

UMBC UGC New Course Request: ENME 421 Advanced Conduction and Radiation Heat Transfer

Date Submitted: November 2, 2009

Proposed Effective Date: Fall 2010

	Name	Email	Phone	Dept
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COURSE INFORMATION:

Course Number(s)	ENME 421
Formal Title	Advanced Conduction and Radiation Heat Transfer
Transcript Title ($\leq 24c$)	Adv Cond/Rad Heat Trans
Recommended Course Preparation	
Prerequisite	ENME 321
Credits	3
Repeatable?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Max. Total Credits	3
If yes, how many total credits?	
Grading Method(s)	<input checked="" type="checkbox"/> Reg (A-F) <input type="checkbox"/> Audit <input type="checkbox"/> Pass-Fail

PROPOSED CATALOG DESCRIPTION:

Introduction to analytical and numerical methods to solve heat transfer problems involving heat conduction and radiation processes.

RATIONALE FOR NEW COURSE:

This undergraduate course is designed to advance the student's understanding of heat transfer and improve their problem solving and analytical skills.

ATTACH COURSE OUTLINE (mandatory):

ENME631/489Y – Advanced Conduction and Radiation Heat Transfer Fall 2009

Mechanical Engineering Department University of Maryland Baltimore County

Instructor: Dr. Ronghui MA
Phone: 410-455-1965
Email: roma@umbc.edu

Office: ECS 215
Office hours: 1:45-2:45 pm Wednesday or by appointment

Reference books: Heat Conduction, by S. Kakac and Y. Yener, 3rd Edition, CRC Press, Taylor & Francis, 1993.
Analytical Methods in Conduction Heat Transfer, by G.E. Myers, 2nd Edition, AMCHT Publications, 1998.
Radiative Heat Transfer, by M. Modest, 2nd Edition, Academic Press, 2006
Thermal Radiation Heat Transfer, by R. Siegel and J.R. Howell, 4th Edition, McGraw-Hill, 2002.
Fundamentals of Heat and Mass transfer, by Frank P. Incropera and David P. Dewitt, 4th Edition, John Wiley & Sons.

Purpose of course: To introduce analytical and numerical methods to solve heat transfer problem involving heat conduction and radiation processes.

Topics to be covered:

1. Introduction: Review of Fundamentals of Heat Transfer
2. Solution with Separation of variables method:
Transient 1D Heat Conduction Problems; Superposition; Steady State Heat Conduction Problems in Cartesian and Cylindrical Coordinate Systems; Heat Conduction Problem Involving Heat Sources or Sinks. Solution with Laplace Transform
Solution with the Similarity Method
Solution with the Integral Method
3. Numerical Method— Finite Differences
Discretizing the Spatial Problem; Steady-state Problems; Transient Problems.
4. Inversed Heat Transfer
5. Radiation ---- Basic Relations
Introduction, Intensity of Radiation, Blackbody Emission, Radiation Properties
Definitions of Properties for Non-black Surfaces, Radiation Properties of Real Materials
Radiation Exchange in an Enclosure
Radiation Exchange among Diffuse-gray (Including Blackbody) Surface; Radiation in Enclosures Having Some Specularly Reflecting Surfaces

**This is approximate and will have to be adjusted contingent on students' and instructors progress through these topics and externals such as the weather.*

Grading: Homework Assignments: 15%
Project: 15%
Exam I: 30%
Exam II 40%

Mechanical Engineering Repeat Policy: At UMBC, students may not register for a course more than two times. They are considered registered for a course if they are enrolled after the end of the schedule adjustment period. Students may petition the Office of Undergraduate Education for a third and final attempt of a course taken at UMBC or another institution, however the Department of Mechanical Engineering will not support petitions to repeat required lower-level courses for the purpose of continuing in the major.

Academic Integrity: By enrolling in this course, each student assumes full responsibility of as a participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty. Academic misconduct could result in disciplinary action that may include, but is not limited to a grade of zero on the particular work, a grade of F in the class, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory. <http://www.umbc.edu/provost/AcademicIntegrity/Honorcode.htm>

UMBC Make-up Examination Policy: **Make-up examinations:** Make-up examinations shall be provided without penalty when the student's absence is the result of illness, death in the immediate family, religious service, or participation in official university activities at the request of appropriate faculty or staff. In the case of illness or death in the immediate family, the student should provide documentation from a personal health care provider, Student Health Services or other official source. With respect to participation in scheduled, authorized University activities, the instructor's obligation to give a make-up examination is conditional on **prior notice of the absence on official departmental stationery by the appropriate faculty or administrator.** The student is responsible for seeing that the notice reaches the instructor in a timely fashion.