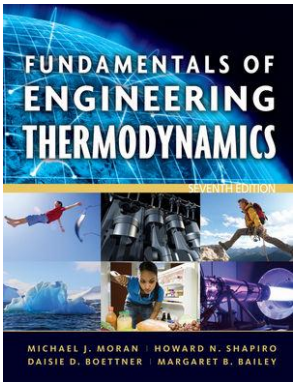
ENGR 320-02 – Engineering Thermodynamics and Heat Transfer
Spring 2012
Course Information

Course Instructor and Contact Information

Instructor:	Dr. Tao Xing
Office:	EP 324F
Office Hours:	2:30 – 4:00 M W F
Email contact:	xing@uidaho.edu

Course Textbook



Moran, M.J., Shapiro, H.N., Boettner, D.D., Bailey, M.B., Fundamentals of Engineering Thermodynamics, 7th edition, John Wiley & Sons, New York, 2011.

Course Description from UI Catalog 2011

> Engr **ID&WS320 Engineering Thermodynamics and Heat Transfer** (3 cr). WSU M E 301. First and second laws of thermodynamics; thermodynamic processes; thermodynamic properties; flow processes; conversion of heat into work; conduction, convection, radiation, and heat exchangers. Recommended Preparation: Engr 210 and Math 310.

Course Web Site

All course-related material is available on the course BlackBoard website. Check it frequently. Download any items of interest that you find there! The Blackboard material is presented in Learning Modules. Each Learning Module corresponds to a class lecture. All material discussed in class can be found in the learning module including reading and homework assignments.

Reading Assignments

Reading assignments are assigned in the Learning Modules. The reading assignments should be read *before* the next class period.

Homework Assignments

Daily homework assignments are assigned in the Learning Modules. Unless otherwise stated, the homework is due at the *beginning* of the next class period. *Homework handed in after the lecture begins is late and will not be accepted*. Selected homework solutions will be posted on the course website after the class period is over. An example of the required homework format can be found on the course website.

Proliferation of solution manuals for textbooks is rampant in the electronic world we live in. Copying the solution of an assigned problem from a solution manual is plagiarism. In addition, copying

the solution of an assigned problem from one of your colleagues (either a fellow student or someone who has already taken the course) is plagiarism. Plagiarism does not help you learn the material and is a serious breach of the UI Student Code of Conduct (see below). The assigned homework problems are carefully chosen to reinforce material you have read in your textbook and discussed in the lecture period. Solution of homework problems is where the majority of the learning process takes place. Do not cheat yourself out of learning by plagiarizing homework solutions.

Does this prohibit you from working in study groups? Absolutely not! On the contrary, working in study groups benefits all members of the group. Study groups are encouraged to discuss homework problems in detail. However the group work ends when it comes time to actually write out your solution to the problem. Just like fingerprints, homework solutions are unique.

Plagiarized homework will receive a grade of zero. Further disciplinary action may be pursued consistent with the University of Idaho Student Code of Conduct (see below).

Software

The focus of ENGR 320 is the study of energy and its transformations. In many systems, energy transformation is accomplished using a working fluid, such as water or air. The properties of the working fluid are important in the design and analysis of systems. The appendices in your textbook contain many thermophysical properties of fluids. The National Institute of Standards and Technology (NIST) has a state of the art software program known as REFPROP that computes the properties of many different fluids. NIST has developed a student version of REFPROP that can be downloaded and installed on your computer. REFPROP will be formally introduced in Lecture 11.

Exams

There will be four in-class exams. They are scheduled for the following dates,

- Exam 1: Friday, February 3, 2012
- Exam 2: Wednesday, February 29, 2012
- Exam 3: Friday, March 30, 2012
- Exam 4: Monday, April 23, 2012

Exams will not be rescheduled. Exams will not be administered early. There is no opportunity to take a make-up exam.

Final Exam

The Final Exam for the course is scheduled for Thursday, May 10, 2012, from 12:30 pm to 2:30 pm. The Final Exam will be a comprehensive exam.

Course Grading

Your overall course percentage will be based on the following distribution,

Item	% of Total
Exams	(15% each)(4) = 60%
Homework	15%
Final Exam	25%
TOTAL	**100%**

The 90-80-70-60 scale will be used as a *guideline* to determine A, B, C, D, F. However, as course instructor, I reserve the right to adjust this scale, based on the class performance as a whole. You can access your current course grade at any time on the BlackBoard website.

Academic Honesty

Article II, Section 1 of the University of Idaho Student Code of Conduct says,

> *Cheating on classroom or outside assignments, examinations, or tests is a violation of this code. Plagiarism, falsification of academic records, and the acquisition or use of test materials without faculty authorization are considered forms of academic dishonesty and, as such, are violations of this code. Because academic honesty and integrity are core values at a university, the faculty finds that even one incident of academic dishonesty seriously and critically endangers the essential operation of the university and may merit expulsion.*

Violation of this code will not be tolerated in this course and will be reported immediately to the Office of the Dean of Students for review.

