

# Fire Dynamics and Fire Protection

Course No. 151003L05

## Overview

This course aims to provide students with the basic skills and knowledge to understand the physical principles governing fire growth.

### Learning objectives

1. Describe the fundamental chemical and thermal mechanisms behind fire growth
2. Comprehend the mathematical descriptions used to quantify fire growth
3. To be able to apply the different mathematical models to quantify a fire
4. Distinguish between a growing fire and a fully developed fire
5. Recognize the relationship between fire growth and life safety
6. Interpret the principles behind the quantification of material flammability
7. Interpret the principles behind the quantification of egress times
8. To be able to apply mathematical principles of material flammability and egress time to establish available and required egress times.
9. Recognize the importance of fire dynamics on a fire strategy
10. Comprehend the concept of consequence analysis

<b>Dates for the Course</b>	<b>6<sup>th</sup> February, 2016 to 12<sup>th</sup> February, 2016</b>
<b>Host Institute</b>	<b>IIT Madras</b>
<b>No. of Credits</b>	<b>1</b>
<b>Maximum No. of Participants</b>	<b>40</b>
<b>Course Modules</b>	<ul style="list-style-type: none"><li>▪ Quantification of a Fire Safety Strategy<ul style="list-style-type: none"><li>○ Prescription vs. Performance</li><li>○ Components and objectives of a fire safety strategy</li></ul></li><li>▪ Egress – principles and calculations</li><li>▪ Fire chemistry<ul style="list-style-type: none"><li>○ Explosions vs. fires – fundamental combustion principles</li></ul></li><li>▪ Fire dynamics<ul style="list-style-type: none"><li>○ Fundamentals of heat and mass transfer for fire</li><li>○ Fundamentals of smoke production</li><li>○ Fundamentals of smoke transport</li><li>○ Fundamentals of ignition and flame spread</li></ul></li><li>▪ The definition of the design fire<ul style="list-style-type: none"><li>○ Material flammability</li><li>○ Parameters affecting ignition</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>○ Parameters affecting flame spread</li> <li>○ Parameters affecting the heat release rate</li> <li>○ Parameters affecting extinction</li> <li>○ Standardized flammability testing and its relation to fundamental combustion</li> </ul> <ul style="list-style-type: none"> <li>▪ The compartment fire framework</li> <li>▪ Detection and Alarm system components design <ul style="list-style-type: none"> <li>○ Performance assessment of smoke detectors</li> </ul> </li> <li>▪ Sprinkler system components and design <ul style="list-style-type: none"> <li>○ Sprinkler activation assessment</li> <li>○ Sprinkler performance assessment</li> </ul> </li> <li>▪ Smoke management components and design <ul style="list-style-type: none"> <li>○ Smoke pressurization design</li> </ul> </li> <li>▪ Principle of structural behaviour in fire <ul style="list-style-type: none"> <li>○ Fire resistance ratings and the standardized fire</li> </ul> </li> <li>▪ Implementation of Fire Protection Systems</li> </ul>
<p><b>Course Registration Fees</b></p>	<p>The participation fees for taking the course is as follows:</p> <p><b>Student Participants:</b> Rs.1000  <b>Faculty Participants:</b> Rs.5000  <b>Government Research Organization Participants:</b> Rs.10000  <b>Industry Participants:</b> Rs.15000</p> <p>The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.</p> <p><b>Mode of payment: Demand draft in favour of “Registrar, IIT Madras” payable at Chennai</b></p>
<p><b>Accommodation</b></p>	<p>The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: <a href="http://hosteldine.iitm.ac.in/iitmhostel">http://hosteldine.iitm.ac.in/iitmhostel</a></p>

## Course Faculty



Prof. José L. Torero is currently Professor of Civil Engineering and Head of School at the University of Queensland since 2012. A BSc from the Pontificia Universidad Católica del Perú (1989) and a MSc (1991) and PhD (1992) from the University of California Berkeley. Prior to joining UQ, Professor Torero held the position of the Head of the Institute for Infrastructure and Environmental, the BRE Trust/RAEng Professor of Fire Safety Engineering and Director of the BRE Centre for Fire Safety Engineering. During his time in Switzerland, he was Landolt & Cia Chair in Innovation for a Sustainable Future at École Polytechnique Fédérale de Lausanne. Additionally, Professor Torero was an Associate Professor at the University of Maryland (USA) and Charge de Recherche at the Centre National de la Recherche Scientifique (France). He is a fellow of the Royal Academy of Engineering, the Royal Society of Edinburgh and the Building Research Establishment.

In 2008 Professor Torero was awarded the Arthur B. Guise Medal by the Society of Fire Protection Engineering and, in 2011, the Rasbash Medal from the Institution of Fire Engineers (UK) for eminent achievement in the advancement of the science of fire safety.

Professor Torero has received numerous education related awards and in 2010 he received the Tam Dalyell Prize for Excellence in Communicating Scientific Knowledge to the Public. His work on bringing technology to the Fire Service was the subject of the April, 2007 BBC Horizon show: "Skyscraper Fire Fighters" that has been shown in more than 30 countries.

He is the author of a book and more than 500 other technical documents for which he has received multiple awards. He is currently the Editor-in-Chief of Fire Safety Journal and was the Associate Editor of Combustion Science and Technology (2005-2010). He is a member of the Editorial Board of Progress in Energy and Combustion Science, Fire Technology, Journal of Fire Protection Engineering, Fire Science and Technology and the International Journal for High-Rise Buildings. He is the vice-Chair of the International Association for Fire Safety Science, chair of the Fire Safety working Group of the International Council for Tall Buildings and Urban Habitat and a member of numerous influential committees and standards development bodies.

## Course Coordinators

Name: Amit Kumar  
V Raghavan  
S R Chakravarthy  
T M Muruganandam

### Contact:

Phone- 044-22574019 (Amit Kumar)  
044-22574712 (V Raghavan)

E-mail: amitk@ae.iitm.ac.in  
raghavan@iitm.ac.in

.....