conducted in the second semester of master professional studies, lasting 90 hours, and is realized in work organizations dealing with production, service and other activities, according to general and individual programme contents, agreed among the co-mentor from the organization, the course teacher-mentor and the student.

During the practice, the student performs general and specific tasks. General assignments mean that the student learns about the history of the company, the organizational structure, the production program, and the measures taken to protect it. Specific professional tasks to be done during the practice are defined by the company's co-mentor and teacher-mentor. These are the thematic units students have done and passed in professional courses, and now they apply the knowledge in practical conditions in the company.

Teachers-mentors and co-mentors precisely define work assignments and obligations in order to familiarize students with the organization of enterprises or institutions, work processes, technology, procedures for controlling the quality of products and services, etc. The co-mentor in the company regularly cooperates with the student, directs him/her and monitors the activities.

On the completed practice, the student submits a report, which according to the content and form corresponds to the instructions of the mentor and the co-mentor defined at the beginning.

No.	Course Name	S	CS	Teacher/s	ECTS

08.	Renewable energy sources	1	M	Rade S. Ciric, Borislav M. Simendic	8

Course content/structure:

Course objective: Introduction of students with ecological aspects, working principles and economic aspects of using renewable energy sources.

Outcome: Gaining the skills for monitoring and adopting new achievements in the field of renewable energy sources and understanding the advantages of these energy sources for the production of electrical and/or thermal energy.

Content:

Theoretical teaching

Energy sources, geothermal energy, wind energy, water energy, solar energy, biomass, energy transformation, production plants. Estimates of reduction of general pollution by the installation of certain types of small power plants. Interdependence between rational use of energy and environmental protection. Economic aspects of the application of renewable energy sources. Business-legal and technical regulation of construction and connection to the small power plant network. Energy policy (SWOT analysis, vertical and horizontal activities according to the key assignments of energy policy in different sectors, incentive measures for wider application of renewable energy sources, Energy Development Strategy of the Republic of Serbia).

Practical teaching

Preparation of seminar papers from selected fields.

No.	Course Name	S	CS	Teacher/s	ECTS
09.	Course from elective block 2	1	E		8

Course content/structure:

See the table below ELECTIVE BLOCK 2

No.	Course Name	S	CS	Teacher/s	ECTS
10.	Course from elective block 2	1	E		8

Course content/structure:

See the table below ELECTIVE BLOCK 2.

No.	Course Name	S	CS	Teacher/s	ECTS
11.	Protection in working and living environment	1	M	Dušan G. Gavanski, Anita D. Petrović Gegić	8

Course content/structure:

Course objective: Introduction to basic principles related to the implementation of environmental policy within the National Strategy for Economic Development of the Republic of Serbia. Acquiring knowledge and skills in the preparation of an environmental impact analysis and integrated prevention of pollution control.

Outcome: Capacity to implement legislation in the preparation of documentation for environmental impact assessment and prevention and control of pollution.

Content:

Theoretical teaching

Introduction to the basic principles of environmental protection. Environmental protection through legal frameworks. ISO standards and environmental protection. Mining, energy and industry from the aspect of sustainable development. Hazards and harms resulting from the working environment and catastrophic events as factors of environmental balance disorder. Preventive environmental protection measures (spatial and urban planning, strategic environmental impact assessment, environmental impact assessment of projects, and integrated prevention and control of pollution). Nature protection, national parks, protection of natural assets, flora and fauna.

Practical teaching

Seminar paper from the mentioned theoretical areas for concrete communal, industrial and other economic facilities.

No.	Course Name	S	CS	Teacher/s	ECTS
12.	**Preliminary master thesis**	**2**	**M**	**All teachers in the study in programme and co-mentors from the industrial placement**	**8**

Course content/structure:

Course objective: Developing the ability to independently plan a project that will solve a concrete practical problem from the selected field. Integration, upgrading and practical application of knowledge acquired during the studies. Developing the ability to perceive and define problems, communicate with the mentor and co-mentor. Introduction to practical methodologies that can be used in the selected field.

Outcome: The student develops the ability to conduct analyses and identifies problems within the given subject. Through the practical application of the acquired knowledge from different fields, the student examines the place and role of the professional master engineer in the selected area, the need for cooperation with other professions and teamwork.

Content:

Teaching on the course is performed through independent applied research. At the beginning of the semester, the coordinator of the study programme coordinates the students, the general themes of master thesis, mentors and company co-mentors. The mentor and co-mentor define the preliminary assignment of the professional master thesis.

After obtaining the theme and the assignment, with regular consulting and reporting, the student studies the relevant professional literature, previous diploma and master thesis from the similar field, and performs preliminary analyses in order to better define the given problem. By the middle of the semester, the student hands over the **seminar paper with the literature review**, which is independently assessed by the mentor and co-mentor from the company.

In the second phase of this course, during Master Practice 2, the student studies in detail the nature, structure and complexity of the problem. Actively looks for published knowledge from a broader theme of the given assignment, plans and conducts surveys and/or preliminary experiments in order to better quantify the task and topic. The student makes conclusions about possible ways of solving, chooses the methodology, and thoroughly plans to organize and perform the main analyses for the master thesis, from surveys, experiments, numerical simulations or statistical data processing. The student performs regular consultations with the mentor and co-mentor, and if necessary with other teachers of the School. The goal of student's activities during this phase of the research is to acquire the necessary experience to solve complex problems and to identify the possibilities for applying previously acquired knowledge in practice.

By the end of the semester, the student submits the **preliminary master thesis**, which should contain the following sections: Introduction, Problem overview, Brief overview of literature data, Detailed elaboration of goals and assignments, Proposed methodology, Work and necessary

resources plan, Preliminary results, Conclusion, References.

The preliminary thesis is evaluated by the panel of 3 members – the mentor, company co-mentor and member. The written report, on the official assessment form, with suggestions for possible revisions, is submitted to the student until the beginning of the examination period.

During the examination period, the student has a **viva defence** of the preliminary thesis before the three-member panel.

No.	Course Name	S	CS	Teacher/s	ECTS
13.	**Professional master practice 2**	**2**	**M**	**All teachers in the study programme and co-mentors from the industrial placement**	**4**

Course content/structure:

Course objective: To acquire new and apply acquired advanced knowledge related to the study programme in the selected work organization, in the function of producing the preliminary and final master theses.

Outcome: Practical experience of using knowledge and skills gained during the basic studies and three semesters of professional master studies. Ability to identify, analyze and solve a specific problem in the field of protection. Data collection and preparation of the practical part of the preliminary master thesis and the final master thesis.

Content:

Professional master practice 2 is conducted in the fourth semester of master professional studies, lasting 90 hours, and is realized in work organizations dealing with production, service and other activities, according to general and individual programme contents, agreed among the co-mentor from the organization, the course teacher-mentor and the student.

In the selection of Professional master practice 2, the School attempts to ensure that work assignments during the period of practice provide adequate opportunities for the student to demonstrate the skills in several categories: application of professional and academic knowledge; practical skills; computer skills; analytical skills, skills to solve specific problems; innovation and originality; developmental skills; time management; written and oral expression.

During the practice, the student performs specific assignments, defined by the company's co-mentor and teacher-mentor, after submitting the seminar paper from the course Preliminary master thesis.

Teacher-mentors and co-mentors have the task of directing the student and should precisely define work assignments and obligations to have the preliminary master thesis elaborated. These are, for example: planning and conducting a survey and/or preliminary experiments, discussing possible ways of solving a specific problem, selecting a methodology, and detailed planning of the performance of the main analyses during the master thesis. In the second phase of the practice, after submitting the written proposal of the final master of thesis, the student executes the planned activities.

On the completed practice, the student submits a report, which according to the content and form corresponds to the instructions of the mentor and the co-mentor defined at the beginning.

No.	Course Name	S	CS	Teacher/s	ECTS
14.	**Final master thesis**	**2**	**E**	**Mentor**	**16**

Course content/structure:

Course objective: Application of theoretical and practical knowledge gained from the study program and professional master practice, with the aim of adopting advanced methods for making complex engineering decisions.

Outcome: Ability to apply acquired theoretical knowledge and skills from a master's studio, to present master's work through written documentation and oral presentation.

Content:

After passing all the exams, the student starts developing the master thesis. It is a research-methodological-practical work of the student in which he/she is acquainted with solving complex practical problems and methodology of developmental and practical research in one of the fields of the master study programme.

The master thesis is produced from any scientific-professional or professional-applicative course, but includes knowledge and skills from several courses.

The teacher of this selected course is the mentor of the student's master thesis. The mentor is an active participant in all stages of the development of the master thesis, and, if necessary, includes the co-mentor from the company (from the student's master practice) and other teachers from the School in the preparation of the thesis.

In addition to a detailed overview of the relevant contemporary literature and/or legal-technical regulations in the selected field, the master thesis should contain at least two of the following elements – analytical, budgetary, design, developmental or experimental aspects.

The thesis is done on an individual basis, and it is desirable that it is related to the specific knowledge gained during the professional master practice in the company. The paper includes initial theoretical research in the field, after which the initial theme and goals of the master thesis are defined. Then it comes to problem solving, calculating, designing, developing, etc. in other words, meeting the goals of the thesis. The thesis must be supported by practical work or experiment, which involves planning the experiment, collecting, processing and analysing data, as well as creating written communication.

After conducting the research, the student prepares the master thesis in the prescribed form containing the following chapters: Introduction, The goal of the thesis, Theoretical research, Experimental research (Practical work), Results and discussion, Conclusion and Review of the used literature.

