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**MSc**

**“ Analysis and Management of Manmade and Natural Disasters”**

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### **THE MSc PROGRAM:**

- Emphasizes in the critical thinking and ethical decision-making.
- Trains students to assess emergency situations and provide management and recovery support to public and private disaster management agencies.

### **Topics are taught in this MSc**

- ✓ *Risk and Crisis Management and Disaster*
- ✓ *Social and Economic Impact of Disasters*
- ✓ *Natural Processes, Hazards and Disasters*
- ✓ *Environmental Risks and Technological Disasters*
- ✓ *Electrical-mechanical disasters,*
- ✓ *Spread of oil spills and fires caused by burning hydrocarbons,*
- ✓ *Technical Assistance for Rehabilitation risk*
- ✓ *Use of Geoinformatics in Managing Disasters*
- ✓ *EU Civil Protection Mechanism*

### **Job Opportunities**

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- ▶ Private and public emergency and disaster management agencies hire this MSc program graduates to fill top-level, directorial or managerial positions. These positions require professionals to handle all types of crisis management issues. Example job titles include:
  - Federal emergency management administrator
  - Disaster management consultant
  - Emergency planning director
  - Crisis manager
  - Disaster management planner
  - Emergency management officer
  - Risk management analyst
  - Disaster planning specialist

## **MODULES**

### **FIRST SEMESTER (30 ECTS)**

- 1) Analysis and Management of Risks and Disasters
- 2) Natural Disasters and relevant Hazards I (Forest Fires and Meteorological Hazards)
- 3) Geoinformatics as a tool for Natural Disasters monitoring
- 4) The Human factor in Risk and Disasters Management
- 5) Economical Impact of Risks and Disasters
- 6) Thesis and Publications writing Techniques

### **SECOND SEMESTER (30 ECTS)**

- 1) Natural Disasters and relevant Hazards II (Geohazards and Hydrohazards)
- 2) Technological Disasters and their impact on Environment

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3) Fire suppression techniques and management in Elelectromechanical facilities and Public Transport means

4) Response for Oil spills spreading and Fire Incidents by Hydrocarbon Combustion

5) Technical work for control and management of Geohazards and Hydrohazards

6) Use of emerging technologies in Training Techniques for making Risks and Disasters

### **THIRD SEMESTER (30 ECTS)**

Project Thesis

#### **1. Analysis and Management of Risks and Disasters**

**The aim** of the course is to familiarize students with risk assessment, disaster response as well as with the planning, assessment and analysis of simple and complex natural and man-made disasters.

Furthermore the role of information and Coordination Operations Centers in crisis management is assessed.

In this course the following topics are taught among others:

- ▶ Awareness and readiness of citizens
- ▶ Risk estimation and management
- ▶ Public administration and Risk Management
- ▶ Stochastic models in risk management
- ▶ Public and private organizations responsible for crisis and risk management
- ▶ Communication and Media Techniques for Crisis and Disaster Management
- ▶ Operational Management of Risks and Disasters

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- ▶ Civil Protection and Local Authorities and Administration Rules and Regulations of Civil Protection National Plan



## 2. Natural Disasters & relevant Hazards I (Forest Fires and Meteorological Hazards)

In the course of Fire-Weather and Forest Fires, the main meteorological, forestry and topographical factors, that affect the blow up and the development of wild fires, are analyzed. Also, simulations of large wild fires and the effect of climate trends on their behavior are presented. Finally it is described the Fireline Intensity of the wild fires and the way it affects on their behavior.

