**ENFP 411 - Risk-Informed Performance Based Design**

**Syllabus**

**Instructor Teaching Assistant**

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**FIRE Center Sponsor: Koffel Associates**

**Catalog Course Description:** Appraisal and measurement of fire safety. Application of systems analysis, probability theory, engineering economy and risk management in the identification and synthesis of components of fire protection engineering. Methods for the development of criteria for the design, evaluation and assessment of fire safety or component hazards.

**Supplemental course description:** An integrative course in which students apply fundamental fire protection engineering concepts to the design of a complex building.

**Prerequisites:** Senior standing in dept., i.e. anticipated graduation in 2018.

**Textbooks:**

SFPE Engineering Guide to Performance-Based Fire Protection (2007)

**Additional References:**

SFPE Engineering Guide to Fire Risk Assessment (2006)

SFPE Handbook of Fire Protection Engineering (5th edition)

NFPA Fire Protection Handbook (20th edition)

**Course Objectives:**

1. Upon completing this course, the student should be able to perform and present a comprehensive performance based design of a building in accordance with prevailing professional standards.
2. ABET Program Outcomes: SO3, 4, 7 and 11.

**Learning Outcomes:**

* Understand and apply the process of performance-based design
* Understand hazard-based and risk-based design approaches
* Develop design fire scenarios
* Consider human performance in design analysis
* Design fire protection systems, such as detection, suppression, and fire resistance, on a performance basis

**Schedule:** Tuesday/Thursday, 5:00 – 6:15 pm, JMP 1109

Tuesday 6:15 – 7:15 pm, JMP 1109

**Grading:**

Design Report (written) 40%

Design Brief (written (35) and presentation (15)) 50%

Miscellaneous assignments 10%

The grade in the final Design Report will be determined based on three principal considerations:

15/40: Does the report demonstrate that the stated goals and objectives were satisfied by the proposed design and were design constraints recognized and adequately accounted for in developing the proposed designs?

15/40: Were all analyses conducted done correctly? Were all methods used within their scope and limitations and were assumptions explicitly stated? Was all input data appropriate for the application?

10/40: Is the report well organized and does it follow the style consistent with that of technical publications in fire protection engineering?

**ABET Student Outcomes:**

The ABET student outcomes that have been identified for this course include:

**SO3) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**

The capstone design project is selected to require consideration of many of the above constraints. To assess these skills, an aspect of the final report will be reviewed to assess the effectiveness of the proposed design to satisfy stated goals and objectives, while accounting for the design constraints.

Assessment: (Based on 15 points)

13-15 Student demonstrates mastery of the objective;

11-12 Student demonstrates partial yet sufficient mastery of the objective;

8-10 Student demonstrates partial but insufficient mastery of the objective;

<8 Student demonstrates virtually no mastery of the objective.

**S04) An ability to function on multidisciplinary teams**

In general, developing a risk assessment requires a team that has expertise in several technical areas. Consequently, fire risk assessment is a particularly appropriate topic to assess a student’s multi-disciplinary and multi-tasking skills. To assess these skills, the assignments for the risk assessment portion of the course will require multi-disciplinary technical skills including fire protection system design, fire modeling, probability theory, and logic modeling.

Assessment: (Based on 10 points)

9-10 Student demonstrates mastery of the objective;

7-8 Student demonstrates partial yet sufficient mastery of the objective;

5-6 Student demonstrates partial but insufficient mastery of the objective;

<5 Student demonstrates virtually no mastery of the objective.

**S07) An ability to communicate effectively**

This SO is assessed via presentations of the design brief for the semester project. In particular, one part of the evaluation of the design brief is an assessment of “presentation skills” made by a review panel consisting of the faculty member teaching the class as well as three senior fire protection engineers. Three principal factors are included in the assessment of “presentation skills”: confident/understandable presentation, proper use of technical language, and effective use of visual aids.

Assessment: (Based on 15 points)

13-15 Student demonstrates mastery of the objective;

11-12 Student demonstrates partial yet sufficient mastery of the objective;

8-10 Student demonstrates partial but insufficient mastery of the objective;

<8 Student demonstrates virtually no mastery of the objective.

**SO11) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice**

This SO is assessed via an aspect of the final report, focusing on the analysis methods utilized to support the proposed designs. In particular, the assessment will review whether the analytical methods were used properly, i.e. within their scope and limitations, all inputs were appropriate, the method was used correctly and all assumptions were explicitly identified.

Assessment: (Based on 15 points)

13-15 Student demonstrates mastery of the objective;

11-12 Student demonstrates partial yet sufficient mastery of the objective;

8-10 Student demonstrates partial but insufficient mastery of the objective;

<8 Student demonstrates virtually no mastery of the objective.

### Notes about submitting assignments:

* Assignments may be submitted multiple times before the due date. You may wish to do this if you would like feedback on a draft of the assignment. Only the final submittal will be graded.
* All assignments are due on the date provided in the assignment
* Late submissions will not be accepted unless prior arrangements have been made.

### Academic Integrity:

The Department abides by and enforces the University’s *Code of Academic Integrity*. The Code can be accessed from <http://www.shc.umd.edu/code.html>.