AME 30334: Heat (and Mass) Transfer
Spring Semester 2014

Lecture
DeBartolo 102
MWF 8:20-9:10 am

Recitations
DeBartolo 136
32334-01, Th 3:30-4:45 pm
32334-02, Th 5:00-6:15 pm

Instructor: Frank P. Incropera (fpi@nd.edu)

Assistants:
Jesse Coffman (jcoffman@nd.edu)
John Dantonio (jdantoni@nd.edu)
Adam Hickmam (ahickma1@nd.edu)
Chris Jasinski (cjasinsk@nd.edu)

Office Hours:
Incropera (Fitzpatrick 361), MWF 10:00 am-12:00 pm,
Assistants (Fitzpatrick 364)
W 3:30-5:30 pm
Th 10:00 am-12:00 pm; 7:00-9:00 pm

Course Description

Heat transfer refers to the transfer of thermal energy, and it is an extension of thermodynamics. Heat transfer processes are ubiquitous to many engineering applications, as well as to conditions in the natural environment. They are central to all manner of energy conversion and utilization systems, as well as to a wide range of commercial products and technologies such as those associated with the aerospace, biomedical and electronic industries. The same can be said of mass transfer, which refers to the relative transfer of chemical species in a mixture.

Learning Objectives

Students completing this course are expected to:

- internalize the terminology and physical principles associated with heat transfer;
- be able to identify pertinent transport phenomena for any process or system involving heat transfer;
- be able to use requisite inputs for computing heat transfer rates and/or material temperatures;

- be able to develop appropriate models of real processes and systems and to draw conclusions concerning process/system design or performance from the attendant analysis; and
- be able to account for the effects of species transfer under conditions for which heat and mass transfer are analogous.

Textbook: *Fundamentals of Heat and Mass Transfer*, 7th Edition, by T.L. Bergman, A.S Lavine, F.P. Incropera and S. P. Dewitt. John Wiley and Sons, 2011.

Student Companion Site: The publisher has provided a Web site that includes answers to selected homework problems, supplemental materials and software entitled *Interactive Heat Transfer*. The site can be accessed at:
http://bcs.wiley.com/he-bcs/Books?action=index&itemID=0470501979&bcsId=6563

Interactive Heat Transfer (IHT): IHT is a general purpose equation solver with an accompanying library of commonly used heat transfer equations and thermophysical property functions. Version 4.0 can be down-loaded from the foregoing Web address to your lap top. The software provides a workspace into which a heat transfer model can be keyed, with relevant equations and properties drawn from the library, and solves the model to obtain the dependent variables of interest. Parameter sensitivity studies are readily performed, and results can be plotted to assess the effect of changes in the independent variables. The model and results can be saved and copied to a Word document, which can be submitted with your solution to a homework problem.

The software includes a *Quickstart Guide* that provides an overview of IHT essentials and can be mastered in little more than an hour. This modest investment of time will reap benefits in many hours saved by using the software to solve homework problems, particularly those involving complex models with extensive calculations. But, some words of caution: (i) Carefully develop your model on paper before keying it into the workspace. Time savings afforded by IHT are meaningless unless the model correctly represents conditions of the problem. (ii) Perform a simple hand calculation to confirm absence of a programming error and hence accuracy of the IHT results. A list of IHT operators and functions is appended to this document.

Your confidence in using the software will build quickly. To assist in the process, IHT includes an *Examples* menu which provides programmed models for fifteen of the examples appearing in the textbook. In the book, the examples are flagged by inclusion of the IHT icon, and in each case you are encouraged to examine the IHT version.

Users have the option of running a *Basic* or *Advanced* version of IHT by clicking on a toggle button. The Advanced version provides additional models for standard heat transfer problems.

Student Evaluation: Grades will be based on the following point distribution:
- homework problems and quizzes (20),
- three, hour-long examinations (50), and
- final examination (30).

Academic Code of Honor: ***As a member of the Notre Dame community, I will not participate in academic dishonesty.***

- Although collaborative study has educational value and is encouraged, all submitted homework must be that of the student.
    - A student may not copy another student's homework solution and may not draw on accessible solution manuals.
- A student may not give or receive unauthorized aid on a quiz or exam.
- If you become aware of an Honor Code violation, you must notify either the instructor or the Honesty Committee of the department within which the course is taught.

The Code of Honor will be strictly applied as described in *The Academic Code of Honor* (http://nd.edu/~hnrcode/docs/handbook.htm)