Upon the completion of the thesis, the student submits a written version of the thesis, which the commission reviews and approves the oral defense. After checking the fulfillment of conditions according to the procedure of the School, the student has a public oral presentation and defence (viva) of the thesis.

ELECTIVE BLOCKS OF COURSES 1 AND 2

No.	Course Name	S	CS	Teacher/s	ECTS
01.	**Prevention and control of water Pollution (block 1)**	2	E	Anita D. Petrovic Gegic	10
Course content/structure:					

Course objective: Introduction to the principles of sustainable management of aquatic systems, measures and monitoring of pollution prevention and purification processes in individual production processes.

Outcome: Theoretical and practical solution of the problem of water pollution prevention and control.

Content:

Theoretical teaching

Hydrological cycle of water. River basin as an ecosystem. Water pollution routes. Waste water parameters. Wastewater treatment: sedimentation, coagulation, flotation, filtration, aeration, degasification, membrane processes, biological wastewater treatment. Types of sludge, methods of sludge treatment. Ideas for cleaner technologies in different industries. Optimization of wastewater treatment processes.

Practical teaching

Concrete examples. Quality control for drinking water, ambient and wastewater. Examination of qualitative and quantitative composition of waste sludge.

No.	Course Name	S	CS	Teacher/s	ECTS
02.	**Fire investigation (block 1)**	**2**	**E**	**Dragan M. Karabasil, Verica J. Milanko**	**10**

Course content/structure:

Course objective: Acquiring theoretical and practical knowledge necessary to investigate the circumstances and causes that led to the fire. Training students for team work and for integrated knowledge in this complex area.

Outcome: Determination of the circumstances and manner of fire outbreak in the function of protection of human lives and property; cooperation with investigative bodies. Students should be trained to follow and adopt innovations in this field.

Content:

Theoretical teaching

Study of the characteristics of the fire according to the place of origin (fires in the open air, on the building), the cause of the fire, the behavior of the material in the fire. Determination of arson techniques. Analysis of the manifestation of fire through traces of fire. Methods and approaches to determining the causes of fire (surveys, methods of elimination, static and dynamic methods, reconstructions) and places of fire. Collecting, analyzing and reconstructing events and producing reports. Application of laboratory methods for fumigation.

Modelling fire threats to objects and territory.

Practical teaching

Concrete examples. Application of laboratory methods for determining the cause of fire. External visits and field work.

No.	Course Name	S	CS	Teacher/s	ECTS
03.	**Design of stationary systems (block 2)**	**1**	**E**	**Dragan M. Karabasil, Branko M. Milisavljevic**	**8**

Course content/structure:

Course objective: To acquire knowledge on the design and execution of complex automatic stationary systems for risk control in the field of protection for the purpose of individual solving of practical problems.

Outcome: Design, implementation and maintenance of stationary systems for fire extinguishing and early detection of hazardous substances.

Content:

Theoretical teaching

Stationary fire extinguishing systems (types and purposes). Water supply in fire extinguishing and protection of facilities and installations. Hydrant networks (types and design methods). Stationary fire extinguishers – division by type of fire extinguishing agent. Design of stationary automatic sprinkler systems (types and design method). Designing various types of stationary fire extinguishing systems (work principle, design method and calculation of elements). Design of stationary automatic systems for early detection of fire and alarm in case of exceeding of predetermined parameters incorporated into the system.

Practical teaching

Specific examples, seminar papers, external visits, fieldwork.

No.	Course Name	S	CS	Teacher/s	ECTS
04.	**Facilities and systems under pressure (block 2)**	**1**	**E**	**Branko M. Milisavljevic**	**8**

Course content/structure:

Course objective: To acquire theoretical and practical knowledge of fluids stored in pressure vessels, as well as quantitative requirements for equipment and systems under pressure. Getting acquainted with diagrams and procedures for assessing compliance, and with legal regulations in this field.

Outcome: Ability to participate in the design, testing and certification of facilities and vessels under pressure. Organizing preventive and corrective measures in systems that are subject to legal regulations in this field.

Content:

Theoretical teaching

Properties of fluids. Characteristics, classification and categorization of vessels. Construction and design, materials, filling and discharging, production (rolling and welding). Special quantitative requirements for pressure equipment (permissible stresses, welded coefficient, pressure limiting devices, hydrostatic test pressure). Commissioning. Labelling pressure vessels. Conformity assessment diagrams. Compliance assessments. Named bodies. Conformity sign. Declaration of Conformity. Regulations in this field. Hazards during use of pressure equipment. Preventive safety measures from injuries and health hazards.

Practical teaching

Specific examples and visits to enterprises.

No.	Course Name	S	CS	Teacher/s	ECTS
05.	**Automated transport and storage Systems (block 2)**	**1**	**E**	**Dusan G. Gavanski**	**8**

Course content/structure:

Course objective: Introduction to working principles, theoretical and practical basics of safe use of automated transport and warehouse systems.

Outcome: Understanding the working characteristics of certain types of automated transport and storage systems and their role in the process of processing, storage, transhipment and transport of various loads in industry. Ability to identify hazardous elements and recommend risk mitigation measures.

Content:

Theoretical teaching

Energy media for the transfer of mechanical power (electromotor drives, pneumatics, hydraulics, mechanical transmission circuits), advantages and disadvantages. Single-axis and multi-axis automatic power transmission and motion control systems, linear and rotary. Requirements regarding speed, power, precision management. Generally on production, automation, transport, transhipment and storage. Automated transport lines. Flexible transport systems. Flexible automated storage systems. Hazards and safety measures in automated transport and warehouse systems.

Practical teaching

Concrete examples. Presentation and analysis of work of concrete machines, devices and systems for storage, transhipment and transport. Analysis of hazardous sites and proposing measures to reduce risk. Seminar papers.

No.	Course Name	S	CS	Teacher/s	ECTS
06.	**Waste management and recycling (block 2)**	1	E	Petra M. Tanovic	8

Course content/structure:

Course objective: Introducing students to potential pollution resulting from the generation of waste, as well as to recycling procedures for various types of materials. Adoption of innovations related to waste management and recycling.

Outcome: Application of acquired knowledge and solving complex practical tasks in enterprises related to waste management and recycling.

Content:

Theoretical teaching

Sustainable development and waste management. Types of waste, collection, separation and reuse of waste. Hierarchy of waste management, preventive strategies. Measures for handling and managing hazardous waste. Categorization of waste according to the EU waste catalog. Waste disposal. Sanitary landfills. Remediation of closed (filled) landfills. Use of waste as energy source. Legislation of the EU and the Republic of Serbia in the field of waste management.

Practical teaching

Specific examples and preparation of seminar papers.

BOSNIA & HERZEGOVINA

UNIVERSITY OF TUZLA

Faculty of Mining, Geology and Civil Engineering
Tuzla

Programme name	DISASTER RISK MANAGEMENT AND FIRE SAFETY
Higher education institution where the programme is being executed	**University of Tuzla, Faculty of Mining, Geology and Civil Engineering**
Educational-scientific field	
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	2018/19
Planned number of students to be enrolled in this programme	20
Programme language	Bosnian, English

Introduction

The Master's Degree in DRM & FSE represents the upgrading of undergraduate studies at Faculty of Mining, Geology and Civil Engineering in Tuzla, as a specialist in mining engineers, drilling of mineral deposits, geology, civil engineering and security and assistance in the field of risk management in disasters and fire. The study is highly multidisciplinary and seeks to prepare engineers of different profiles to respond to the challenges of designing preventive protection, as well as active and advisory role in accidental events. The curriculum of the study is designed to provide students with the engineering basis of risk management in their related technical and organizational aspects. The study consists of 6 mandatory subjects and the final master's work. Special emphasis was placed on the current and constantly growing risks of floods, landslides, seismic activities in the region, and as a specific feature of B&H, special risks have been dealt with in the mining and thermal energy sectors. Approved knowledge through this master's degree can be applied in different sectors of society and economics and combine with the knowledge acquired by the undergraduate degree.

Programme Structure and Capacity

The name of the master 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 master 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 to the doctoral studies if students decide so.

The study programs prerequisites for the enrolment are completed undergraduate studies of Mining, Geology, Borehole mining, Civil Engineering or Safety and Health with at least 240 ECTS. The course consists of lectures and practice. During the teaching process, students are referred to the independent research and the emphasis is placed on his personal involvement in the teaching process. During the lectures theory is presented using the adequate didactic tools in fully equipped ERASMUS K-FORCE classroom, 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 will be auditory, laboratory, computer or computing with special IT tools and simulation software. Part of the Practice may be carried out in the companies or other institutions.

All laboratories at Faculty of Mining, Geology and Civil Engineering in Tuzla, with their standard infrastructure equipment can be used for student education, and particularly will be involved Laboratory for natural hazards, safety and ventilation (with new multigas detector), Laboratory for non-destructive material testing (with INNOVA Concrete Armature Detector, which will be used as equipment for assessment of damaged structures after disaster events, within the course Assessment of damaged civil engineering structures) Laboratory for geomechanics (Water is the most common cause of the instability of the terrain, whether it is landslide or instability of the foundation pit. The reason for this is the change in the physical-mechanical characteristics of the soil when changing the humidity (water content). The equipment provided for this project (sample dryer) allows accurate definition of material humidity under certain conditions). And Laboratory for Mineral Raw Materials Preparation and Material Testing (with USB microscopes).

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 fulfils all obligations predicted by the study programme and collects at least 60 ECTS in the process.