**In this course, the following topics are taught among others:**

- ▶ Climate change and extreme events
- ▶ The mechanism and the evolution of extreme meteo- hazards
- ▶ Impact of the extreme events to lives and properties

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- ▶ Agro fires – forest fires, Fire ignition factors, fire acceleration factors, fireline intensity, wild effect and fires, flame heights and wind, fire anatomy, features of a fire, PyroMeteorology
- ▶ Fire Simulation models
- ▶ Fire behaviour forecasting models
- ▶ Multi – purpose evacuation plans in case of accelerated and intense fires
- ▶ First responders actions for citizens relief
- ▶ Meteo – Hazards: Typhoons, Cyclons, Windshears, Lighting Strikes, Mechanism, Impacts. Protection rules and Regulation

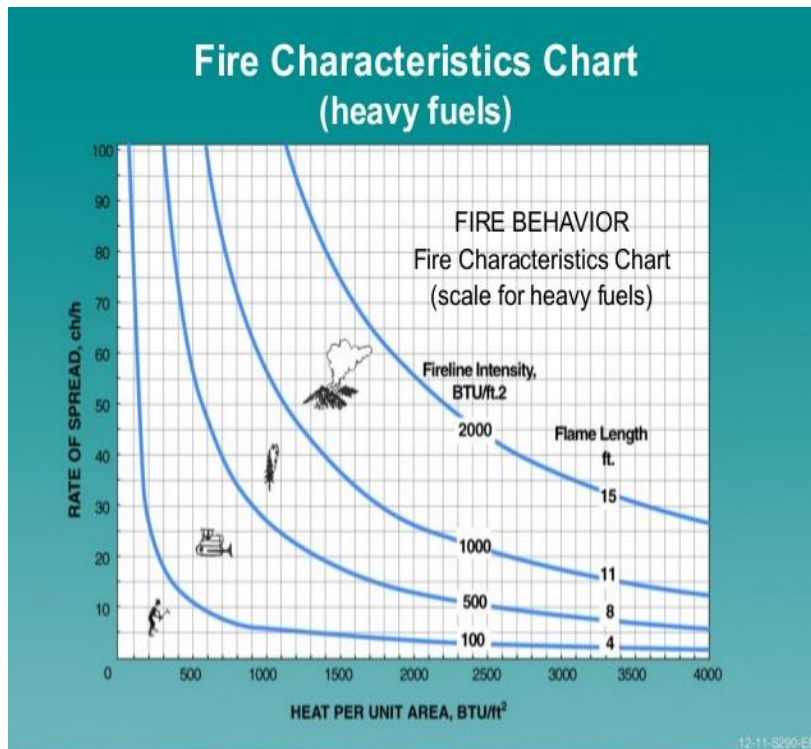
## FIRE WEATHER AND WILD FIRES

The slide is titled "Fire Suppression Limitations" and is part of a presentation on "Intermediate Wildland Fire Behavior" (S-290). It lists four categories of flame lengths and their corresponding suppression challenges:

- 0 - 4 ft.** Fires can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the fire.
- 4 - 8 ft.** Fires are too intense for direct attack on the head by persons using hand tools. Handline cannot be relied on to hold the fire.
- 8 - 11 ft.** Fires may present serious control problems; torching out, crowning and spotting. Control efforts at the head will probably be ineffective.
- >11ft.** Crowning, spotting and major fire runs are probable. Control efforts at the head of the fire are ineffective.

At the bottom of the slide, it is identified as "Unit 12 Part 1 Gauging Fire Behavior and Guiding Fireline Decisions" with the code "12-9-S290-EP".

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### 3. Geoinformatics as a tool for Natural Disasters monitoring

**The aim** of this course is students’ familiarisation with GIS and Remote Sensing methodologies and Techniques related with applications focusing in Natural Disasters

**In this course** the following topics are taught among others

- ▶ GIS softwares and their technical characteristics, specific GIS software
- ▶ GIS applications in natural disasters management
- ▶ On map exercises for natural disasters control with the help of GIS
- ▶ Forest Fire behaviour modeling with the use of specific GIS software

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- ▶ Evacuation zones modelling after a natural disaster with the help of a specific GIS





