Course Syllabus

(NOTE: This is a preliminary draft of the course syllabus. The final version will be provided at the end of the first week of classes)

1. Course Information

AE/ME 6766	**Combustion** (~ 3hrs/week)		**Spring Term 2024**
Mondays	:	**03:30-04:45 PM YELLOW ROOM (to be confirmed)**	
Wednesdays	:	**03:30-04:45 PM YELLOW ROOM (to be confirmed)**	

2. Instructor & Grader Information

Instructor & Grader:	Dr. Louis SATYANARAYAN Ph.D.
Email :	Louis.Satyanarayan@georgiatech-metz.fr
Office Room Number:	226
Office Hours (by appointment):	Tuesdays: 11:00AM – 12:00PM
	Thursdays: 11:00 AM – 12:00 PM

I am always available for short questions or concerns just after class.

If required you may also send an email to make an appointment or come directly to my office in the slots given above.

3. a. General Information

- ***Crosslisted with AE / ME 6766.***
- BRING A CALCULATOR TO THE CLASS REGULARLY
- Classes will be a good mix of lectures, problem solving sessions, real-life examples and interesting discussions on the subject.
- The lectures will try to balance theoretical concepts and practical examples so that the students can appreciate both aspects.
- Many example problems will be presented during the lectures that show how to use effective problem-solving strategies in the analysis of combustion
- Two case-studies will be included to help the students appreciate the problems faced by the industry and how a solution was arrived at.
- Repetition and practice are the best methods for developing the problem-solving skills that are a primary outcome of this course.

b. Course Goals/Outline

A student taking this course is intended to understand the following subjects:

1. Modeling of chemical reaction rates and reaction mechanisms.
2. Simplified models for chemical reactors with combined chemical and thermal analysis.
3. Development of the conservation equations for reacting, multispecies flows (including reaction rates and molecular transport).
4. Propagation of laminar premixed combustion waves (detonations and deflagrations).
5. Physical and chemical effects on laminar, premixed flames (e.g., flame speed and thickness).
6. Structure of laminar diffusion flames and burning droplets.
7. Time and spatial scales in turbulent flames.
8. Structure and governing processes in turbulent flames.

4. Pre &/or CoRequisites

Pre-requisites:

- Consult GTA academic office

5. Textbook:

1. Stephen Turns, An Introduction to Combustion: Concepts and Applications, 3rd edition

Additional Texts:

2. Irvin Glassman et al., Combustion, 3rd-5theditions

6. Syllabus/Topics covered/Scheme

Course Overview

No.	Chapter / Title	Description
1	Chapter 1	Introduction to Combustion + Overview
2	Chapter 2	Chemical Kinetics
		HW1
3	Chapter 3	Coupled Chemical and Thermal Analysis
		Quiz 1
4	Chapter 4	Conservation (Transport) Equations, Multi-Component, Reacting Fluids
5	Chapter 5	Premixed Combustion: 1-d Combustion Waves
		HW 2
6	Chapter 6	Planar Detonations
		Quiz 2
7	Chapter 7	Laminar Premixed Flames (Deflagrations)
8	Chapter 8	Ignition
		HW3
9	Chapter 9	Laminar Nonpremixed Combustion
		Quiz 3
10	Chapter 10	Introduction to Turbulent Combustion
11	Chapter 11(optional)	Experimental Combustion & analysis
		Final Exam

7. GT Academic Honor Code

As usual the GT Academic Honor Code is followed for this class. Please check this link for clear information : http://www.honor.gatech.edu/plugins/content/index.php?id=9

8. Canvas

Your instructor uses CANVAS to send you messages and your results of homeworks and quizzes. You are supposed the check your ME6766 messages and announcements every day to make sure you don't miss anything. It is not guaranteed that the system will email you messages after being posted.

9. GRADING

WEIGHT:

- Quiz 1 : 20% (closed book, closed notes, will include Chapters 1-3, more info below)
- Quiz 2 : 20% (closed book, closed notes, will include Chapters 4-6, more info below)
- Quiz 3 : 20% (closed book, closed notes, will include Chapters 7-9, more info below)
- Final Exam: 25% (closed book, closed notes, All chapters from 1-11, more info below)
- Homework: 15% (each hw has the same weight, although some may take more time to solve than others)

You are however allowed to bring a calculator, a unit conversion sheet and also a formula sheet maximum 2 sides of one A4-size sheet of paper, normal size letter type

For each item or assignment, you will receive a numerical grade on canvas. These numbers must be interpreted as :

90%-100% : A
80%-89.99%: B
70%-79.99%: C
60%-69.99%: D
below 60% : F

Should canvas make any calculation for you, ignore it, because it does not count the above-mentioned weights for each task.

10. Course Expectations & Guidelines

a. BEHAVIOR IN CLASS :

Class participation (being present, paying attention, asking questions if needed, ...) is perfect. What is not OK is "noise". Noise means that you disturb your teacher and also your colleague students who equally paid their

tuition fees and have the right to follow my class. For urgent matters, you are excused to leave class briefly and then to return (bathroom, water fountain, something urgent, ...) – do it quietly please.

b. Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit

http://www.catalog.gatech.edu/policies/honor-code/ or

http://www.catalog.gatech.edu/rules/18/.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

c. Attendance and/or Participation

Attendance and participation in class is required. If you miss class for any reason, it is your responsibility to obtain the notes for that day from a fellow student. This includes any announcements, concerns, helpful hints, etc. given by the instructor to the class.

d. Collaboration & Group Work

- Discussions between students on homework problems outside of class is not encouraged.
- However, quizzes and exams must be written and submitted by each student independently.
- Copying and/or cutting and pasting someone else's work and submitting it as your own is not permitted. This will result in reduction of your marks.

e. Extensions, Late Assignments, & Re-Scheduled/Missed Exams

- No credit will be given for the late submission of any course work.
- It is your responsibility to ensure that your work is submitted to Canvas by the appropriate time.
- Any work missed because of Institute-approved activities (e.g., field trips and athletic events) can be made up.

11. Acknowledgements (for making the core of this syllabus):

Sections 3.b-6 prepared by: Dr. Jerry M. Seitzman with changes incorporated by Louis Satyanarayan

Sections 1-3.a prepared by: Dr. Marc K. Smith with changes incorporated by Louis Satyanarayan

Sections 7-11 prepared by: Dr. N. Declercq with changes incorporated by Louis Satyanarayan