

Instructors:

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Course Description:

The primary aims of this course are:

1. Provide a review of the mechanisms whereby people are affected by exposure to toxic effluent and heat in fires, including toxicology of fire effluent components, common fire scenarios causing death and injury to building occupants, examination of individual incidents through fire investigation, trends in fire injury and death statistics, the decomposition chemistry of common materials, standard small and large scale experimental approaches and standards.
2. Review the derivation and application of fractional effective dose (FED) methods for predicting time to incapacitation and death in fires for use in fire safety engineering calculations.
3. Review the formulation and application of evacuation models.
4. Review trends in human behavior and factors which affect the behavior of people in fire situations.

Texts:

SFPE Handbook of Fire Protection Engineering, 4th Edition, P.J. DiNenno (ed.), Quincy: NFPA, 2008.

SFPE, Predicting 1st and 2nd Degree Skin Burns from Thermal Radiation, Engineering Guide, March 2000.

Grading System: Semester grades will be determined according to the following relative weights:

Item	Proportion (%)
Exam 1	20
Exam 2	25
Exam 3	25
Project	20
Homework	10
Total	100

Grade	% Points
A	90-100
B	80-89
C	70-79
D	60-69

All assignments are expected to be submitted on or before the announced due date. Assignments submitted late will be penalized, with exceptions granted if requested before the due date.

Any student with special needs, including extensions for assignments, should see me as soon as the problems or needs arise.

Project:

Students enrolled in ENFP 613 will complete the projects individually. Deliverables for the 613 projects will include a class presentation (~15 minutes) plus an executive summary of the project (3-4 pg. description). Most of the class presentations will be made starting on May 3, though some may be provided earlier. All written descriptions are due by the beginning of class on May 3.

Students enrolled in ENFP 429 can complete the project individually or in pairs. The deliverable for the 429 projects will be a written report. Reports are due by the beginning of class on May 3.

Examples of topics include:

- Review of past fire incident which involved multiple fatalities
- Review of toxicity analysis method, basis for correlations, LC₅₀ values
- Review of case study (either actual or hypothetical)

All project topics need to be pre-approved.

Preliminary Outline:

Week	Topics	Reading	Lecturer
25 Jan	Course overview; Introduction to life safety concepts		JM
1 Feb	Characteristics of people movement: movement on stairs, level walkways, through doorways, stair design, ergonomics considerations of egress system design	SFPE, Ch. 3-12, 3-13	JM
8 Feb	Evacuation time analysis: Components of evacuation time, Transitions, Queues		JM
15 Feb	Human behavior: decision-making, response to alarm systems, information, and environmental cues	Reports (1), (2), and (3)	EK
22 Feb	Basis of evacuation models	SFPE, Ch. 3-17; Report (4)	EK
29 Feb	Evacuation models demonstration	Model guides	EK + SG
7 Mar	TBD		
14 Mar	Use of evacuation models: Case studies; Model defaults; Performance-based design concepts	Report (5)	EK
21 Mar	Spring Break		-
28 Mar	Data used in performance-based design, including wayfinding, visibility factors affecting response	SFPE, Ch 2-4; Reports (6) and (7)	EK
4 Apr	Physiological and toxicological effects of combustion products: derivation of predictive calculation models		JM
11 Apr	Physiological and toxicological effects: continued	SFPE, Ch. 2-6	JM
18 Apr	Tenability analysis methods: FED approach, toxic potency, n-gas model		JM
25 Apr	Hazard calculations		JM
2 May	Project presentations		JM
9 May	Project presentations		JM

Report (1): "Panic and Human Behaviour in Fire" by Fahy and Proulx (<http://www.nrc-cnrc.gc.ca/obj/irc/doc/pubs/nrcc51384.pdf>)

Report (2): "Response to Fire Alarms" by Proulx (http://www.fpemag.com/archives/article.asp?issue_id=40&i=267)

Report (3): "Predicting Human Behavior during Fires" by Kuligowski (pre-journal unformatted version)

Report (4): "A Review of Building Evacuation Models, 2nd Edition"
<http://www.evacmod.net/videos/papers/KuligowskiEgressModelReviewTechNoteNov2010FINAL.pdf>

Report (5): "Representing Evacuation Behavior in Engineering Terms" by Gwynne, Kuligowski and Nilsson (pre-journal unformatted version)

Report (6): Appendix B in the following report by Lord et al.:
<http://fire.nist.gov/bfrlpubs/fire05/PDF/f05156.pdf>

Report (7): Literature Review from Bryan Hoskins' Ph.D.