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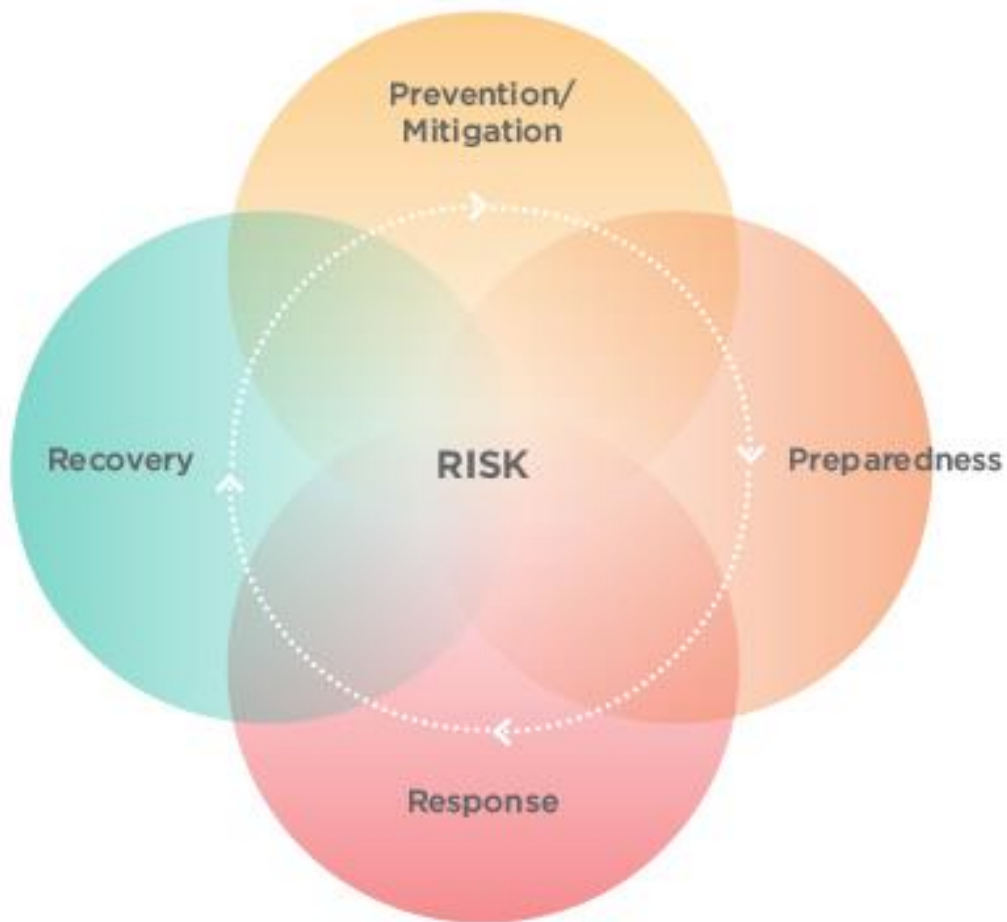
#### **4. The Human factor in Risk and Disasters Management**

**The aim** of the course is to introduce the students to acquired knowledge as well as current research on psychological and behavioral reactions of individuals, groups and masses in both man-made crises and natural disasters.

**The course** includes the following modules:

- ▶ Theories of Personality-Behavior and Response patterns, Theories of Cultural Behavior
- ▶ Emotional Intelligence and Herding
- ▶ Panic and Post-Traumatic Stress Disorder
- ▶ Burn out Syndrome
- ▶ Crisis Management at both local and state level as well as creation of pathways for preparing individuals and groups to reacting in a better way to such events in order to mitigate human loss
- ▶ Crisis management simulators and their use
- ▶ The help of Crisis Control Room Operation in the training and Response capability of Civil Protection Staff

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## 5. Economical Impact of Risks and Disasters

