Course Syllabus *(draft, final version will be announced at the first class)*

Course Information

Course Prefix, Number, Section	MECH 6375
Course Title	Boiling Heat Transfer and Two Phase Flow
Term	Fall 2016
Days & Times	Tuesday & Thursday; 11:30am-12:45pm; ECSS 2.311

Professor Contact Information

Professor	Xianming Dai
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Email Address	Dai@utdallas.edu
Office Location	ECSN 2. 928
Office Hours	Tuesday & Thursday; 2:30pm-3:30pm or by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Prerequisites: MECH 3315 Fluid Mechanics; MECH 3320 Heat Transfer

Course Description

Introduction to the physics and significant progresses in boiling heat transfer followed two-phase flow. Boiling heat transfer includes incipience phenomena, nucleate and film boiling regimes, and critical heat flux in pool and flow boiling. The most recent progress on boiling heat transfer will be introduced. Selected engineering application topics related to phase change thermal transport will also be covered.

Student Learning Objectives/Outcomes

At the conclusion of this course, students will:
1. Be knowledgeable about boiling heat transfer and two phase flow;
2. Understand the fundamentals of interfaces and boiling;
3. Understand the principles to enhance boiling heat transfer;
4. Be capable of providing reasonable thermal management solutions using boiling heat transfer;
5. Have a general idea about existing and potential applications of boiling heat transfer.

Suggested Course Materials

Suggested Readings/Texts

1. Van P. Carey, Liquid Vapor Phase Change Phenomena (2nd Edition), 2007.
2. Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incropera, David P. DeWitt, Fundamentals of Heat and Mass Transfer (7th Edition), 2011.

Suggested Materials

3. Satish Kandlikar, Handbook of Phase Change: Boiling and Condensation, 2007.
4. John R. Thome, Encyclopedia of Two-Phase Heat Transfer and Flow I: Fundamentals and Methods (Kindle Edition), 2015.
5. John R Thome, Jungho Kim, Encyclopedia of Two-Phase Heat Transfer and Flow II: Special Topics and Applications, 2015.

Assignments & Academic Calendar

Topics, Reading Assignments, Due Dates, Exam Dates

Homework is due one week after the assignment.
Quiz will be open book and in class.
Mid-Term Exam: October 18
Final Exam: December 13

Grading Policy

Homework: 20%
Quiz: 20%
Mid-Term Project and Presentation: 25%
Final Project and Presentation: 35%
Additional Project: Extra 10%

Course Policies

Make-up exams
Makeup exams will be allowed only with pre-approval of the instructor or with an acceptable and documented reason.

Extra Credit
Extra 10% credits will be given when a student chooses to do an additional project.

Late Work
Homework will be due at the beginning of class one week after the assignment. Points are taken off as follows: Up to 24 hours from the due date = -25%; 24 to 48 hours late = -50%. More than 48 hours late assignments will not be accepted.

Class Attendance
Pease ask for a leave with an acceptable reason when needed.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.

Tentative Schedule

Date	Sections	Topics
8/23	1	Introduction; Why boiling?
8/25	2.1	Surface Tension
8/30	2.2	Contact Angle and Wetting
9/1	2.3	Wetting on Roughness
9/6	2.4	Wetting and Heat Transfer
9/8	2.5	Transport Effects and Dynamic Behavior at Interfaces
9/13		**Quiz 1**
9/15	3.1	Heterogeneous Nucleation and Interfaces
9/20	3.2	Onset of Boiling and Bubbles
9/22	3.3	Bubble Dynamics
9/27	3.4	Regimes of Pool Boiling
9/29	3.5	**Quiz 2**
10/4	3.6	Nucleate Boiling and Film Boiling
10/6	3.7	Models for Correlations of Nucleate Boiling
10/11	3.8	Critical Heat Flux of Pool Boiling
10/13	3.9	Enhancement of Pool Boiling
10/18		**Mid-Term: Project and Presentation**
10/20		Invited talk on Boiling Heat Transfer
10/25	4.1	Regimes of Two Phase Flow
10/27	4.2	Models for Two Phase Flow
11/1		Annular Flow
11/3	4.3	**Quiz 3**
11/8	4.4	Internal Flow Boiling
11/10	4.5	Flow Instability
11/15	4.6	Critical Heat Flux of Flow Boiling
11/17	4.7	Enhancement of Flow Boiling
11/22	5	Introduction to Condensation Heat Transfer
11/24		**Thanksgiving Day**
11/29	6.1	Application: Heat Pipe
12/1	6.2	Application: Thermal Management of Electronics
12/6	6.3	Application: Thermal Energy Systems
12/8		**Quiz 4**
12/13		**Final: Project and Presentation**
12/15		Additional Project Deadline
12/20		
12/22		**Grading Online Deadline**