Professionalism

You are training yourself, through formal education, for a career in engineering or a related field. Professional integrity is expected in the workplace, and it is also expected in the classroom. This includes, but is not limited to,

- On-time class attendance. In your professional career, you will no-doubt be involved in many things requiring your on-time attendance (meetings, conferences, etc.). Entering a meeting, presentation, or a class lecture late is a distraction for everyone. It can completely derail the proceedings. Distractions like this often cause those who are trying to focus to lose their concentration.
- Attention during class. It is my sincere hope that you never will have to deal with people talking, whispering, laughing, eating, internet-surfing, or doing other distracting things while you are giving a presentation. For the presenter, this is not a pleasant experience. It causes one to lose his/her train of thought very quickly. Causing a presenter to stumble because of distractions degrades the quality of the presentation. Activity that distracts the presenter also distracts those in the room who *want* to hear the material.

  Respecting the individual presenting the information and respecting your peers that surround you in the room by refraining from distracting activity is truly professional in every sense of the word.
- Cell phones. This falls under the previous category, but it warrants a separate bullet. Hearing a cell phone ring during a presentation is a huge distraction for everyone. Sending and receiving text messages or surfing the internet is distracting you from the material being presented. I respectfully request that you **turn your cell phone off** during the class period.
- Courtesy and respect. These represent the pinnacle of professional integrity. Exhibiting courtesy and respect to others is absolutely essential for effective communication.

Syllabus (next page)

Lec	Date	Day	Topic	Reading
	9-Jan	M		
1	11-Jan	W	Introduction	
2	13-Jan	F	Concepts and Definitions	1.1 - 1.4
	16-Jan	M	Martin Luther King Day - UI Closed	
3	18-Jan	W	Pressure, Temperature, Specific Volume	1.5 - 1.9
4	20-Jan	F	Work and Power	2.1 - 2.3
5	23-Jan	M	Heat and Heat Transfer Modes	2.4
6	25-Jan	W	The First Law for Closed Systems	2.5 - 2.6
7	27-Jan	F	Properties of Substances	3.1 - 3.5
8	30-Jan	M	The First Law for Closed Systems using Properties	3.6, 3.8
9	1-Feb	W	The First Law for Closed Systems using Properties	3.8
10	3-Feb	F	**EXAM 1**	
11	6-Feb	M	Retrieving Properties from Software - REFPROP	3.7
12	8-Feb	W	Other Thermodynamic Properties	3.9 - 3.11
13	10-Feb	F	The Ideal Gas Model	3.12 - 3.15
14	13-Feb	M	Ideal Gas Examples	3.12 - 3.15
15	15-Feb	W	Conservation of Mass	4.1 - 4.3
16	17-Feb	F	The First Law for Control Volumes	4.4 - 4.5
	20-Feb	M	PRESIDENTS' DAY - UI CLOSED	
17	22-Feb	W	Steady State Analysis of Mechanical Devices	4.6 - 4.11
18	24-Feb	F	Steady State Analysis of Mechanical Devices	4.6 - 4.11
19	27-Feb	M	Transient Analysis	4.12
20	29-Feb	W	**EXAM 2**	
21	2-Mar	F	The Second Law of Thermodynamics	5.1 - 5.4
22	5-Mar	M	Application of the Second Law to Cycles	5.5 - 5.10
23	7-Mar	W	Entropy	5.11 - 6.2
24	9-Mar	F	Evaluating the Entropy Change of a Process	6.3 - 6.6
	12-Mar	M	Spring recess	
	14-Mar	W	Spring recess	
	16-Mar	F	Spring recess	
25	19-Mar	M	The Second Law for Closed Systems	6.7 - 6.8
26	21-Mar	W	The Second Law for Closed Systems	6.7 - 6.8
27	23-Mar	F	The Second Law for Control Volumes	6.9 - 6.10
28	26-Mar	M	Isentropic Processes	6.11
29	28-Mar	W	Isentropic Efficiency of Mechanical Devices	6.12 - 6.13
30	30-Mar	F	**EXAM 3**	
31	2-Apr	M	Vapor Power Cycles - The Rankine Cycle	8.1 - 8.2
32	4-Apr	W	Rankine Cycle Improvements - Superheat and Reheat	8.3
33	6-Apr	F	Vapor Power Cycle - Examples	8.1 - 8.3
34	9-Apr	M	Gas Power Generation - The Brayton Cycle	9.5 - 9.6
35	11-Apr	W	Brayton Cycle Improvements - Reheat and Regeneration	9.7 - 9.8
36	13-Apr	F	Gas Turbine Application - Jet Propulsion	9.9
37	16-Apr	M	Spark Ignition Engine Model - The Otto Cycle	9.1 - 9.2
38	18-Apr	W	Compression Ignition Engine Model - The Diesel Cycle	9.3
39	20-Apr	F	Power Generation Review	Ch 8, 9
40	23-Apr	M	**EXAM 4**	
41	25-Apr	W	Vapor Compression Refrigeration	10.1 - 10.3
42	27-Apr	F	Cascade and Multi-stage Refrigeration Systems	10.4
43	30-Apr	M	Cascade and Multi-stage Refrigeration Systems	10.4
44	2-May	W	Heat Pump Systems	10.6
45	4-May	F	Review for the Final Exam	
46	10-May	TH	**FINAL EXAM (12:30 - 2:30 pm)**	