Graduates` Competencies

- competency in assessment of damaged civil engineering structures from aspect of disaster risk management.
- competency in recognition and assessment of risks in mining and thermal energy sector
- assess the hazard and risk related to geotechnical structures
- assess the hazard and risk related to natural phenomenon
- competency in design of fire safety systems and fire risk assessment
- comment on proposed measures to reduce the risk in simpler problems in geotechnics
- participates in teams dealing with assessment and reduction of geotechnical hazard and risk in emergency situations
- use literature, legislation, standards and international recommendations to solve problems in this area

Study Programme Structure

No.	Course Name	S	CS	Teacher/s	ECTS
01.	**Assessment of damaged civil engineering structures**	1	M	PhD Damir Zenunovic Civ.Eng.	8
Course content/structure:					
Civil engineering structures, forms, design concept, execution. Loads and structural responses (static and dynamic). Service life of structures. Sources of hazards. Risk analysis. Failures and collapse in civil engineering. Types of structural damage after disaster (fire, earthquake, explosion, flood, overload, landslide etc.). Assessment of damages (methodology, testing methods, equipment, applicability). Case studies.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
02.	**Risk management in mining and thermal energy sector**	1	M	Dr.sc. Zvjezdan Karadžin Dr.sc. Rijad Šišić Dr.sc. Jelena Marković	8
Course content/structure:					
Identification and classification of hazards; preliminary and detailed hazard analyses (Fault tree analysis Event tree analysis; Failure mode and effects analysis, etc); Analysis of withdrawal, evacuation and rescue; International standardization in risk management, Reporting and communication in risk management; Case studies - mining accidents.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
03.	**Geotechnical hazards**	1	M	Dr.sc. Kenan Mandžić Dr.sc. Adnan Ibrahimović Dr.sc. Elvir Babajić	8
Course content/structure:					
▪ Identification, classification and physical properties of soil and general structural properties of rocks. ▪ The mechanical properties of soil and rock ▪ Alteration processes in rock as a hazard ▪ Water as a hazard in geotechnics ▪ Geotechnical research in soil and rock ▪ The influence of slope stability and foundation pits on the safety of people and machinery ▪ The concept of hazard and risk ▪ Estimates of hazard and risk in geotechnics ▪ Uncertainties in Geotechnics ▪ Emergency geotechnical measures for natural disasters ▪ The reduction of risk in slope ▪ Factor of safety ▪ Geotechnical monitoring					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
04.	**Fire safety engineering**	1	M	Dr.sc. Rijad Šišić Dr.sc. Jelena Marković	8

Course content/structure:

Fundamental thermal science, Fire Dynamics, Active and passive fire protection, Human Response to Fire, Structural fire protection, Explosion prevention and protection, Fires and explosion in mining and industry, Fire safety regulations and management, Fire hazard and risk analysis, Fire and explosion forensic and investigation

No.	Course Name	S	CS	Teacher/s	ECTS
05.	**Risk Analysis in Decision Making Process**	2	M	Dr.sc. Edin Delic	4

Course content/structure:

Terminology of Hazard Risk, System definition and system view of integrated disaster management, Risk analysis: Process and Issues, Risk strategies, Risk communication, System formulation examples, Disaster risk management, Source of uncertainty, Conceptual risk definition, Decision making and integrated risk management: Individual decision making, Decision making in organizations and government, Human behaviour during disaster, Current hazard mitigation polices.

No.	Course Name	S	CS	Teacher/s	ECTS
06.	**Community resilience to hazards**	2	M	Dr.sc. Zvjezdan Karadzin	4

Course content/structure:

Students will gain through the combination of theoretical units and practical case studies knowledge of master techniques and mechanisms that are necessary for building community resilience to catastrophic events.

Introduction, Legal framework, EU Civil Protection Mechanism Directive, Defining resilience across disciplines, Defining community resilience to hazards, Risk assessment, Role of Civil protection departments in catastrophic event occurrence, Analytical tools for community decision-making upon catastrophic event occurrence, Aspect of disaster risk financing within the disaster risk management plans, Financial mechanisms and tools (domestic and international)

UNIVERSITY OF BANJA LUKA

Faculty of Architecture, Civil Engineering and Geodesy

Banja Luka

Programme name	Module for Second study cycle – Study program Civil Engineering
Higher education institution where the programme is being executed	University of Banja Luka, Faculty of Architecture Civil Engineering and Geodesy
Educational-scientific field	Civil Engineering
Type of studies	Master Academic Studies
Study scope, expressed in ECTS	60
Academic degree, abbreviation	Master of Civil Engineering – Disaster Risk Management
Study length	1 year
Future course implementation starting year	2018
Planned number of students to be enrolled in this programme	20
Programme language	Serbian/English

Introduction

The module for Study Programme of the graduate academic studies in Disaster Risk Management presents the continuation of the undergraduate academic studies of Civil Engineering at the Faculty of Architecture Civil Engineering and Geodesy, University of Banja Luka. Engineering and technical disciplines are incorporated into the realization of the curriculum of the Graduate academic studies of Risk and Fire Protection Management, and as such represent a continuing education for Civil Engineer. The module for Graduate Master Programme of in Disaster Risk Management should enable students to additionally generalize and widen their knowledge based on the understanding of the basic principles in field of Risk and Fire Protection Management. Students will master professional knowledge for the realization of the contemporary technical systems, acquire ability to integrate knowledge which is to be applied in specific cases and are introduced in the research, and in individual and creative work during the realization of the study Programme.

Programme Structure and Capacity

The name of the module for Study Programme is Disaster Risk Management. The acquired academic title is Master in Civil Engineering - Disaster Risk Management. 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 module for 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 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.

In learning process students actively use IC technology based equipment (desktop computers, laptops, projectors, cameras, e-book readers, TV screens, external HDD, printers, etc.) and Laboratory equipment (precise scales, exicators, pycnometer, microscopes, hardness meters, distance meters, calipers, accelerometers, etc.). They work individually or in small groups and use laptop computers and other ICT equipment to learn and work and take notes on their group's discussions (replacing the use of poster paper or handwritten overhead transparencies). Teaching will be organized in multimedia classroom equipped with appropriate equipment and internet connection designed to assist presenters with incorporating technology into their presentations. Multimedia classrooms have ceiling mounted projectors, computers, document cameras, projection screens, speakers and amplifiers. Some are also equipped with SMART Boards and large screen TVs. Students also can use laboratories in Institute for Urbanism, Civil Engineering and Ecology of Republic of Srpska with who University of Banja Luka has special agreement with, where faculty has already settled laboratory equipment from other Projects. The most of the equipment is mobile so that can be used as a field equipment when it needs for some outdoor field research and investigation.

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 fulfils all obligations predicted by the study programme and collects at least 60 ECTS in the process.

Graduates` Competencies

Graduate students who have attended the module for graduate academic studies in Risk and Fire Protection Management are competent and qualified to solve complex 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:

Qualifications that students acquire at the end of the graduate academic studies:

- Technical knowledge for solving complex civil engineering problems in the area of Earthquakes, floods, landslides and fire safety and design;
- Ability to apply knowledge in solving problems in the new or unknown environment;
- 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;
- Mechanisms to manage in the risk and crisis situations and ability to evaluate the situation in prevention of natural and man-made disasters ;

- Students are enabled to design projects, organize and manage risks and fire protection;

Students who graduate Masters studies module Disaster Risk Management at the Faculty of Architecture Civil Engineering and Geodesy, will be enabled to do all the works of a Civil engineer as well as the work with emphasis on Risk and Fire Protection Management.

Study Programme Structure

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
01.	**Modeling of Structures**	1	M	Gligor Radenković	5
Course content/structure:					
Introduction. Mechanical model. The calculation model. Mathematical model. Sources of error in numerical problem solving. Interpolation and approximation. Calculating the value of the integral. Numerical differentiation. Solving nonlinear equations. Solving systems of linear equations. Solving systems of nonlinear equations. Ordinary differential equations that arise in the construction industry. Partial differential equations that arise in the construction industry. Numerical methods for solving the (system) ordinary and partial differential equations. The limit case problem elastostatic and elastodynamic. The strong form. Weak form. The methods for the numerical solution of the limiting problem. Finite Element Method. Finite difference Method. Finite volume Method. Collocation methods. The method of least squares. The method of random knots. Problem of eigenvalues. Use ready-made software packages. Defining individual annual duties. Collocation methods. The method of least squares. The method of random knots.					
No.	**Course Name**	**S 1/2**	**CS M/E**	**Teacher/s**	**ECTS**
02.	**Aseismic Design and Construction**	1	M	Mato Uljarević	5
Course content/structure:					
Introduction to Earthquake Engineering. Earthquakes: phenomenon hypocenter and epicenter, events on the Earth's surface. Earthquake intensity scale. Principles of seismic analysis. Basic principles of design and construction of buildings in seismically active areas. Fundamentals of passive and active control of the structure. Analysis of the input data. The choice of the structural system. Principles of design of building structures to the effects of the earthquake. Specific problems in steel, reinforced concrete and masonry structures in buildings. Chapter overview of current seismic regulations. Modeling of structures in seismic design. Current computer programs in the field of earthquake engineering.					
No.	**Course Name**	**S 1/2**	**CS M/E**	**Teacher/s**	**ECTS**
03.	**Operational Research in Civil Engineering**	1	M	Goran Ćirović Dragan Nikolić	6
Course content/structure:					
Introduction. About the Course. Basic terms. Introduction to Optimization systems in construction. Review of methods for optimization. Linear, nonlinear and dynamic programming. Optimization of stochastic systems. Resolving uncertainty, fuzzy (fuzzy) numbers. Application of rough sets in the construction industry. Multi-criteria optimization. Review of methods for multi-criteria optimization. Setting the task and basic concepts. Analysis of the area of the criterion, the weight coefficients, epsilon limitation, the methods of the distance, the target programming. Stochastic search methods that mimic the biological process of evolution (genetic programming, genetic algorithms, hip searches). Examples of the application of genetic algorithms. Formulation of tasks for term papers.					
No.	**Course Name**	**S 1/2**	**CS M/E**	**Teacher/s**	**ECTS**
04.	**Geohazards**	1	M	Bojana Grujić	6

