



## Course Objectives

This course is designed to give students a quantitative understanding of fire behavior. The fundamentals of physics and chemistry of combustion are presented and used to derive key analytical relationships that describe fire behavior and growth. Application of these relationships to the analysis of common fire scenarios is emphasized.

The Accreditation Board for Engineering and Technology (ABET) evaluates engineering programs in the United States (see [www.abet.org](http://www.abet.org)). ENFP415 seeks to foster ABET Outcomes 1 and 6.2. Outcome 1 is an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. Outcome 6.2 is an ability to analyze and interpret data.

## Course Content

Introduction to premixed and diffusion flames; thermochemistry; conservation equations; ignition and burning rate of liquid and solid fuels; flame spread; fire plumes; flame radiation.  
Chapters 1 – 10 of Quintiere; Chapters 2-5, 8, 12 of Turns

## Textbooks

Course website: [elms.umd.edu](http://elms.umd.edu)

Required: Quintiere, J. G., *Fundamentals of Fire Phenomena*, John Wiley & Sons, Chichester, UK, 2006.  
A new hardcover copy of this book is \$35 on Amazon (July 29, 2019); buy it, keep it with you when you leave UMD

Recommended: Turns, S. R., *An Introduction to Combustion*, McGraw-Hill, New York, USA, 2012.  
A new softcover copy of this book is \$20 on Amazon (July 29, 2019); for more details on combustion chemistry, this will be a valuable reference to keep with you (especially if you continue with research)

**Dr. Isaac T. Leventon**

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### Class Meets

Tuesdays & Thursdays

11:00 am – 12:15 am

PHYS 1201

### Office Hours

JMP Fire Protection Eng.

Conference Room

Tuesdays

Noon – 2:00 pm

### Teaching Assistants

Hongen Zhou

(MS student)

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### Prerequisites

Thermodynamics

Fluid Mechanics

Heat and Mass Transfer

### Course Communication

For general questions regarding class content, assignments, absences, or accommodations, please visit during office hours or after class. For time-sensitive questions or concerns, you may reach me by email; however, meeting in person is preferred, especially to sort through questions on HW or in-class problems. If needed, the University provides guidance on writing professional emails ([ter.ps/email](http://ter.ps/email)).

## Grading

Midterm Exam	30 %
Final Exam	30 %
Homework	30 %
In-Class Quizzes	10%
Participation	5%*

Final Grade Cutoffs							
+	97.00%	+	87.00%	+	77.00%	+	67.00%
A	94.00%	B	84.00%	C	74.00%	D	64.00%
F	<60.0%						
-	90.00%	-	80.00%	-	70.00%	-	60.00%

Undergraduate students will be asked to complete approximately 6 homework assignments, each worth 5 points each. Graduate students will be asked to complete the undergraduate assignments and additional, graduate-level problems (one per assignment), each worth 2 points. Graduate students will also be asked to make a presentation on a fire dynamics topic not covered in the lectures. This presentation will be graded with equal weight as an additional homework assignment.

Late work will not be accepted for course credit so please plan to have it submitted by the scheduled deadline. I am happy to discuss any of your grades with you; if I have made a mistake, I will correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

All scores from graded items will be posted on the course ELMS page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please visit me during office hours.

## Activities, Learning Assessments, & Expectations for Students

### Course Format

A series of related lectures will be followed by a homework assignment. One week after the homework is assigned, it will be reviewed during an in-class problem solving session. All homework assignments will be due at the beginning of this session. Assignments should be completed individually and submitted (neatly written) on paper. We will solve each of the HW problems together in class, after you submit them; thus, late homework will not be accepted. I will do my best to assign problem sets on Thursdays so that you have 5 days (including the weekend) to work on them before office hours on Tuesdays//the final due date on the following Thursday. Students may work together to understand assigned problems and course material, but they are expected to complete their assignments independently.

The midterm and the final exams will be conducted in an open-book fashion. No electronic communication devices will be allowed. The exams will consist of conceptual questions and engineering problems similar to those given as homework. Each exam will typically include a series of three to four long answer problems, including calculations. The final exam will be cumulative but will primarily focus on the material taught between the midterm and the end of the semester. For each of the two exams (midterm and final), Graduate students will be given 1 additional problem.

## Student Conduct and Course Related Policies:

Regular attendance, active participation in lectures and problem solving sessions, and careful completion of homework assignments is expected and essential for the successful completion of this class as the presented material covers a wide range of topics, which are not available in any single textbook. Students are expected to make responsible and respectful decisions regarding cellphone and laptop use in class. Generally, the use of computers and phones will not be permitted during class (except when required for ADS accommodations). If you have critical communication to attend to, please excuse yourself and return when you are ready. For further information on the course policies, please visit:

<http://www.ugst.umd.edu/courserelatedpolicies.html>

The UMD Code of Academic Integrity defines standards prohibiting the following forms of academic dishonesty: cheating, fabrication, facilitating academic dishonesty, plagiarism, and self-plagiarism. Violations of this code will be taken seriously. For more information on these policies, you may review the Code of Academic Integrity here:

<https://www.president.umd.edu/sites/president.umd.edu/files/files/documents/policies/III-100A.pdf>

## Course Schedule (Tentative)

Date	Subject	
August 27	Course Overview	
September	Thermochemistry, Conservation Equations, Combustion Chemistry, Adiabatic Flame Temperatures	(HW 1 due Sept. 12; HW 2 due Sept. 19/26)
October	Premixed Flames, Non-premixed Flames	(HW 3, 4 due Oct 10, 31*)
	<b>Midterm Exam</b>	(Oct. 24)
November	Ignition of Liquids and Solids, Flame Spread	(HW 5 due Nov 14 or 21)
December	Burning Rate	(HW 6 due Dec 5)
December 11	<b>Final Exam, Wednesday, December 11; 8:00 – 10:00 AM</b>	

**Note:** This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

## Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit [www.ugst.umd.edu/courserelatedpolicies.html](http://www.ugst.umd.edu/courserelatedpolicies.html) for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

## Get Some Help!

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit [tutoring.umd.edu](http://tutoring.umd.edu) to learn more about the wide range of campus resources available to you. Your TA and I both have office hours – we are here to help, please stop by if you have any questions or concerns.

You should also know there are a wide range of resources to support you with whatever you might need (see [go.umd.edu/assistance](http://go.umd.edu/assistance)), and if you just need someone to talk to, visit [counseling.umd.edu](http://counseling.umd.edu) or [one of the many other resources on campus](#).



Most services free because you have already paid for it, and **everyone needs help...** all you have to do is ask for it.

## Names/Pronouns and Self Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit [trans.umd.edu](http://trans.umd.edu) to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

## Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live and believe this may affect your performance in this course, please visit [go.umd.edu/basic-needs](http://go.umd.edu/basic-needs) for information about resources the campus offers you and let me know if I can help in any way.