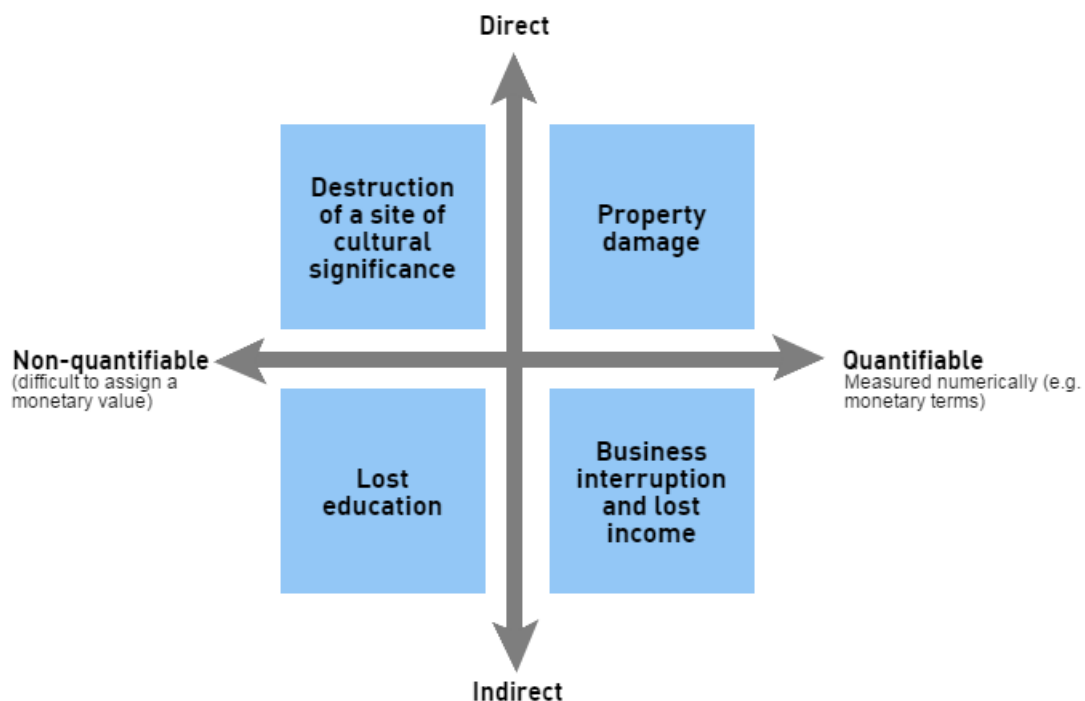
**The aim** of this course is to introduce the students in the analysis of the Socio – economical impact after a Disaster or a Technological Accident , as well as to offer them an acquaintance with the development and restructural plans, practices and funding possibilities after a catastrophic event

**In this course**, the following modules are taught among others

- ▶ Hazards and macroeconomy
- ▶ Public funding and Hazards
- ▶ Private funding for Infrastructures
- ▶ Cooperation schemes between private and public sector
- ▶ Cost benefit analysis

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- ▶ Cost estimation in a case of a disaster
- ▶ External financial aid
- ▶ Technical and Financial Evaluation of Rehabilitation and Restoration Programs
- ▶ Macroscale policy impacts after a disaster or accident



## 6. Thesis and Publications writing Techniques

**The aim** of this course is to offer to the students the essential techniques and knowledge relevant with papers and presentations implementation as well as the guidelines and the tips how to prepare, write and present him/her MSc Thesis

**In this course** the following modules are taught among others:

- ▶ Research Methodology
- ▶ Ethical Issues
- ▶ Searching Techniques

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- ▶ Writing and Compilation Techniques
- ▶ Statistics and diagrams
- ▶ Academic writing, expression techniques
- ▶ Structure of an MSc thesis
- ▶ MSc presentation and relative techniques
- ▶ Interaction between Audience and presenter
- ▶ Orthotypography norms, Communication Techniques

## **7. Natural Disasters and relevant Hazards II (Geohazards and Hydrohazards)**

**The aim** of this course is to introduce students in the analysis and mechanism of the Natural Disasters that are related with Geo- Hydro extreme phenomena, as well to present to them their impacts to human lives and infrastructural.