Course content/structure:

Basic concepts and definitions, the theoretical basis; Geological environment-natural environment, natural hazards geological hazards; Socio-economic aspects of natural and geological hazards, geological hazard classification; The basic principles of the study of geological hazards, methods of geological hazards; Methods of assessing geological hazards; The specifics of the study of geological hazards, Practical examples; Legislation and Practice.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
05.	**Experimental Analysis of Structures**	1	E	Dragan Milašinović Valentina Golubović-Bugarski	4

Course content/structure:

Introduction. General and local deformations. Experimental static and dynamic load. Determination of deformation line construction. Stress state determination by using Hooke law or registering other parameters through which directly the stresses are expressed (vibrations, displacements, etc.). Determining the direction and size of the main Stresses in case of a flat state of Stress. Stress circles and deformation circles. Polar display. Determining the direction and size of the main power in case of a flat sheet. Stress circles and deformation circles. Instruments for registration of general deformation under static and dynamic loads. Instruments for extensometer tests under static and dynamic loads (mechanical, acoustic, electric). Short-term and long-term measurements. Measuring tape. General principles for setting up instruments for the registration of general and local deformations. Bases for making the test program. Balance of Forces (the principle). Examples of tests of different characteristic structures "in-situ" with particular reference to the analysis of the test results. Prefabricated concrete, steel and concrete road and railway bridges of various types, concrete and steel plants, crane rail, and industrial plants, ceiling joists, piles, cranes and others. Examination of the structure as a stage in the construction of buildings. Examples of tests. Numerical modeling of the structure as a basis for experimental analysis. The actual behavior of the structure in relation to the provided budget from the viewpoint of the justification degree hypothesis adopted in the designing of buildings.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
06.	**Application of GIS in Roads**	1	E	Dušan Jovanović	4

Course content/structure:

Introduction to GIS. Historical development. Definitions and concepts. Data types in GIS. GIS components. CAD systems and GIS. Types of GIS. Land information systems. Spatial information systems. Hardware component of GIS. Data collection devices. Digitizers. Scanners. Data collection tools in the field. Photogrammetric systems. Satellite sensors. Devices for handling and processing. Computer systems. Peripheral devices. Computer networks. Elements of security, protection, management and control in computer networks. Devices for output and presentation of data. Software GIS component. Software hierarchy in GIS-packages. Basic software. Application software. Basic functions of GIS. Applicable aspects of GIS. Communication and Presentation Software. Spatial data collection. Primary methods of collecting. Secondary collection methods. Sources of data (official and special cartographic sources). Data quality. Types and general causes of errors. Verification of collected data in GIS. Updating and maintaining data. Planning and designing. Modeling data and processes in GIS (geometric modeling, topological modeling, topological-geometric queries, modeling of thematic content). Principles of modeling (layer, object, georelation). Structuring spatial data. Databases (basic concept and definitions). Manage and administer databases. Access data in a database. Database. Transaction concept in DBMS. Data models (logical, hierarchical, network, relational, object oriented, hybrid, physical). Covering spatial data. Standards in GIS. GIS and the Internet. Practical experience in the application of GIS in the world. Application of geoinformation systems in roads. Planning. Designing. Construction.

Exploitation. Maintenance. Infrastructure management. Traffic Management. Directions for further development of GIS. Organizational aspects of GIS. Demonstrate the application of GIS tools.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
07.	GIS in Hydrotechnical Practice	1	E	Dušan Jovanović	4

Course content/structure:

Principles of spatial databases. Modeling databases. Database metadata. Support to making spatial decisions. Data mining for spatial data. Collect data and create a database. Working with basic GIS tools for performing tasks in hydrotechnical practice. Introduction to ArcHydro. Working in HEC Extensions for ArcGIS (HEC-GeoHMS, HEC-GeoRAS). Practical classes (exercises) follow the course of theoretical instruction. Demonstrate the application of GIS tools.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
08.	Exploitation and Protection of Groundwater	1	E	Nenad Jaćimović	4

Course content/structure:

Introduction. Basic characteristics of porous environment. Basic rules of the occurrence and movement of groundwater. Basic mechanisms for spreading underground pollution. Experimental methods for determining the hydrogeological parameters of the porous environment. Hydraulic Wells. Multiple flow in the porous environment. Numerical models: division, purpose, application. Examples from practice.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
09.	Specific Problems in Civil Engineering Management	1	E	Goran Ćirović Dragan Nikolić	4

Course content/structure:

Characteristics of a modern construction company. Organization and management of a modern construction company. Management function. Human Resources Management, Strategic Human Resource Management, Training and Development, Organizational Behavior, Business Ethics, Teamwork. Public Sector Management, Public Sector Restructuring, International Public Sector Standards, Organizational Behavior, Changes in Organizational Structure and Contemporary Information Technologies, Leadership and Organizational Change, Organization and Functioning of Public Administration, Public Relations Strategy and Tactics. Marketing management of construction companies. Contemporary managerial methods and techniques. Financial Management, Managerial Accounting, Financial Accounting. Quality Management-TQM. Reengineering in construction. Application of benchmarking. Construction works abroad. Strategy and contracting techniques.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
10.	Bridges	1	E	Dragan Milašinović	4

Course content/structure:

General about bridges. Definition of the bridge. Overview of the development of bridges. Bridge project. Division of bridges. Bridging the bridges. Position and shape of the bridge in the base. Road vertical alignment on bridges. The number and size of the bridge opening. Traffic conditions. Loads of road, rail and pedestrian bridges. Dynamic influences. Concrete bridges. Division of concrete bridges. Elements of bridge construction. Disposition solutions. End and river bridge pillars. Elements of pavement structure. Formation of cross-section of pavement structure. Constructive bridges of reinforced and prestressed concrete bridges. Prevent assembly bridges. Armored joints and bearings. Procedures for the construction of concrete bridges. Metal bridges. Division of metal bridges. Elements of bridge construction. Disposition solutions. Elements of supporting structure.

The upper machine and the supporting structure of the upper machine. Steel orthotropic plates. Sprays and transverse stiffening. Main carriers (full and lattice). Methods of building metal bridges. Wooden bridges. Division of wooden bridges. Elements of bridge construction. Disposition solutions. Elements of supporting structure. The upper machine and the supporting structure of the upper machine. Bridges of glued laminated wood. Procedures for the construction of wooden bridges. Equipment bridges. Overview and assessment of the bridges. Maintenance of bridges.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
11.	**Constructive Rules for Fire safety of Building**	1	E	**Mirjana Laban Gordana Broćeta Saša Čvoro Vinko Babić Stevo Borojević**	4

Course content/structure:

Physico-chemical basis of the burning process. Definition and conditions for burning. Burning materials. Causes of fire. Combustion of fuel gases, liquids and solid materials. Products of the uncontrolled combustion process. Common fires. Fire sectors. Fire resistance of construction structures. Classification and typology of buildings from the aspect of fire safety (residential, public, commercial, industrial, warehouses, garages, high buildings, buildings - cultural heritage). Current legislation in the field of fire protection. Fire resistance of building materials and constructions. Regulation on Construction Products 305/2011 / EC. Testing methods for the building materials fire resistance according to European standards. Fire protection preventive construction measures. Fire sector, characteristics of fire sector. Evacuation from areas affected by fire. Fire stairs. Evacuation time calculation. Markings and evacuation plan. Fire protection systems in buildings. Smoke extraction. Regular maintenance importance of of the building and systems for fire protection. Qualitative and quantitative assessment of the fire risk. Analysis of existing and planned facilities - project documentation, analysis of built objects and examination of applied conceptual solutions from the aspect of fire protection**.**

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
12.	**Design of Fire alarm System and Fire extinguishing System**	2	E	**Vinko Babić**	7

Course content/structure:

Physico-chemical basis of the burning process. Definition and conditions for burning. Burning materials. Causes of fire. Combustion of fuel gases, liquids and solid materials. Products of the uncontrolled combustion process. Common fires. Fire sectors. Fire resistance of construction structures. Classification and typology of buildings from the aspect of fire safety (residential, public, commercial, industrial, warehouses, garages, high buildings, buildings - cultural heritage). Current legislation in the field of fire protection. Fire resistance of building materials and constructions. Regulation on Construction Products 305/2011 / EC. Testing methods for the building materials fire resistance according to European standards. Fire protection preventive construction measures. Fire sector, characteristics of fire sector. Evacuation from areas affected by fire. Fire stairs. Evacuation time calculation. Markings and evacuation plan. Fire protection systems in buildings. Smoke extraction. Regular maintenance importance of of the building and systems for fire protection. Qualitative and quantitative assessment of the fire risk. Analysis of existing and planned facilities - project documentation, analysis of built objects and examination of applied conceptual solutions from the aspect of fire protection.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS

13.	Risk Analysis in Decision-making Process	2	E	Goran Cirovic Mirjana Laban Aleksandar Borković	7

Course content/structure:

Terms. Definitions. Hazard. Risk. System approach to integrated management of catastrophic events. Formulating examples and characteristic cases. Simulation. Dynamic system approach. Risk management from catastrophic events. Sources of uncertainty. Conceptual definition of risk. Probabilistic stochastic approach. Engineering decision making under conditions of uncertainty. Decision-making process and integrated risk-matching: individual decision-making, decision-making in organizations, institutions and companies, decision-making at government level. Application of systemic analysis in disaster management. Human behavior during a catastrophic event.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
14.	Financial Resilience to Hazards	2	E	Dragan Nikolić	7

Course content/structure:

Introduction. The concept of resistance at risk of catastrophic events. Financial aspect of resistance to hazards. Financial-economic approach in the disaster management cycle. Role of Disaster Risk Reduction in Risk Management. Evaluation and risk assessment. Modeling catastrophic risks in relation to financial-economic solutions / variants. Financial risk insurance: diagnosis, strategy and action plans. Analytical tools in the process of making financial decisions. Disaster risk financing. Financial mechanisms and tools (domestic and international). EU directives on protection mechanisms.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
15.	Assessment of Damaged Structures	2	E	Vlastimir Radonjanin Mirjana Malešev Gordana Broćeta	7

Course content/structure:

Destructive and non-destructive testing methods (equipment, procedures, application). Classification and expression Damage to buildings after catastrophic events (fires, earthquakes, explosions, floods, overcrowding etc.). Methodologies for reviewing and assessing the condition of construction structures. Technical regulations. Examples of Examination and Assessment of the condition of damaged buildings.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
16.	Repair of Timber, Steel and Masonry structures	2	E	Vlastimir Radonjanin Mirjana Malešev Snežana Mitrović	7

Course content/structure:

Introduction. Masonry: Causes, mechanisms and forms of degradation of damaged masonry structures. Classifications and the expression of damage due to overcurrent masonry structure, uneven subsidence and incidental operations (fires, earthquakes, explosions, etc.). Materials and techniques for the structural recovery of masonry; Materials and techniques for protecting masonry structures (protection from moisture, heat repairs, etc.). Steel constructions: The damage due to corrosion of steel structures and their classification; Damage to steel structures due to the effect of high temperature and fire, overloading with snow, the impact of the ice in a closed steel sections, etc.; Methods and techniques for the repair of damaged steel structures; Protection of steel structures. Timber structures: Factors ensuring durability and expected life of the exploitation of certain types of timber structures; Types, classification and illustration defects and damage in timber structures in accordance with the nature of the cause. Methods and techniques for

identification and quantification of the damage; Methods and techniques for the repair and protection (replacement, filling, sealing, reinforcement, addition of elements, coupling agent…); The rehabilitation of cultural heritage. Examples of the characteristic damage, and assessment of retrofitting, steel and timber structures. Defining individual annual duties.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
17.	**Repair of Concrete Structures**	2	E	**Vlastimir Radonjanin Mirjana Malešev Gordana Broćeta**	7

Course content/structure:

Introduction. Technical conditions and criteria for the selection of materials for the repair of concrete structures. Preparation of concrete structures for rehabilitation (preparation of concrete, preparation of reinforcement). Techniques for the installation of repair materials. Methods for increasing the adhesion. Rehabilitation procedures for cracks. Structural rehabilitation and reinforcement (methods, details and fundamentals of the budget): reduction of the load of structural elements; Transferring loads to adjacent structural elements of sufficient capacity; Reducing the range of structures that do not have a satisfactory load capacity; The change of the construction system, the reinforcement of the structures by the prestressing methods; Rehabilitation by increasing the cross-section; Reinforcement and repair by gluing additional lamellas. Materials for the rehabilitation and protection of concrete structures. Technical regulations in the field of repair of concrete structures. Examples of remediation of concrete structures. Defining individual annual tasks.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
18.	**Roads Geotechnical Problems**	2	E	**Mato Uljarević**	7

Course content/structure:

Introductory lecture, development of profession and types of problems, exhibits and activities. Investigations on the routes and borrowings. Investigation of soil properties in laboratories. Models of soil behavior in road surfaces. Soil consolidation. Improving the soil. Modules of compressibility of the substrate - rules, tests. Load capacity of traffic lanes. Landslides and rocks - exploration works, analyzes, rehabilitation. Support structures. Modern solutions for reinforcement - modeling and application. Observations and measurements. Road tunnels - basic analysis of deformations and bearing capacity, construction and observation.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS
19.	**Floods Risk Management**	2	E	**Marina Babić-Mladenović**	7

Course content/structure:

European and our experience in the area of flood protection. Typology of floods and factors that influence the occurrence of high water. Hydrologic basin level and watercourses. The risk of high water. Numerical modeling of propagation of flood waves. Using hydraulic software tools (HEC-RAS, GeoRAS) and GIS tools (ArcView / ArcGIS). Methods for assessing the flood damage. Mapping the damage and the risk of flooding. Investment of active and passive protection measures - facilities and flood management schemes. Optimizing the design of the dam. Non-investment protection measures - an integrated approach in the sphere of planning, protection / revitalization of facilities, environmental protection, information and education of the population. Exercises: The annual task, which consists of numerical examples that follow from the lectures and seminars.

No.	Course Name	S 1/2	CS M/E	Teacher/s	ECTS

20.	Integral Management of Water Resource	2	E	Tina Dašić	7
Course content/structure:					
Basic concepts from integral water resource management. Water resources: Basin as a management unit. Characteristics of natural water systems. Water requirements, water balance on the basin. Use of water, protection from water protection and water protection. Types and characteristics of built-in integral management systems. Water and its role in the socio-economic system. Ecological component of hydraulic engineering solutions. Planned use of water resources. Application of optimization and simulation methods in choice of solution. Modeling of integral water resource management in the catchment area. Integral water resource management and legal framework and regulation. Integrated water resource management plans for river basins: examples from practice from the environment.					
No.	**Course Name**	**S 1/2**	**CS M/E**	**Teacher/s**	**ECTS**
21.	**Master's Thesis**	**2**	**E**	**Mentor**	**16**
Course content/structure:					
Obtaining knowledge on the manner, structure and form of writing a report after the performed analyses and other activities within the set topic of the Master thesis. Upon elaborating the Master thesis, students obtain the experience for writing papers in which it is necessary to describe problems, used methods and procedures, and obtained results. Furthermore, the objective of the elaboration and defense of the Master thesis is to develop the ability of the students to prepare the results of their individual work in the form appropriate for public presentation, as well as to answer any suggestions or questions related to the set topic. With Master thesis student show that have knowledge and comprehension within the field of Civil engineering related to risk and safety management and that he/she is able to critically evaluate knowledge and identify new scientific problems and that they have understanding of implications within the related research area. With Master thesis student show that have skills that independently explain choice of scientific theoretical and/or experimental methods to solve a field related problems, have an independent and critical estimation of the chosen theories and methods as well as the analyses, results and conclusions, that he/she is able to apply to a wide range of engineering methods in research and development in the field of Civil engineering related to risk and safety management, be able to, if necessary, develop new methods for solving a specific problem in the field and be able to communicate relevant scientific and professional aspects of project work in a clear and systematic way both to specialists and the public.					

ALBANIA

UNIVERSITY OF TIRANA

Faculty of Economics

Tirana

Programme name	MASTER OF SCIENCE IN RISK MANAGEMENT
Higher education institution where the programme is being executed	University of Tirana, Faculty of Economics
Educational-scientific field	Risk Management
Type of studies	Master Studies
Study scope, expressed in ECTS	120 ECTS
Academic degree, abbreviation	Master of Science in Risk Management (MScRM)
Study length	2 Years
Future course implementation starting year	Academic Year 2018-2019
Planned number of students to be enrolled in this programme	40
Programme language	English/Albanian

Introduction

The study programme of the graduate academic studies in Risk Management is a forthcoming academic programme of studies to be offered by the Faculty of Economy, University of Tirana in the academic year 2018-2019. This two-year study program, in its full focus, combines theoretical and practical knowledge to encourage critical and creative thinking to students as well as to expose them to contemporary and key issues in the field of risk management. The Master Program aims to combine three approaches to risk management: enterprise risk management; Financial risk management; and disaster risk management. In its first years, this master program will be offered in cooperation with international partners, and students will be offered the opportunity to develop exchanges at Western Balkan universities for a one-semester period. At the same time, different subjects will work on the basis of the concept of joint lectures and will be offered in cooperation with project partners and other field experts who practice their profession in important institutions in Albania. The curriculum of this program have been widely consulted not only with K-Force project partners, but with experts of the most important institutions in the field of financial risk management, disaster management and significant representatives o research institutions in Albania.

Programme Structure and Capacity

The name of the study programme is Risk Management. The acquired academic title is Master of Science in Risk Management. 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 in higher levels (PhD).

The study programme prerequisites for the enrolment are completed undergraduate studies with at least 240 ECTS and the passed enrolment application phase, which requires a certain level of academic performance of the student. The course consists of lectures and practice. During the teaching process, students are referred to the independent research and the emphasis is 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. Laboratories hours will enable the completion of different key subjects within the curriculum of the program which are essential in developing knowledge in risk management. Such subjects include: Econometrics, Risk Modelling in Practice, Disaster Risk Management, Climate Change adaptation in Practice, etc. Adequate software packages will be used for teaching purposes. 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 fulfils all obligations predicted by the study programme and collects at least 120 ECTS in the process.

