**MATH 373 INTRODUCTION TO NUMERICAL ANALYSIS**

**Department:** Mathematics and Computer Science

**Designation:** Required

**Catalog Data:** (3-0) 3 credits. Prerequisite: MATH 321 and CSC 150 or permission of instructor. This course is an introduction to numerical methods. Topics include elementary discussion of errors, polynomial interpolation, quadrature, non-linear equations, and systems of linear equations. The algorithmic approach and efficient use of the computer will be emphasized. Additional topics may include: calculation of eigenvalues and eigenvectors, numerical differentiation and integration, numerical solution of differential equations.

**Prerequisites:** Math 321 and CSC 150**.**.

**Textbook:**

* Optional: *Numerical Methods for Engineers (5 ed.)*, by Chapra and Canale, McGraw-Hill, 2006
* Optional: *Excel for Scientists and Engineers (Numerical Methods)*, by E. Joseph Billo, Wiley, 2007.
* There is also a [wiki textbook on Numerical Methods](http://en.wikibooks.org/wiki/Numerical_Methods)
* We will also be using a [text](http://showard.sdsmt.edu/Math373/_AppliedNumMethodsText_SMH/TextDirectory.htm) by [Dr. Stan Howard](http://sdmines.sdsmt.edu/sdsmt/directory/personnel/showard)

**Course Learning Outcomes: ????**

**Topics:** Polynomial interpolation, quadrature, non-linear equations, systems of linear

equations, the algorithmic approach, calculation of eigenvalues and eigenvectors,

numerical differentiation and integration, and numerical solution of differential

equations

**Class/Laboratory Schedule:** Varies

**Contribution to Criterion 5:** basic math and sciences

**Relationship of Course to ABET Outcomes (a) through (k)**

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| --- | --- | --- | --- |
|  | **Level of Emphasis** | | |
|  | Low | Medium | High |
| **ABET Outcome** |  |  |  |
| (a) an ability to apply knowledge of mathematics, science, and engineering |  |  | X |
| (b) an ability to design and conduct experiments, as well as to analyze and interpret data |  |  |  |
| (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability |  |  |  |
| (d) an ability to function on multidisciplinary teams |  |  |  |
| (e) an ability to identify, formulate, and solve engineering problems |  |  |  |
| (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 the need for, and an ability to engage in life-long learning |  |  |  |
| (j) a knowledge of contemporary issues |  |  |  |
| (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. |  | X |  |

**Prepared By:** Dr. Kyle Riley, Department Head; June 1, 2010