ENCH630: TRANSPORT PHENOMENA, Spring 2004

Instructor:

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Teaching Assistant:

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Course Description:

Momentum, heat and mass transfer theory is taught at both the continuum and microscopic levels utilizing integral and differential conservation equations; similarities between the three types of transport; dimensionless analysis and time scales; Finite Fourier Transform and similarity methodologies; and numerical analysis. The course includes steady- and unsteady-state creeping and laminar flows; viscous and inviscid flows; transport at interfaces; lubrication theory; boundary layer theory; forced and natural convection; with specific application to complex and biological chemical engineering processes.

The course is divided into 3 parts: (a) similarities between the three types of transport and relevant mathematical methodologies (Appendix, Chapters 1-5), (b) fluid mechanics (Chapters 5-8), and (c) heat and mass transfer (Chapters 9-12). Additional material includes lectures on mesoscale fluid dynamics.

Required Text:

Analysis of Transport Phenomena, by William M. Deen, Oxford University Press (1998).

On reserve in the Engineering Library. Note that the library has also an array of books with similar title; all of them may be used for further study.

Grading Policy:

Homework and Class Participation	15 %
Project	15 %
Mid-term exam	30 %
Final exam	40 %

Examinations:

All exams are “closed-books”/“closed-notes”.
The “mid-term” exam will be one class period in length.
Date for “mid-term” exam (subject to change): Wednesday March 17, 2004.
Final Exam: the date is set by the University (Saturday May 15, 2004, at 1:30pm).

Homework Assignments:

Homework problems will be assigned on a regular basis.
The homework must be submitted at the beginning of the class the date it is due.
The problems and the solutions will be posted on the course web page.

Project:

The goal of the project is to familiarize the students with the current scientific and engineering utilization of transport phenomena. Teams of two students will choose (in agreement with the course instructor) a research topic involving application of transport phenomena to nanotechnology, bioengineering, biomedicine, polymer science, etc. Based on recent publications, the students shall write a proposal (up to 12 double-space pages excluding references) describing the proposed research. The proposal should include abstract, introduction, review of relevant publications, proposed research, conclusions and references. The paper is due two weeks before the end of the semester, i.e. on Wednesday April 28, 2004. The teams will also present their proposed project in class at the same day.

Academic Honesty:

Plagiarism and academic dishonesty will not be tolerated, and suspected incidence will be referred to the Student Honor Council of the Judiciary Programs. For more information see:
http://www.testudo.umd.edu/soc/dishonesty.html & http://www.studenthonorcouncil.umd.edu