MEC 501 Convective Heat Transfer and Heat Exchange  
Spring 2011

Instructor: David J. Hwang (david.hwang@stonybrook.edu)

Class hours: Tuesday 3:50-6:40PM (Soc. & Beh. Sci Bldg N107)

Office Hours: Wednesday 3pm-5pm (tentative; TBA in class, 222 Heavy Engineering)

Catalog Description:
Differential and integral formulation. Exact and approximate solutions. Topics include parallel and boundary layer flows, similarity solutions, external and internal flows, laminar and turbulent convection, and forced and free convection.

Prerequisites: MEC 305 (Undergraduate Level Heat and Mass Transfer) or equivalent

Text Book: Convective Heat Transfer by Bejan, 3rd Ed., Wiley

References:
Heat and Mass Transfer by Mills, CRC Press
Fundamentals of Heat and Mass Transfer by Incropera, DeWitt, Bergman, and Lavine, Wiley
Heat transfer: A practical Approach by Cengel, McGraw Hill
Convective Heat and Mass Transfer by Kays, Crawford, and Weiqand, McGraw Hill

Grading:  
Homework (weekly or bi-weekly) - 20%
Midterm (early April) - 40%
Final Exam - 40%

Course Outline:
1. Introduction (concepts of convective heat transfer)
2. Formulation of basic conservation equations
3. Scaling analysis and similarity variables, and exact/approximate solutions
4. Convective heat transfer in laminar external boundary layer flow
5. Convective heat transfer in laminar internal boundary layer flow
6. Convective heat transfer in turbulent flow
7. Natural convection
8. Mass transfer
9. Special topics in convective heat transfer (TBA)

Course Objectives:
- Identify mechanism of convective heat transfer and its relative importance
- Formulate conservation (continuity, momentum and heat) relations
- Determine non-dimensional parameters by scaling analysis
- Apply similarity concepts to proceed for exact and approximate solutions
- Distinguish between external and internal boundary layer flows
- Distinguish between laminar and turbulent flows in terms of heat transfer
- Distinguish between natural and forced convections
- Distinguish between heat and mass transfer
Statement on Academic Dishonesty

Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work that is not originally yours. Examples include, but are not limited to, copying or plagiarizing class assignments including homework, reports, designs, computer programs, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted to the fullest via the CEAS CASA committee. For you, the honest student, academic dishonesty results in lower class curves, hence a depression in your GPA and class standing, while cheapening the degree you earn.

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