

Name of the module (English): Engineering Methods in Fire Protection					
Module code (UP): M24 (provisional)		Name of the module (Portuguese): Métodos de Engenharia na Proteção Contra Incêndio			
Module code (THM): IMTM (provisional)		Name of the module (German): Ingenieurtechnische Methoden im Brandschutz			
Module code (UC): M24 (provisional)		Name of the module (Spanish): Métodos de ingeniería en protección contra incendios			
Credits: 6 ECTS	Module status: Obligatory	Duration: 1 semester	Semester: 2	Year: 1	Frequency: Every year
Type of tuition: Classroom-based		Workload: 180 h	Attendance time: 60 h	Self-study time: 120 h	
Usability: Master (Degree in Sustainable Design, Construction and Management of the Built Environment)			Classification: Engineering / Architecture	Teaching language: English	
Module responsibility: Jens Minnert (THM)		Lecturers: Manuel Daniel Alvear Portilla (UC)			
Description / Observations: Every year a couple of thousand people die through fires in countries of the European Union. Furthermore, some ten thousand people are heavily injured. Besides the damage to persons the damages concerning buildings account for billions. Against this background, fire protection is an important part of sustainability, both in what concerns the effect of fire in CO2 emissions (in the accident itself and in the subsequent refurbishing need), as well in the impact, concerning increased risk of fire, of design options mainly specified under sustainable perspectives. Fire protection is an inherent part in the bachelor study programme of architects and civil engineers. Within this master course this knowledge is deepened and is put on a more scientific basis.					
Recommended Requirements Basic knowledge about sustainable concepts in design, construction and managements of buildings and infrastructures.					
Basic competences: <ul style="list-style-type: none"> • Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context. • Students are able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study. • Students are able to integrate knowledge and deal with the complexity of making judgments based on information that is incomplete or limited, including reflections on the social and ethical responsibilities associated with applying their knowledge and judgments. • Students are able to communicate their findings and the ultimate knowledge and reasons behind them to specialist and non-specialist audiences in a clear and unambiguous manner. • Students possess the learning skills to enable them to continue studying in a largely self-directed or autonomous manner. 					
Transverse competences: Within the course the students learn to understand the basics and advanced aspects of “Engineering Methods in Fire Protection”. To deal with this ambitious task a good theoretical background is necessary. Depending on the topic different ways of learning and teaching are possible. To transfer the theoretic aspects into practice and into the planning process of buildings a good knowledge of software tools is necessary.					
Specific competences: To be able to design sustainable buildings by seeking the fire resistance of their components and designing emergency exits using numerical simulations.					

Learning outcomes:

On successful completion of this module, the students will be able:

- To assess smoke spreading.
- To plan and assess escape routes.
- To assess the effects of fire on structural design.
- To understand the connection between Sustainability and Fire Safety
- To assess the risk level associated to sustainable design options
- To apply these concepts in projects.

Content:

- Basic and advanced aspects of fire protection
- Basic and advanced aspects of simulation tools for fire protection
- Fire simulation
- Smoke simulation
- Simulation of evacuation
- Interrelation between Sustainability and Fire Safety
- Impact of Fire in the increase of CO2 emissions
- Analysis of the risk of fire associated to sustainable design options in Green and Rehabilitated buildings
- Risk of Fire and mitigation strategies for Materials/Systems/Characteristics of sustainable profile

Teaching methodology:

The teaching methodology (e.g. lectures, group work, inverted class) relating to the theoretical context depends on the respective topic. Right from the beginning of the course students learn how to work with the specific software tools to get a more detailed view of the theoretical context. The work in the computer labs will be done in small groups. At the end of the course the students will work on case studies or real projects. The result of the project is presented in a report and with an oral presentation. The report and the presentation will be evaluated.

Training activities:

	Number of hours	% Attendance
Theory	30	100
Classroom practice	30	100
Tutorials	5	100
Evaluation	5	100
Group work	30	0
Self-directed work	50	0

Assessment method:

	Minimum weighting	Maximum weight
Continuous classroom evaluation	0%	20%
Final written work	50%	100%
Oral presentation	0%	30%
Practical exercises	0%	20%

Grading system:

U.PORTO	20	19	18	17	16	15	14	13	12	11	10	9	...	0	
Portugal	Very Good with distinction			Good with distinction			Good			Sufficient			Fail		
U.CANTABRIA	10.0	9.9	9.0	8.9	...	7.0	6.9	...	5.0	4.9	...	0.0			
Spain	Sobresaliente			Notable			Aprobado			Suspenso					
THM	100	...	88	87	73	72	58	57	...	50	49	...	0		
Germany	Excellent			Good with distinction			Satisfactory			Sufficient			Fail		

Bibliography:

The SFPE Handbook of "Fire Protection Engineering", 3^o edition, National Fire Protection Association Quincy, Massachusetts, Society of Fire Protection Engineers, Boston, Massachusetts U.S.A., 2003.
Segurança Contra Incêndios na Reabilitação Sustentável de Edifícios Antigos, Silva, J. M. Dissertação de Mestrado, Mestrado em Construção e Reabilitação Sustentáveis, Universidade do Minho, 2014.