**In this course** the following modules are taught among others:

- ▶ Extreme Hydro - phenomena, storms, snowfall, intense rainfalls,
- ▶ Flash floods, The mechanism and its homicidal characteristics, forecasting, guidelines for survival, evacuation plans
- ▶ Landslides, mechanisms, characteristics, human losses and landslides
- ▶ Rockfalling
- ▶ Tsunami, mechanism, characteristics, forecasting, protection and evacuation plans
- ▶ Volcanos, eruption, lava phenomena and characteristics, evacuation and response plans

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- ▶ Earthquake, Analysis of the phenomenon, Structural vulnerability, Building stability and earthquakes, Safety and protection techniques, plans and rules for extrication



## **8. Technological Disasters and their impact on Environment**

**The aim** of this course is to familiarize students with Man Made disasters, Environmental Crises and Health Impacts in Disasters.

In this course the following modules are taught among others:

- ▶ Worldwide Risks and Hazards. Anthropogenic Disasters: Technological, Threats to Humanity, War, Asymmetric Threats.
- ▶ Basic Principles of Toxicology & Ecotoxicology. Estimation of Environmental and Ecological Risk
- ▶ Technological Disasters: Technological Accidents, Chemical Accidents in Industrial Facilities, Transport Accidents: Road, Rail, Marine, Air, Pipelines. Radiological & Nuclear accidents. Challenge of Technological Accidents due to Natural Disasters (NaTech). Risk management in Greece. Presence of hazardous substances. Dangerous substances in Greek facilities.

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- ▶ Risks from terrorist acts. Chemical, Biological, Radiological, Nuclear and Explosive (CBRN (E)) Threats and ways of managing them.
- ▶ Worldwide Biological Disasters: Biological threats (Categorization-Danger-Consequences-Antidotes-New technologies in the detection of biological hazards (nano-sensors)).
- ▶ Human Loss Management at national level.
- ▶ Tackling marine pollution incidents.
- ▶ Modeling of accidents involving dangerous substances. Use of special software.
- ▶ Waste Management (Dangerous Chemical Waste, Solid Waste, Waste Waste, Radioactive Waste
- ▶ Critical Infrastructure Protection.
- ▶ Technological risks of the future.
- ▶ Voluntarily, students are encouraged to complete the Introductory e-Course on Climate Change (UN) on-line.



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## 9. Fire suppression Techniques and Management in Electromechanical Facilities and Public Transport Means



### Management in Electromechanical ans

the students in the  
industries (chemical industries,  
Industrial Gases Production, etc) as  
ms of various Transportation  
Buses, Trams, Trains, Ships etc).

In order firstly to understand their operation and furthermore to study  
the following:

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- ▶ Cause of fires in the electrical and mechanical subsystems of the above categories
- ▶ Preparation of fire safety , fire protection plans and procedures
- ▶ Installation of various types of apparatus and sensors in critical locations for assessing fire risk.
- ▶ Risk Analysis (Evaluation of the performance of various components, Initiating events, Subsequent scenarios, Fire scenarios, Consequences-Fatalities, Assessment of Risk Value)
- ▶ Confrontation and management of fires with respect to minimization of equipment and casualties



## **10. Response for Oil spills spreading and Fire Incidents by Hydrocarbon Combustion**

**The objective of this course** is to familiarize students with the physicochemical properties of liquid and gaseous fuels as well as with their combustion properties.



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At the same time, students are ready to cope with the spread of fires and oil spills due to the burning of gaseous and liquid hydrocarbons.

In addition, students gain the competitive advantage of acquaintance and use of state of the art scientific instrumentation that contributes to the irrefutable identification of fingerprints of various sources of pollution.