Graduates` Competencies

This program will provide a broad knowledge system in finance and specifically in the field of risk management, with the main objective of forming specialists capable of practicing the risk analyst's profession in various sectors of the economy. The curriculum of the program prepares the student with all the necessary skills as a risk analyst with a high level of theoretical scientific knowledge and practical knowledge, as well as in-depth knowledge in quantitative analysis. Qualifications that indicate the end of the graduate academic studies include:

- demonstrated systematic knowledge and understanding in the field of risk management that complements the knowledge gained at the undergraduate academic studies, being the basis for developing critical thinking and application of knowledge;
- ability to apply knowledge in solving problems in the new or unknown environment;
- 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 judgements;
- ability to clearly and unambiguously transfer knowledge and the way of making conclusions to the professional and wider public;
- ability to continue the studies independently in the future.

This diploma will enable graduate students of this study program to be hired in institutions at central and local level, research institutions, financial institutions, entities, companies (public or private),

various associations, etc. as a specialist in the relevant field of study or in the role of risk manager. Also successful completion of this study program enables students to coherently pursue a research or academic career through continuing doctoral studies, thus enhancing opportunities for further development of their professional career.

Study Programme Structure

No.	Course Name	S	CS	Teacher/s	ECTS
01.	**Foundation for risk assessment and Decision Making**	1	M	FEUT Staff and Project partners	TBD[3]
Course content/structure:					
Introduction to the field of risk management, including risk analysis, risk evaluation and risk treatment, detailed treatment of the risk concept, general risk theory, risk analysis methods within safety, health, environment and society, basics of uncertainty and sensitivity, different ways of evaluating risk and introduction to risk perception and decision making concerning risk treatment. "What Rational Choice Theory is About"; Decisions under Ignorance; Decisions under Risk: Probability; Decisions under Risk: Utility; Game Theory.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
02.	**Enterprise Risk Management**	1	M	FEUT Staff	TBD
Course content/structure:					
Introduction to ERM; Evolution of ERM; Challenges to ERM; Defining ERM; Definition of risk; Definition of ERM; Basic definition; Key criteria; ERM process cycle; Fundamental benefits; Challenges of traditional ERM frameworks; Value-based ERM framework; Overcoming the challenges with a value-based ERM framework; Risk categorization and definition; Qualitative risk assessment; Emerging risk identification; Killer risks; Practical modelling; Quantify individual risk exposures; Quantify enterprise risk exposure; Defining risk appetite and risk limits; Integrating ERM into decision-making; Decision-making with ERM; Risk-priority decision-making; Return-priority decision-making; Internal risk messaging; Integrating ERM into business performance analysis; Integrating ERM into incentive compensation; External risk messaging; Objectives-based ERM; ERM framework; Risk identification; Risk quantification; Risk decision-making; Risk messaging; ERM for non-corporate entities.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
03.	**Financial Forecasting and Evaluation**	1	M	FEUT Staff	TBD
Course content/structure:					
The importance of business valuation; Fundamental Principles of Value Creation; The key factors that really drive the stock market; Reorganizing the financial statements; Return on Invested Capital; Growth and Value; Core Valuation Techniques; Analysing and forecasting performance; Estimating Continuing Value; Mergers and Acquisitions; The impact of the alternative financing instruments in the value; Valuing Flexibility; Valuation in Emerging Markets; Valuing High-Growth and Cyclical Companies; Bank Valuation; Insurance Companies Valuation.					

[3] To be defined

No.	Course Name	S	CS	Teacher/s	ECTS
04.	**Econometrics**	1	M	FEUT Staff and guest lecturers	TBD

Course content/structure:

Factor Models; Principal Component Analysis; Term Structure Factor Models; Equity PCA Factor Models; Classical Models of Volatility and Correlation; Introduction to GARCH models; Monte Carlo Simulation with GARCH Models; Time Series Models and Cointegration; Introduction to Copulas; Conditional Copula Distribution and Quantile Curves; Advanced Econometric Models; Markov Switching Models; Forecasting and Model Evaluation; Returns Models; Volatility Models.

No.	Course Name	S	CS	Teacher/s	ECTS
05.	**Research Methods**	1	M	FEUT Staff	TBD

Course content/structure:

Understanding the philosophy and methods of research in economic sciences; The nature of finance research; Types of research; Formulating and clarifying the research topic; Research design; Critical review of the literature; Ethical principles in the process of research and scientific study; Using Secondary data; Selecting samples; Collection of primary data through interviews and observation; Collection of primary data through questionnaires; Analysis of qualitative data; Analysis of quantitative data; Writing and presenting of the study and research - Concepts of academic writing - The combination of qualitative and quantitative data - Argumentation and presentation of conclusions and recommendations.

No.	Course Name	S	CS	Teacher/s	ECTS
06.	**Governing Sustainability**	2	M	FEUT Staff and Guest Lecturer (UNDP Climate Change Program, REC Albania)	TBD

Course content/structure:

Theoretical approaches to governance, different governance models in terms of scales and levels, and how successfully various governance regimes deal with concrete sustainability challenges. The focus will be on: History of the development of the concept of governance and its discontents; Basic approaches to governance and their theoretical foundation in social theory (market, collective action, state regulation, business initiatives, NGOs, social movements, etc.); Various governance models currently practiced with regard to pressing sustainability challenges.

No.	Course Name	S	CS	Teacher/s	ECTS
07.	**Risk Management in Banking**	2	M	Part time Lecturer from Banking Sector	TBD

Course content/structure:

Risk and Risk Management; Liquidity management and liquidity gaps; Interest Rates Gap; Hedging and Gap Management; Convexity risk in banking - The case of Mortgages; Funds Transfer Pricing Systems; Portfolio Risk and Factor Models; Returns, Random shocks and Value-at-Risk; Volatility; Market risk regulations; Credit risk; Capital Allocation and Risk Contributions; Default Models; Risk-adjusted Performance Measure; Credit derivatives; Securitizations.

No.	Course Name	S	CS	Teacher/s	ECTS
08.	**Risk Management and Insurance**	2	M	FEUT Staff and Guest Lecturers from Albanian Financial Supervising Authority	TBD
Course content/structure:					
Fundamentals concepts - certainty, risk and uncertainty; Types of pure risk; Risk management process; Insurance activity, Legal principles of insurance, Insurance contract conditions; Managing of personal risks through insurance - life and health insurance; Managing of property risks - property insurance policies; Managing of liability risk - Liability insurance policies, Types and operations of insurance companies; Pricing and reserves of insurance products; reinsurance activity; Financial reporting and regulation of insurance activity.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
09.	**Disaster Risk Management**	2	M	Lecturers from Project partners, FEUT Staff and Guest Lecturers from REC Albania and UNDP CC programme	TBD
Course content/structure:					
Risk: principles and applications, and the dynamic risk assessment process; Preparedness, prevention, response and recovery; Concepts of insurance and reinsurance in managing the risk of environmental hazards; Framework for risk management (including terrorism) using catastrophe models; Emergency planning and legislation; Emergency response – e.g. early warning systems, evacuation and management; Disaster recovery problems – e.g. political will, economics, uneven distribution of knowledge and resources, education, public awareness, culture, religion, gender and ethnicity; Elements of Search and Rescue, leadership and practical skills in emergency response.					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
10.	**Probability in Risk Management**	2	M	Lecturers from Project Partners, FEUT Staff and Guest Lecturers from Albanian Financial Supervising Authority	TBD
Course content/structure:					
Probability a tool for risk management; Counting for probability; Elements of probability; Discrete Random variables; Commonly used discrete distributions; Application for discrete random variables; Continuous random variables; Commonly used continuous distributions; Application for continuous random variables; Multivariate distributions; Applying multivariate distributions; Stochastic processes;					
No.	**Course Name**	**S**	**CS**	**Teacher/s**	**ECTS**
11.	**Risk Modeling in practice**	3	M	Lecturers from the project partners, FEUT Staff and Guest Lecturers from	TBD

				Albanian Financial Supervising Authority	
Course content/structure:					
The Context and Uses of Risk Assessment; Key Stages of the General Risk Assessment Process; Approaches to Risk Assessment and Quantification; The Process of Modeling; Full Integrated Risk Modelling: Decision-Support Benefits; Organisational Challenges Relating to Risk Modelling; The Design of Risk Models – Principles, Processes and Methodology; Financial Statement Modeling; Single and multiperiod Period Asset Allocation Models; Environmental Modeling; Simulation in Practice; Using Excel/VBA for Simulation Modelling; Using @RISK for Simulation Modelling.					
No.	**Course Name**	**S**	**CS M/E**	**Teacher/s**	**ECTS**
12.	**Risk-Based Audit**	**3**	**M**	**FEUT Staff**	**TBD**
Course content/structure:					
Why risk based audit planning?; Basic planning techniques; Using the corporate risk register; The annual audit plan; Engagement planning; Project management; Keeping the accent on risk; A holistic approach to audit risk planning; Determining risk management maturity; Enterprise- wide risk management; Risk Appetite; Control risk self-assessment; Developing an audit approach; The illusion of perfection.					
No.	**Course Name**	**S**	**CS M/E**	**Teacher/s**	**ECTS**
13.	**Management Information System**	**3**	**E**	**FEUT Staff**	**TBD**
Course content/structure:					
The Modern Organization in the Global Web Based Environment; Information Systems: Concepts and Management; Organizational Information Systems; Managerial Support System; Data & Knowledge Management; Network Applications; E-Business & E-Commerce; Ethics, Privacy and Information Security; Wireless, Mobile Computing & Mobile Commerce; Acquiring Information Systems and Applications.					
No.	**Course Name**	**S**	**CS M/E**	**Teacher/s**	**ECTS**
14.	**Climate Change Adaption**	**3**	**E**	**Lecturers from the project partners, FEUT Staff and Guest Lecturers from UNDP**	**TBD**
Course content/structure:					
The human face of climate change; Vulnerability to climate change impacts; Vulnerable groups; The political process - mapping adaptation actors; Resilience and adaptive capacity; From environmental justice to climate justice; International governance of climate change adaptation; Adaptation planning in developing countries; Ecosystems-based Adaptation; Field trips and adaptation planning in practice; Economics of Climate Change; Inside the global climate change negotiations.					
No.	**Course Name**	**S**	**CS M/E**	**Teacher/s**	**ECTS**
15.	**Valuation of Real Estates**	**3**	**E**	**FEUT Staff**	**TBD**

Course content/structure:

The Property Market and Price Determination; The Commercial Property Market; What is Property Valuation; Valuation Mathematics; Valuation Process; Valuation Methods; Valuation for Financial Statements and for Secured Lending Purposes; Valuation for Taxation Purposes; Valuation for Compulsory Purchase and Compensation; Specialist Valuations; Investment Valuations - Further Considerations; Investment Appraisal; Development Appraisal; Valuation of Investment Property; Valuation of Owner Occupied Property.

