

## School of Computing and Information Sciences

**Course Title:** Numerical Analysis

**Date:** 3/20/10

**Course Number:** MAD-3401

**Number of Credits:** 3

<b>Subject Area:</b> Foundations	<b>Subject Area Coordinator:</b> Geoffrey Smith <b>email:</b> smithg@cis.fiu.edu
<b>Catalog Description:</b> Basic ideas and techniques of numerical analysis. Topics include: finite differences, interpolation, solution of equations, numerical integration and differentiation, applications, introduction to applied linear algebra. This course will make extensive laboratory use of the computer facility.	
<b>Textbook:</b>	
<b>References:</b>	
<b>Prerequisite Courses:</b> COP 2210 or CGS 2420 and MAC 2312	
<b>Corequisite Courses:</b> None	

Type: Elective

Prerequisites Topics:

Course Outcomes:

1. Master algorithms to find roots of equations and interpolation
2. Master numerical differentiation
3. Master numerical integration
4. Be familiar with finite differences
5. Be familiar with numerical solutions to differential equations
6. Be familiar with numerical error analysis
7. Master writing program solutions using the above techniques

**School of Computing and Information Sciences**  
**MAD 3401**  
**Numerical Analysis**

**Relationship between Course Outcomes and Program Outcomes**

<b>BS in CS: Program Outcomes</b>	<b>Course Outcomes</b>
a) Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms	1, 2, 3, 4, 5, 6, 7
b) Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.	1, 2, 3, 4, 5, 6, 7
c) Demonstrate proficiency in problem solving and application of software engineering techniques	
d) Demonstrate mastery of at least one modern programming language and proficiency in at least one other.	
e) Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.	
f) Demonstrate the ability to work cooperatively in teams.	
g) Demonstrate effective communication skills.	

**Assessment Plan for the Course & how Data in the Course are used to assess Program Outcomes**

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:  
<http://www.cis.fiu.edu/programs/undergrad/cs/assessment/>

**School of Computing and Information Sciences**  
**MAD 3401**  
**Numerical Analysis**

**Outline**

<b>Topic</b>	<b>Number of Lecture Hours</b>	<b>Outcome</b>
--------------	--	----------------

**School of Computing and Information Sciences**  
**MAD 3401**  
**Numerical Analysis**

**Course Outcomes Emphasized in Laboratory Projects / Assignments**

Outcome	Number of Weeks
---------	-----------------

**Oral and Written Communication**

No significant coverage

Written Reports		Oral Presentations	
Number Required	Approx. Number of pages	Number Required	Approx. Time for each
0	0	0	0

**Social and Ethical Implications of Computing Topics**

No significant coverage

Topic	Class time	student performance measures

**School of Computing and Information Sciences**  
**MAD 3401**  
**Numerical Analysis**

**Approximate number of credit hours devoted to fundamental CS topics**

<b>Fundamental CS Area</b>	<b>Core Hours</b>	<b>Advanced Hours</b>
<b>Algorithms:</b>		
<b>Software Design:</b>		
<b>Computer Organization and Architecture:</b>		
<b>Data Structures:</b>		
<b>Concepts of Programming Languages</b>		

**Theoretical Contents**

<b>Topic</b>	<b>Class time</b>
Numerical analysis	40 hours

**Problem Analysis Experiences**

--

**Solution Design Experiences**

--

**School of Computing and Information Sciences**  
**MAD 3401**  
**Numerical Analysis**

**The Coverage of Knowledge Units within Computer Science Body of Knowledge<sup>1</sup>**

Knowledge Unit	Topic	Lecture Hours
----------------	-------	---------------

---

<sup>1</sup>See <http://www.computer.org/education/cc2001/final/chapter05.htm> for a description of Computer Science Knowledge units