**In this course** the following modules are taught among others:

- ▶ Hydrocarbon Chemistry and Technology
- ▶ Combustion of Hydrocarbons
- ▶ Oil Spills
- ▶ Hands on experience with real samples
- ▶ VCR + RFF Labs



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## **11. Technical work for control and management of Geohazards and Hydrohazards**

**The aim** of the course is to:

- ▶ examine the possibilities offered by modern engineering science and the technological development in various sectors in order to reduce the losses from various disasters.
- ▶ provide students with expertise that can be used to prepare disaster mitigation and disaster prevention plans as well as to directly address the risks in the field with temporary structural interventions.

In particular, technical interventions and construction works are being considered to minimize the risk of potential disasters such as earthquake, tsunamis, floods and fire.

**In this course**, the following modules are taught among others:

- ▶ Structure analysis of buildings and constructions
- ▶ Vulnerability of constructions, fatigue and stress

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- ▶ Technical and structural problems of constructions after an earthquakes,
- ▶ technical and structural problems in dams, embankments and overhangs after a flood. Protection methods and restoration
- ▶ Vulnerability of constructions after a tsunami



## **12. Use of emerging technologies in Training Techniques for making Risks and Disasters**

**The aim** of this course is to introduce to the students the use of modern Technologies (i.e. Augmented Reality Techniques) as a tool for emergency and awareness in case of Disasters and Accidents

**In this course**, the following modules are taught among others:

- ▶ Use of modern technologies for education and training purposes
- ▶ Use of social media in an emergency situation
- ▶ Malicious use of social media during an emergency situation
- ▶ Augmented reality as a tool for fire suppression

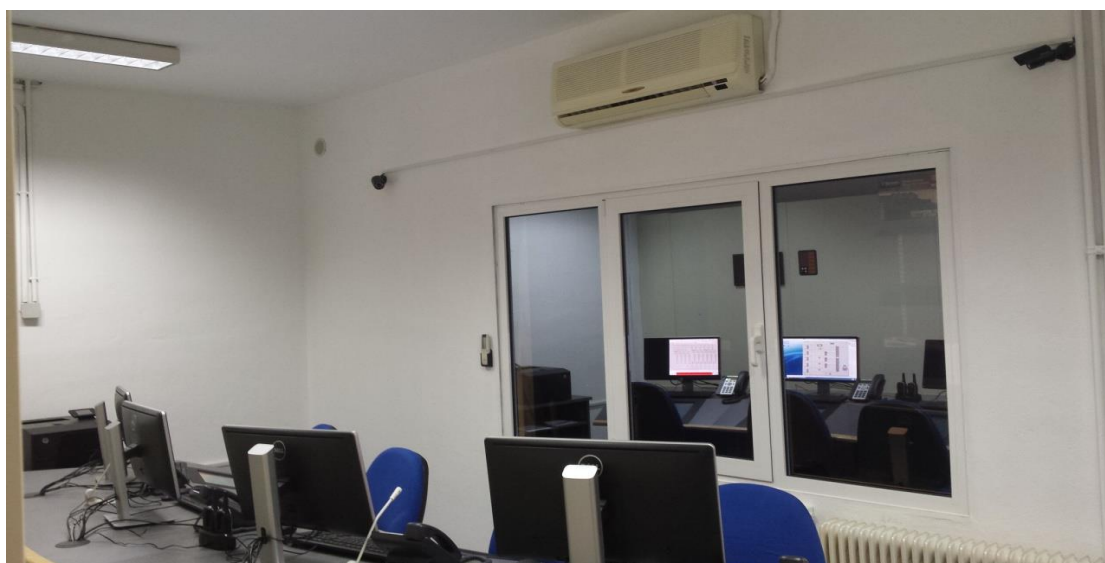
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- ▶ Cell phones application development with a specific content for disaster management
- ▶ Drones and robots tools for citizens awareness and help



Virtual Control Room (VCR)

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## **Training and Certification**

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## **CONCLUSION**

**It is of our understanding that this MSc program, as it operates, is unique in Balkan Area, and therefore, an interesting case-study.**

**We intend to pursue its realization by opting to use blended learning techniques.**