ENPH/PHYS 430 Mathematical Methods of Physics and Engineers

Department: Mathematics, Physics and Engineering
Credit Hours: 3

Current Catalog Description:
Mathematical Techniques from the following areas: infinite series; integral transforming; applications of complex variables; vectors, matrices and tensors; special functions; partial differential equations; Green's functions; perturbation theory; integral equations; calculus of variations; groups and group representatives. Credit for both ENPH 430 and PHYS 430 will not be awarded.

Course Schedule:
3 lecture hr/ wk, 0 lab hr/week

Course Web Page:

Prerequisites by Topic:
Math 306 – Differential Equations
Math 333 – Calculus III

Program Outcome and Course Learning Goals Map:
The Program Outcomes for Engineering Physics are:

A. an ability to apply knowledge of math, engineering & science
B. an ability to design and conduct experiments, as well as to analyze and interpret data
C. an ability to design system, component or process to meet needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
D. an ability to function on multi-disciplinary teams
E. an ability to identify, formulate, and solve engineering problems
F. an understanding of professional and ethical responsibility
G. an ability to communicate effectively
H. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
I. a recognition of need for, and ability to engage in life-long learning
J. a knowledge of contemporary issues
K. an ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
L. a depth and breadth of knowledge in engineering and physics necessary to work in a multidisciplinary environment

Course Learning Goals:
Each student that passes this course with a C or better should be able to demonstrate a mathematical ability to work problems involving:

1 Solutions to differential equations-- in both closed form and by using power-series;
2 convergence of infinite series and transformation of series; techniques for evaluation of integrals-- including use of symmetry arguments, contour integration, and tabulated integrals;
3 Integral transforms-- Fourier series, Fourier transforms, and Laplace transforms;
4 Vectors and matrices—Linear Vector Spaces, Linear Operators, Matrices, Coordinate Transformations, Eigenvalue problems, Diagonalization of Matrices;
5 Special Functions—Legendre, Bessel, Hypergeometric, Confluent Hypergeometric, Mathieu, and Elliptic;
6 Integral equations—Classification, Degenerate Kernels, Neumann and Fredholm Series, Schmidt Hilbert theory;

7 Calculus of Variations.

Some of these mathematical topics may be replaced with topics from partial differential equations, Greens Functions, or perturbation theory.

This course addresses the Engineering Physics **Program Outcomes A, G, and L**

Academic Honesty:

Cheating, plagiarism (submitting another person's materials or ideas as one's own), or doing work for another person who will receive academic credit are all-impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure of give help during an examination, the unauthorized copying of examinations, assignments, reports, or term papers, or the presentation of unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

Students with Disabilities Policy:

It is the policy of Tarleton State University to comply with the Americans with Disabilities Act (ADA) and other federal, state, and local laws relative to the provision of disability services. Students with disabilities attending Tarleton State University may contact the Office of Disability Services at (254) 968-9478 to request appropriate accommodation. Furthermore, formal accommodation requests cannot be made until the student has been officially admitted to Tarleton State University.

Contribution of Course to Meeting the Professional Requirement:

Math/Science Topics: 100%

Status of Continuous Improvement Review of this Course:

Prepared by: *Jim McCoy*
Date: *May 2, 2005*

Reviewed by: *Daniel K. Marble*
Date: *May 19, 2005*