No.	Course Name	S	CS M/E	Teacher/s	ECTS
16.	**Fundamentals of Logistics and Operations Management**	3	E	FEUT Staff	TBD

Course content/structure:

Introducing Logistics, Forcasting Logistics Requirements; Logistics Strategy; Locating Facilities in Logistics Systems; Selecting the Suppliers; Managing a Warehouse; Managing Freight Transport; Purchasing and Procurement; Planning and Controlling the Flow of Materials; Global Logistics Operations; Location Decisions; Managing Capacity; Financial and Business Formulas for Supply Chain and Logistics Managers; Link between Finance and Operations; Health and Safety Considerations.

No.	Course Name	S	CS M/E	Teacher/s	ECTS
17.	**Energy Markets**	3	E	Lecturers from the project partners, FEUT Staff	TBD

Course content/structure:

An overview of the energy markets; Risk management in energy markets; The energy derivative markets; Energy futures contracts; Options trading and hedging application strategies; Energy option - pricing models; Value at risk and stress testing; Management controls; Derivative controls and usage statement and control infrastructure; OTC derivatives legal documentation; Energy market hedging scenarios; Technical analysis for energy future markets; Operational risk and its management; Accounting for energy derivatives trades.

No.	Course Name	S	CS M/E	Teacher/s	ECTS
18.	**Occupational and Health Safety**	3	E	Part time Lecturer from Health Sector in Albania	TBD

Course content/structure:

Making a Commitment: Management's Commitment and Involvement; Being a Part: Workforce Involvement; Put It in Writing: A Written Safety and Health Program; Getting Safe Performance: Motivating Safety and Health; How They Act: Behavior-Based Safety; New Approaches: Lean Safety and Sustainability; Search for the Culprits: Hazard Identification; Taking a Serious Look: Analyzing Hazards; Hurting: Occupational Injuries; Using the Tools: Accident Prevention Techniques; Budgeting for Safety and Health; OSHA Safety and Health Training Requirements; Workplace Security Program; Occupational Safety and Health Resources.

EPOKA UNIVERSITY

Faculty of Architecture and Engineering

Tirana

Programme name	PROFESSIONAL MASTER IN DISASTER RISK MANAGEMENT AND FIRE SAFETY
Higher education institution where the programme is being executed	Epoka University, Faculty of Architecture and Engineering
Educational-scientific field	Civil Engineering
Type of studies	Second Level Studies
Study scope, expressed in ECTS	60
Academic degree, abbreviation	Professional Master in Disaster Risk Management and Fire Safety, PM in DRM -FS
Study length	1 year
Future course implementation starting year	2018-2019 Academic Year
Planned number of students to be enrolled in this programme	20
Programme language	English

Introduction

The students eligible to continue the Professional Master program in Disaster Risk Management and Fire Safety Engineering at the Faculty of Architecture and Engineering, Epoka University, must have at least a 3-year Bachelor Diploma in Civil Engineering, Environmental Engineering, Hydrotechnical Engineering, Architecture or other related fields.

The primary objective of this professional master program is to provide industry and society with qualified candidates who through in-depth knowledge in the field can contribute to a safer society. One of the most important aspects in this context is to reduce risks and improve safety. The program aims to be organized in close contact with industry partners focusing particularly on disaster risk management and fire safety issues. The courses of the program are mainly in the field of civil engineering, but also including other areas such as architecture, management, design, computer engineering and economics, thus intending to have a multidisciplinary prospectus of the study program. The main objective of the program is to provide a holistic and professional approach to develop the knowledge in the field of Disaster Risk Management and Fire safety. The course seeks to provide participants with opportunities for improving their understanding of different topics including: Risk assessment applications, Flooding and River management, Conceptual approaches to vulnerability across different social dimensions/perspectives, fire science, including laboratory classes, fire safety engineering and relevant structural engineering topics, such as concrete materials, earthquake engineering. The students will gain knowledge also of the critical issues in structural fire safety engineering, and understanding of relevant fire and structural behaviours. In addition, the students will be familiar with performance-based approaches to design and have an awareness of the capabilities – and limitations – of relevant advanced modelling methods for structures and fire. The program is one year Master Program consisting in 2 semesters. Students are required to take in the first semester 2 Core Courses and 2 Elective Courses, whereas in the second semester 2 Core Courses,

1 Practical Course and 1 Elective Course in the field of Disaster risk management and fire safety engineering. Each semester includes 30 ECTS, so in total the master program is composed of 60 ECTS.

Programme Structure and Capacity

The ICT Equipment will be used to improve the technological conditions of the study environment at Epoka University that will be used for teaching and training purposes in the framework of the Professional Master program in Disaster Risk Management and Fire Safety.

Graduates` Competencies

The program aims to develop highly skilled human resources who can advance the knowledge in the field of Disaster Risk Management and Fire Safety. The students are expected to expand and upgrade their knowledge and skills in the field. This is a one-year full time program covering fundamental principle, technical skills and scientific knowledge related to Disaster Risk Management and Fire Safety.

The objectives and goals of the Professional Master in Disaster Risk Management and Fire Safety at Epoka University are:

1. To equip our students with solid technical knowledge in the field of Disaster Risk Management and Fire Safety by:

- broadening the horizon of the students in the field of DRM and FS.
- increasing the ability of students to identify, formulate and solve complex issues in the reduction the negative impacts of disasters and fire in a systematic way,
- increasing awareness of students about cost, time and quality issues in construction.
- increasing their ability to collect, analyse, and interpret data,
- developing knowledge, skills and competencies to meet disaster management and fire safety demands

2. To reinforce their contemporary knowledge which will be necessary in their professional career:

- providing the students with knowledge on contemporary issues in the field of DRM and FS,
- enhancing awareness of students about the impact of DRM and FS in a global and societal context (social, economic, legal and/or environmental implications),
- increasing awareness of students about DRM and FS issues in construction works.
- increasing their ability to use advanced communication tools such as web-based applications, software etc.
- understanding and use disaster risk management and fire safety engineering tools and approaches

Study Programme Structure

No.	Course Name	S	CS	Teacher/s	ECTS
01.	Project Planning, Management and Coordination	1	M	Julinda Keçi	7.5
Course content/structure:					

Planning, management and coordination of projects. Application and integration of project management processes to the typical project lifecycle (initiating, planning, executing, monitoring, and closing). Studies in the nine knowledge areas defined by the Project Management Institute (PMI): Project Integration, Scope, Time, Cost, Quality, Human Resources, Communications, Risk and Procurement Management. Tools/ techniques for construction project planning and control of costs, time, risk and quality; Issues relating to TQM and health and safety; teamwork and leadership roles.

Introduction to Program Planning; Project Management Knowledge Areas; Project Management Process Groups; Discussion of Project Delivery Methods, Contract Terms, Project Documentations and Quality Assurance Systems; Stages of a Project Development; Work Breakdown Structure; Application; Stochastic Network Techniques in Project Planning; Critical Path Method; Program Evaluation and Review Technique; Project Cost Plan; Resource Handling, Leveling and Constrained Scheduling; Project Cash Flows; Project Funding; Application.

No.	Course Name	S	CS	Teacher/s	ECTS
02.	Structural Fire Safety	1	M	Erion Luga	7.5

Course content/structure:

Structural integrity and compartmentation are principal aspects of fire safety in buildings. This course addresses the effects of fire on materials used in construction assemblies. Characteristics and limitations of standard fire resistance tests are reviewed along with empirical guidelines and correlations from the standard tests. Heat transfer and mechanics based analyses are applied to evaluate the fire resistance of construction assemblies.

Introduction. Principles of Construction. Building Construction. Principles of Fire Resistance. Fire Behavior vs. Building Construction. Wood Construction. Ordinary Construction. Concrete Construction. High Rise Construction. Collapse. Non-Combustible materials.

No.	Course Name	S	CS M/E	Teacher/s	ECTS
03.	Techniques and Tools in Risk Management	2	M	Julinda Keçi	7.5

Course content/structure:

Putting risk into perspective: Risk attitudes and impact on decision-making; Background to risk and uncertainty; Risk management system; Tools and techniques of risk management; Risk identification tools; Risk analysis tools: Quantitative and qualitative analysis; Risk response tools

Case study presentations; Utility and risk attitude; Risks related to projects constraints- Time, Cost and Quality; Sensitivity, breakeven and scenario analysis; Risk analysis using Monte Carlo simulation; Contracts and risks; Application.

