

ChE-721: COMBUSTION REACTION ENGINEERING
Fall 2009

Instructor: Professor Ed Dreizin (dreizin@njit.edu);

Textbook: *An Introduction to Combustion. Concepts and Applications* by Stephen R. Turns Second Edition, McGraw Hill, 2000
ISBN13: 9780072350449
ISBN10: 007235044X

Additional Literature:

Combustion by I. Glassman, R. Yetter, Fourth Edition, Acad. Press, 2008; ISBN 978-0-12-088573-2

Combustion Physics by Chung K. Law, Cambridge University Press, NY, NY, 2006
ISBN-10: 0521870526; ISBN-13: 978-0521870528

Principles of Combustion by K.K. Kuo, Second Edition, John Wiley and Sons, 2005
ISBN-10: 0471046892; ISBN-13: 978-0471046899

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Credits:

Mini-Project (flame equilibrium computation):	10 %
Research Paper Review:	25%
Midterm Quiz:	30%
Final:	35%

Research Paper Review: Select a research paper from *Combustion and Flame* or *Combustion Science and Technology* published between 2006 and 2009 and prepare a 1 - 2 page written review with brief statement of the reported accomplishments and constructive criticism of the conducted experiment or developed model. Present a copy of the reviewed paper along with your review. A 10-min Power Point presentation should also be prepared and given in class if time permits.

WEEK	TOPICS, links for Home Work/Notes	PAGES	CHAPTER
1	Introduction, terminology, fuels	1 - 8, 18 - 35	1,2
2	Combustion thermodynamics, equilibrium computations, mini-project on equilibrium computation using computers,	9 - 15, 36 - 45	2
3	Chemical kinetics - Introduction	111 - 124	4
4	Chemical kinetics, multi-step, chain reactions, time scales	125 - 147	4
5	Important chemical combustion mechanisms	148 - 177	5
6	Premixed flame phenomena	253 - 282	8
7	Flame measurements, Quenching/Ignition criteria. Mini-project due	283 - 304	8
8	Midterm Quiz		
9	Quiz discussion, mini-project discussion; Deadline for paper selection		
10	Laminar diffusion flames	305 - 361	9
11	Droplet combustion	362 - 410	10
12	Solid fuel combustion/metal combustion	519 - 546	14
13	Combustion application discussion, pollution control (paper review due)	550 - 594	15
14	Discussion of combustion research paper reviews, Consultation		
15	Final		

Bring in:

- Calculators
- Notes
- Clean paper
- Book helps

Attendance counts

Additional consultation time will be available and oral presentations of the prepared paper reviews will be requested

HW: will be assigned, will not be graded. Solutions will be discussed in class

- Collaborative efforts for the homework are encouraged
- Discussions of the homework questions, class examples, and other course related topics are encouraged via Moodle and other means.
- I am always open to your questions: via e-mail or personally.
- Mini-project, paper review and exam assignments must be performed individually.
- All examinations will be **open book open notes**.
- **Academic integrity and honesty** are of paramount importance.
 - The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students