

COURSE IMPLEMENTATION DATE:	May 1994
COURSE REVISED IMPLEMENTATION DATE:	September 2008
COURSE TO BE REVIEWED:	September 2008
(Four years after implementation date)	(MMMM YY format)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.

Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT:	Science, Health and Human Services/Mathematics and Statistics	
MATH 316		3
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
	Numerical Analysis	
COURSE DESCRIPTIVE TITLE		

CALENDAR DESCRIPTION:

This course covers the construction and application of numerical computing solutions to mathematical problems that include applications of linear algebra, differentiation and integration, non-linear equations, the approximation of functions, and ordinary differential equations.

PREREQUISITES: MATH 112 or MATH 221 and knowledge of a programming language acceptable to the department.

Note: As of September 2009 the prerequisites will change to the following: MATH 112, knowledge of a programming language acceptable to the department, and either MATH 221 or MATH 152.

COREQUISITES:

SYNONYMOUS COURSE(S)	SERVICE COURSE TO:
(a) Replaces: _____ <i>(Course #)</i>	_____
(b) Cannot take: _____ for further credit. <i>(Course #)</i>	_____
	<i>(Department/Program)</i>

TOTAL HOURS PER TERM: 60	TRAINING DAY-BASED INSTRUCTION
STRUCTURE OF HOURS:	LENGTH OF COURSE: _____
Lectures: 60 Hrs	HOURS PER DAY: _____
Seminar: Hrs	
Laboratory: Hrs	
Field Experience: Hrs	
Student Directed Learning: Hrs	
Other (Specify): Hrs	

MAXIMUM ENROLLMENT:	36
EXPECTED FREQUENCY OF COURSE OFFERINGS:	every second year
WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	<input type="checkbox"/> Yes <input type="checkbox"/> No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

AUTHORIZATION SIGNATURES:

Course Designer(s): _____ Math Department	Chairperson: _____ Peter Mulhern (<i>Curriculum Committee</i>)
Department Head: _____ Gillian Mimmack	Dean: _____ Jackie Snodgrass
PAC Approval in Principle Date: _____	PAC Final Approval Date: Feb. 1, 2008

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course introduces students to some basic numerical techniques for solving equations in one variable and for linear systems, numerical differentiation and integration, and approximating solutions of ordinary differential equations. Students also learn how error can be estimated and approximation can be improved. Students are also required to implement some of the algorithms and to use some existing software packages.

This course is designed to enable students to:

1. understand the inherent limitations of floating point representation and machine accuracy.
2. become acquainted with the mathematics behind some of the basic classical techniques for finding solutions to numerical problems.
3. become acquainted with some basic algorithms in approximation theory.

METHODS:

This course is primarily lecture-based. Evaluation includes quizzes, tests and a final exam.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check :) Yes No

METHODS OF OBTAINING PLAR:

Course challenge.

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

The textbook is chosen by a departmental curriculum committee. Recent text used:
Burden and Faires. *Numerical Analysis*. 5th edition. PWS.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

The weighting of the various components may vary from instructor to instructor and from year to year, although there must be at least two midterms, and the comprehensive final exam must be worth from 30% to 50% of the final grade. A student must obtain at least 40% on the final exam in order to pass this course.

Quizzes	10%
Assignments	10%
Tests (2)	40%
Final Exam	40%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. Solutions of equations in one variable
 - a. The Bi-section method
 - b. Fixed-point iteration
 - c. The Newton Method
 - d. Error analysis for iterative methods
2. Interpolation and polynomial approximation
 - a. Interpolation and the Lagrange polynomial
 - b. Divided differences

- c. Numerical differentiation and integration
 - d. Numerical differentiation
 - e. Richardson's extrapolation
 - f. Elements of numerical integrability
 - g. Initial value problems for ordinary differential equations
 - h. Elementary theory of initial value problems
 - i. Euler's method
 - j. Higher-order Taylor methods
 - k. Runge-Kutta methods
 - l. Stability and stiff differential equations
3. Iterative techniques in matrix algebra
- a. Norms of vectors and matrices
 - b. Eigenvalues and eigenvectors
 - c. Iterative techniques for solving linear systems
 - d. Error estimates and iterative refinement
4. Approximation theory
- a. Discrete least squares approximation
 - b. Orthogonal polynomials and least squares approximation