No.	Course Name	S	CS	Teacher/s	ECTS
04.	Fire Simulation Evacuation	2	M	Sokol Dervishi	7.5

Course content/structure:

Introduction to life safety concepts. Human behaviour in fire theories: decision making, response to alarm systems, information, and environmental issues. Characteristics of people movement through smoke. Evacuation time analysis: Components of evacuation time, Transitions, Queues. Design of evacuation alarms. Panic. Social impacts; Fire Safety Education. General concepts of evacuation modelling. Review of evacuation models. Use of evacuation models. Use of evacuation

models: Case studies; Uncertainties, Model defaults; Performance based design concepts. FDS+ Evac tutorial.

No.	Course Name	S	CS	Teacher/s	ECTS
05.	**Flood Risk Assessment**	1	E	Miriam Ndini	7.5

Course content/structure:

Introduction to flood risk management. Types of floods and their processes, Characteristics of flood and their causes. Definition of flood, events driven by rainfall/runoff processes and by different natural or anthropic factors. Quantifying flood risk – probabilistic and statistical approaches. Design floods - and estimation of peak flows methods, catchment characteristics method, storm hydrographs and unit hydrograph methods. Measuring flood processes- Delineation of the flood-prone area- Floodway and flood plain- Monitoring River Hydraulic parameters. Vulnerability analysis. Floods in a changing world. Changes in Flow regimes, Changes in water resources Climate Change and its impact in Flood. Evaluation of Meteorological and Hydrologic Drought. Drought in water management. Implications of water management. "Bridging" DRM with climate change adaptation. Flood Control Mechanisms. Structural measures for flood control (dams, dikes, diversions). Non-structural measures. Informational system of flood warning and forecasting. Updating the flood forecast. Flood management plans, and operation rules of the structural measures. Flood disaster management (Pre-, post- and during flood). Flood emergency response and flood preparedness. EU framework directive on floods. European experience in managing floods.

No.	Course Name	S	CS	Teacher/s	ECTS
06.	**Reinforced Concrete Structures**	1	E	Enea Mustafaraj	7.5

Course content/structure:

Introduction, Serviceability, Design consideration, Analysis of section, Creep, Shrinkage and thermal strains, Deflection Serviceability, Calculation of curvature, Calculation of deflection, Controlling deflection ,Cracking Calculation of crack widths, Controlling cracking and crack widths

Design Details, Bond, Anchorage, Laps/splices, Placing of bars, Bending of reinforcement, Bar curtailment, Restraint of compression reinforcement, Design of ties. Buckling, Slenderness effects in structures Classification of structures, Design methods Simplified design method Design example with questions Bending about both axes Slender beams. Behaviour of RC columns Calculation of ultimate strength Design of tied columns Slenderness effect, Short and long columns. Slab Design, Solid, Ribbed Sab. Foundation Design. Shear Wall The purpose Structural. Forms Positioning Analysis Design. Shear Wall Design. Design of Retaining Structures

No.	Course Name	S	CS	Teacher/s	ECTS
07.	**DRM & FSE in Landscape Scale**	1	E	Artan Hysa	7.5

Course content/structure:

Introduction to Landscape Implications of FS-DRM. Practice_ QGis Introduction

Theory_ System Thinking in FS-DRM at Landscape scale

Practice_ QGis / basic tools

Theory_ Management principles in Natural systems; Mitigation, Adaptation, Resiliency, Feedback loop, etc

Practice_ QGis / editing tools

Theory_ Resilient Human systems as DRM framework

Practice_ QGis / analysis tools

Theory_ Wildfires

Practice_ QGis / analysis tools II

Theory_ Floods and Coastal Disaster Risk Management

Practice_ QGis / applied statistics

Theory_ Earthquakes and Landslides

Practice_ QGis / Publishing

Practice _ Data Collection and Study area Analysis

Practice_ Literature Review [Case study Analysis presentations] / Research supervision

Practice_ Literature Review [Case study Analysis presentations] / Research supervision

Practice_ Literature Review [Case study Analysis presentations] / Research supervision

Practice_ Literature Review [Case study Analysis presentations] / Research supervision

Practice_ Literature Review [Case study Analysis presentations] / Final Remarks

No.	Course Name	S	CS	Teacher/s	ECTS
08.	**Durability of Concrete**	1	E	Erion Luga	7.5

Course content/structure:

Aspects of Environment; atmospheric environment, sea environment, soil environment, industry environment. Aspects of Material; corrosion of reinforcing bar, alkali-aggregate reaction, carbonation, fire damage, soundness, hydrate—chemical corrosion fire dimensional stability, pore structure—permeability chlorine ion permeation frost resistance. Frost Resistance, Shrinkage, Creep, Corrosion of Embedded Rebar, Sulphate Attack, Alkali Aggregate Reaction, Resistance to Heat and Fire, Acid Attack.

No.	Course Name	S	CS	Teacher/s	ECTS
09.	**River Engineering**	1	E	Miriam Ndini	7.5

Course content/structure:

Introduction to River Engineering- Fluvial Geomorphology: Fluvial system; Planform relationships; Bankfull and effective discharges; Hydraulic geometry; Stream classification; Stream and river response River Mechanics and Stable Channel Design; Regime relationships; Analytical solutions; Extremal hypotheses; Geotechnical considerations; Bank stabilization techniques; HEC-RAS – Copeland's stable channel design method.

Erosion and Sedimentation: Incipient motion; Modes of sediment transport; Supply vs. capacity; Sediment transport equations; Sediment rating curves.

Management and Restoration of Streams and Watersheds: Water policy; Riparian areas, wetlands, and floodplains; Basic concepts and tools; Strategic vs. tactical restoration; Watershed analysis.

No.	Course Name	S	CS	Teacher/s	ECTS
10.	**Advanced Construction Materials**	2	E	Erion Luga	7.5

Course content/structure:

This Course deals with the Engineering design and problems of construction materials. Emphasis will be upon preparation, quality control and testing. The objective of this course is to provide advanced information and develop a better understanding of key materials such as concrete and other important types, requirements and related behaviour characteristics of advanced materials technology. The structure of the course is organized as follows. Introduction; Structural Clay products; Natural Rocks; Concrete aggregates; Portland Cement; Pozzolans; Chemical Admixtures; Concrete; Concrete Mix Design; Concrete Durability; Special Types; Polymer Binders.

No.	Course Name	S	CS	Teacher/s	ECTS
11.	**Earthquake Disaster Mitigation**	2	E	Huseyin Bilgin	7.5

Course content/structure:

Video showing about Earthquakes. Overview of Disaster Management. Earthquakes and Earthquake Hazard Analysis. Review of Seismic Design Concepts and Building Code Requirements. Disaster Preparedness. Seismic Vulnerability & Risk Assessment (Cases from different countries). Rapid Visual Screening of Buildings (FEMA154). Case Studies on Seismic Vulnerability & Risk Assessment of Buildings. Earthquake Damage and Seismic Vulnerability Assessment of Bridges Disaster Response. Post-Earthquake Assessment. Rehabilitation and Reconstruction. Public buildings (School, hospitals. etc.). Disaster Mitigation Structural Retrofitting & Strengthening. Case Studies on Seismic Rehabilitation, Retrofitting & Strengthening. Technologies and Research on Earthquake Damage & Mitigation. Social Impacts. Earthquake Education.

No.	Course Name	S	CS	Teacher/s	ECTS
12.	**Wireless Sensor Networks for Environmental Monitoring**	2	E	Endri Stoja	7.5

Course content/structure:

Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors. Network Architecture – Traditional layered stack, Cross-layer designs, Sensor Network. Architecture. Hardware platforms: motes, hardware parameters. Introduction to Network Simulator 3 (ns-3). Medium Access Control – Protocol design Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled. MAC Protocol Analysis – Asynchronous duty-cycled. X-MAC Analysis (Markov Chain). Routing protocols: MANET protocols. Routing protocols for WSN – Resource-aware routing, Data-centric, Geographic Routing. Broadcast, Multicast. Opportunistic Routing Analysis (Markov Chain). Clustering goals, types, high-level overview, clustering in WSNs. QoS management Basic functions, centralized solution, Topology control, Sensor mode selection. Security Possible attacks, countermeasures, SPINS, Static and dynamic key distribution.

No.	Course Name	S	CS	Teacher/s	ECTS
13.	**Research Methods**	2	E	Albana Halili	7.5

Course content/structure:

Introduction to Research Methods; Defining the Research Problem; Research Design; Sampling Design; Measurement and Scaling Techniques; Methods of Data Collection; Processing and Analysis of Data; Sampling Fundamentals; Testing of Hypotheses-I (Parametric or Standard Tests of Hypotheses); Chi-square Test; Analysis of Variance and Covariance; Testing of Hypotheses-II (Nonparametric or Distribution-free Tests); Multivariate Analysis Techniques; Ethics in Research & Interpretation and Report Writing.

CONCLUSION

K-FORCE project's Partners from Serbia, Bosnia & Herzegovina and Albania prepared draft of modernized or new Master Programmes curricula and syllabi, with active steering by EU partners.

Proposed modernized and new curricula are aligned with regional needs and NQF/EQF, with agreed common learning outcomes.

The goal is to create both regionally mutual and compatible higher education (HE) in the field of DRM&FSE and aligned to WB national specifics of the Law on HE.

Curricula and syllabi will be written in Serbian or Albanian or Bosnian and English languages and will be available in electronic form on the HEIs' website.

The recognized growing market in the area of DRM&FSE, as one of the key sectors in the near future, can lead to economic progress in Western Balkan countries and therefore master programmes presented in this report will supply labour market with the corresponding highly educated labour force.