

**ENFP 405, Structural Fire Protection (3 credits)**

**ENFP 621, Analytical Procedures of Structural Fire Protection (3 credits)**

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Course Description: Structural integrity and compartmentation are principal aspects of fire safety in buildings. This course addresses the effects of fire on materials used in construction assemblies. Characteristics and limitations of standard fire resistance tests are reviewed along with empirical guidelines and correlations from the standard tests. Heat transfer and mechanics-based analyses are applied to evaluate the fire resistance of construction assemblies.

Course Outcomes: Students will gain the ability to design experimental apparatus, experimental procedures and data analysis generating novel information and knowledge in fire science and engineering. Students will also gain knowledge of contemporary issues relevant to the fire engineering profession and a broad understanding of the relevant societal issues impacted by engineering solutions.

Teaching Assistant:

TBD

Texts:

- Buchanan, A., Structural Design for Fire Safety, New York, John Wiley, 2001.
- SFPE Handbook of Fire Protection Engineering, 4<sup>th</sup> Edition, P.J. DiNenno (ed), Quincy: NFPA, 2008.
- ASCE/SFPE 29, Standard Calculation Methods for Structural Fire Protection, Reston, VA, ASCE, 2005.

References:

- Underwriters Laboratories, *Fire Resistance Directory*, Northbrook, IL, 2011.

Grading System:

Item		Proportion (%)	Grade		% Points
Examination #1		35	A		90-100
Examination #2		35	B		80-89
Homework		30	C		70-79
			D		60-69
Total		100	E		<60

All assignments are expected to be submitted on 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.

**Please keep in mind that preserving academic integrity is essential. Information on Academic Integrity can be found at:**

<http://www.studentconduct.umd.edu/aca/honorpledge.html>

Topic	Schedule (estimate)
I. Fire Endurance Requirements for Construction Assemblies A. Basis of classification B. Performance requirements	8/29
II. Fire Endurance Tests A. Building Construction Assemblies 1. Overview of standard test method 2. Performance criteria 3. Limitations of test method 4. Non-standard evaluations B. Protection of Wall Openings 1. Overview of standard test methods- doors, windows, duct & cable penetrations 2. Performance criteria	9/5          9/12
III. Guidelines for estimating fire resistance	9/19
IV. Evaluating the Fire Resistance of Steel Structural Elements A. Material properties B. Empirical correlations for columns, beams and trusses C. Thermal response: lumped heat capacity, finite element analysis E. Mechanics-based approach: beams, columns F. Response of structural frames	9/26
<i>Exam #1</i>	10/24
V. Evaluating the Fire Resistance of Timber Structural Elements A. Material properties B. Effect of fire exposure C. Critical char depth D. Glue-laminated members	10/31
VI. Evaluating the Fire Resistance of Concrete & Masonry Assemblies A. Material properties B. Thermal analysis via graphs/tables C. Moment-bearing capacity analysis for slabs and beams D. Empirical correlations	11/14
VIII. Light-frame walls	12/5
<i>Exam #2</i>	12/17 at 2:00?