

**ENFP415/651: FIRE DYNAMICS (3 credits)**  
**SYLLABUS**

**Class Time & Location:** Tuesdays and Thursdays, 2:00 – 3:15 PM, JMP 3216

**Instructor:** Dr. Stanislav I. Stoliarov, stolia@umd.edu, (301)405-0928

**Office Hours:** Tuesdays, 3:30 – 7:00 PM, JMP 3104C

**Teaching Assistant:** Becca Morgenstern, rmorgen11@gmail.com

**Office Hours:** Fridays, 10:00 AM – 3:00 PM

**Objectives:** This course is designed to give students a quantitative understanding of fire behavior. The topics covered include premixed and diffusion flames, ignition of liquids and solids, flame spread, rate of burning, and fire plumes. Prerequisite requirements are primary courses in thermodynamics, fluid mechanics, and heat transfer.

**Textbooks:** Required: Quintiere J. G., *Fundamentals of Fire Phenomena*, John Wiley & Sons, Chichester, UK, 2006. Recommended: Turns S. R., *An Introduction to Combustion*, McGraw-Hill, New York, USA, 2012.

**Format:** A set of lectures will be followed by a problem solving session. Homework will be assigned one week prior to the session and will be due at the beginning of the session. Late homework will not be accepted. Midterm and final exams will be conducted in a semi-open-book fashion: only personal lecture notes and instructor's slides are allowed. The exams will consist of conceptual questions and engineering problems similar to those given as homework. The final exam will cover only the material taught between the midterm and the end of semester.

**Grading:** For undergraduate students, there will be 5 homework assignments, each worth 6 points. Graduate students will be required to complete the undergraduate assignments and 5 additional, graduate-level problems (one per assignment), each worth 2 points. Graduate students will also be asked to make 15 min presentation on fire dynamics related topic not covered by the lectures. This presentation will be graded on 5 point scale. There will be 2 exams: midterm and final. Again, graduate students will be given 1 additional problem on each test. Every undergraduate exam will be worth 30 points; every graduate exam will be worth 35 points. For undergraduates, the overall grade will be calculated based on the maximum of 90 points; for graduate students, the overall grade will be based on 115 points. Up to 5 extra points will be given to those students who actively participate in classroom discussions.

**Communications:** Lecture slides and homework assignments will be posted on the Blackboard (<https://bb.eng.umd.edu/>). The homework solutions should be submitted on paper in clear, legible writing or typing. While team studying is encouraged, all submitted work must be prepared individually. It is unacceptable to submit any work that is copied. The homework will be graded and returned to the student. All grades will be posted on the Blackboard.

**Attendance:** Regular attendance and participation in lectures and problems solving sessions is expected. If a student is absent from the class on the day homework is due, he or she should make an effort to email the instructor homework prior to the deadline. If a student is absent on days when an exam is scheduled, he or she is required to notify the instructor in advance, and upon returning to class, bring documentation of the illness, signed by a health care professional.

**Special Needs:** Anyone having special needs regarding disabilities, schedules, and religious conflicts, please see the instructor in private.

**ABET Outcomes:** The Accreditation Board for Engineering and Technology (ABET) evaluates engineering programs in the U.S. (see [www.abet.org](http://www.abet.org)). ENFP415 seeks to foster ABET Outcomes 5 and 9. Outcome 5 is a demonstrated ability to identify, formulate and solve engineering problems representative of those commonly encountered in the fire protection engineering practice. Outcome 9 is a demonstrated recognition of the need to engage in life-long learning and ability to maintain state of the art fire protection engineering knowledge and skills.

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**TENTATIVE SCHEDULE**

| <b>Date</b> | <b>Subject</b>                          |
|-------------|-----------------------------------------|
| Aug 30      | Course Overview                         |
| Sept 4      | Combustion Chemistry and Thermodynamics |
| Sept 6      | Combustion Chemistry and Thermodynamics |
| Sept 11     | Combustion Chemistry and Thermodynamics |
| Sept 13     | Premixed Flames                         |
| Sept 18     | Problem Solving Session                 |
| Sept 20     | Premixed Flames                         |
| Sept 25     | Premixed Flames                         |
| Sept 27     | Premixed Flames                         |
| Oct 2       | Nonpremixed Flames                      |
| Oct 4       | Nonpremixed Flames                      |
| Oct 9       | Problem Solving Session                 |
| Oct 11      | Ignition of Liquids and Solids          |
| Oct 16      | Ignition of Liquids and Solids          |
| Oct 18      | Ignition of Liquids and Solids          |
| Oct 23      | Ignition of Liquids and Solids          |
| Oct 25      | Problem Solving Session                 |
| Oct 30      | <b>Midterm Exam</b>                     |
| Nov 1       | Flame Spread                            |
| Nov 6       | Flame Spread                            |
| Nov 8       | Flame Spread                            |
| Nov 13      | Flame Spread                            |
| Nov 15      | Problem Solving Session                 |

|        |                                        |
|--------|----------------------------------------|
| Nov 20 | Burning Rate                           |
| Nov 22 | Thanksgiving Recess                    |
| Nov 27 | Burning Rate                           |
| Nov 29 | Burning Rate                           |
| Dec 4  | Burning Rate                           |
| Dec 6  | Problem Solving Session                |
| Dec 11 | Fire Plumes                            |
| Dec 17 | <b>Final Exam, 10:30 AM - 12:30 PM</b> |