

FEATURED ARTICLE

Fire Safety Engineering Programs in Santander and Madrid

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The Spanish for Fire Safety Engineering is *Ingeniería de Seguridad Contra Incendios* (ISCI). The new ISCI Group, established in 2012 and coordinated by the Association of Professional Fire Engineers (APICI), with the support of the Public Administration, has a main objective of analyzing the current status of Fire Safety Engineering in Spain. This group, along with the collaboration of many companies and institutions, is actually proposing new ideas for the development of this field based on qualified engineers. Two important examples of education programs in Fire Safety in Spain are the GIDAI Group, Santander, and the Universidad Pontificia de Comillas, Madrid.

GIDAI

For several years, the GIDAI Group has had a line of academic training in Fire Safety within the doctoral program in Industrial Engineering from Universidad de Cantabria. During the last five years, GIDAI has granted seven doctoral degrees and has supervised about 15 additional doctoral students, with diverse subjects in the fire safety field, such as fire safety in transportation, fire and evacuation computer modeling, smoke movement, the analysis of solid phase degradation, decision support systems, etc.



During the first stage within the doctoral program, students learn the theoretical fundamentals of different phenomena related to fire safety science. Students cover the theoretical bases of fire dynamics, fire behavior of materials (calculating, in practical cases, their properties using analytical methods, STA and cone calorimeter tests), zone models (conducting practical case studies and studying the model CFAST) and field models (using FDS as an application case). Additionally, the general concepts of active and passive fire protection are instilled.

Once they overcome this first phase, the students focus on a specific area within the broad field of fire safety and focus all their doctoral development on that particular topic, thus they become an international expert on that subject. With the aim of completing and optimizing their training, doctoral students participate in the quasi-annual international conference organized by our group GIDAI, as well as other events where they present developments in their work. Finally, and with the advice of the research team of GIDAI, they have the opportunity to publish papers in international research journals.

Additionally, GIDAI offers Masters degrees on Experimental and Mathematical Methods for the Analysis of Combustion and Fire Dynamics, where we introduce students to the fundamentals of combustion and fire

dynamics, as well as different experimental methods that allow the characterization of material fire behavior and fire computer models, with an average of 5 students per year in recent years. Finally, GIDAI also has two undergraduate courses on the subjects of fire computer modeling and fire safety, with a total of about 70 students each year.

ICAI

In Madrid, Universidad Pontificia de Comillas and the Association of Professional Fire Engineers (APICI) have been offering the 4th edition of the Master program in Fire Protection Engineering (MIPCI). The program consists of 60 ECTS-credits, where 30 ECTS-credits are accumulated attending classes from September to May. The rest of the credits are covered with complementary activities like autonomous work, essays and scheduled site visits. This past year, our students have been able to receive real fire fighting training, which has become a very useful experience in their formation. Also, the students are invited to some special events related to the Fire Protection field like the VII International Congress of Fire Safety Engineering organized by APICI, Fundación Mapfre, ALAMYS and AFITI and held in Madrid in February.

The contents of this postgraduate program start with a deep review of heat transfer and fluid mechanics in order to understand the main fundamentals of fire. Then the primary active, passive and water-based fire protection systems are introduced and described by theoretical and practical lessons, using different software like HASS. Performance-based design is exhaustively explained, in comparison with prescriptive design, and analyzed within the presentation of real projects. These topics are also described and applied in regard to three different sectors, building, industry and transportation systems, with an emphasis on stations and tunnels. Also, its legal aspects are included, like fireman services, fire investigation and insurance. Moreover, the main techniques in fire simulation and evacuation are studied and practiced, with the use of well-known software like FDS and Legion.



From February to July, the students have to develop a master thesis. Every student chooses their own supervisor, who guides them during this period and guarantees the professionalism and the quality of the thesis before their public presentation. One of our major concerns is the teaching quality. Forty lecturers participate in this program, coming from other universities, research institutes, industry and the public administration. The group of students is always reduced, with a maximum of thirty.

In support of this academic program, in the Institute for Research in Technology (IIT) that belongs to Universidad Pontificia de Comillas, one PhD student is working on smoke movement in large volume spaces. Full-scale fire tests have been carried out and numerical models are being developed. Additionally, some new research topics are beginning with undergraduate students. They are working on the use of scaling laws and also on multi-objective optimization of structures in fire.

One of our main challenges is to offer a deep knowledge in this field so that our students become professionals in a sector which is not well recognized within our country yet. Thanks to the Alumni Association of MIPCI, these professionals are becoming a well-known group to prove the qualification received and encourage their recognition by the industry and the public administration.