Syllabus

Instructor: Arnaud Trouvé  
Department of Fire Protection Engineering, University of Maryland  
Office: JMP 3104D / Tel: (1) 301-405-8209  
Email: atrouve@umd.edu / Web: http://www.fpe.umd.edu

Course website: https://myelms.umd.edu/courses/1216651

Course duration: 12 weeks (11/28/2016-02/24/2017)

TA: Stephanie Poole (Email: spoole12@terpmail.umd.edu)

Course objectives

Fire modeling has become a major component in fire protection engineering. A basic description of fire modeling requires some understanding of both fire physics and scientific computing. We review in this course the fundamentals of enclosure fire dynamics, including relevant concepts in thermodynamics, combustion, fluid mechanics and heat transfer. We also provide an introduction to computer-based enclosure fire modeling, including zone modeling and Computational Fluid Dynamics (CFD).

The objectives of the course are to provide a fundamental understanding of enclosure fire dynamics, review the concepts used in hand calculations of enclosure fire properties, provide an introduction to FDS and CFAST as leading fire modeling software used by fire modeling practitioners and as examples of the zone modeling and CFD approaches.

Outline

1. Week 1: Introduction and Overview of Fire Modeling
2. Week 2: Introduction to FDS and CFAST
3. Week 3: Governing Equations
4. Week 4: Fuel Sources
5. Week 5: Combustion
6. Week 6: Mid-Term Exam
7. Week 7: Fire Plumes
8. Week 8: Ceiling Jet and Fire Detection
9. Week 9: Vent Flows
10. Week 10: Heat Transfer
11. Week 11: Water-Based Fire Suppression
12. Week 12: Final Exam

Course material


Course format

The typical format of the course during Week (n) is as follows:

1) Modules: release of Week (n) material on Friday of Week (n-1) (see the Lecture Videos and Files folders on the course website);

2) Discussion Board: initial contributions to the Week (n) discussion on Monday-Wednesday and review on Wednesday (see the Discussions folder on the course website);

3) Online meeting: discussion and Q&A session on Thursday (8:00-9:00 pm US-EST); the meeting is recommended but not mandatory; note that the online meeting is recorded and that the recording will be available for 2 weeks (see the Conferences folder on the course website);

4) Discussion Board: last contributions to Week (n) discussion on Friday (see the Discussions folder on the course website);

5) Homework Assignments: due date on Monday of Week (n+1) (see the Assignments folder on the course website).

Course grading

• Weekly homework assignments (40% - 200 points); Discussion Board participation (10% - 50 points); Mid-Term Exam (25% - 125 points); Final Exam (25% - 125 points).

• Weekly homework assignments: the assignments are problems that require solutions. Showing details, e.g. intermediate steps in a calculation or a line of argument, and adding comments are strongly encouraged for full credit and are a requirement for partial credit.

• The Mid-Term Exam will cover Modules taught in weeks 1-5; the Final Exam will cover all Modules. The Exams are to be completed individually, without correspondence to fellow students or colleagues. The Mid-Term Exam will take place during week 6 of the course; the Final Exam will take place during week 12 of the course.

• Late homework will be penalized at a rate of 10% of the grade per day unless special arrangements are made.

• A+ = 97-100; A = 93-96; A- = 90-92; B+ = 87-89; B = 83-86; B- = 80-82; C+ = 77-79; C = 73-76; C- = 70-72; D+ = 67-69; D = 63-66; D- = 60-62; F < 60

Course evaluation

• Comments/feedback during or at the end of the term are welcome and encouraged. In addition to individual comments sent directly to the instructor (atrouve@umd.edu), a formal online evaluation will be proposed to students at the end of the term. This evaluation will be completely anonymous.