COURSE SYLLABUS

<table>
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<tr>
<th>Course Number:</th>
<th>MAC 2313</th>
<th>Course Title:</th>
<th>Calculus III</th>
</tr>
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<tbody>
<tr>
<td>Prerequisite(s):</td>
<td>MAC 2312</td>
<td>Course Credit:</td>
<td>5</td>
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<tr>
<td>Course Credit:</td>
<td>5</td>
<td>Course Hours:</td>
<td>Lecture 5 hours</td>
</tr>
<tr>
<td>College:</td>
<td>Arts &amp; Sciences</td>
<td>Required Text(s):</td>
<td>Thomas’ <em>Calculus</em> by Weir, Hass</td>
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<tr>
<td>Department:</td>
<td>Mathematics</td>
<td>Supplies:</td>
<td>web access to <a href="http://www.MyMathLab">www.MyMathLab</a> for homework, quizzes</td>
</tr>
<tr>
<td>Faculty Name:</td>
<td>Dr. Bruno Guerrieri</td>
<td></td>
<td>Maple (version 12 can be obtained through the Maple Adoption Program) (Recommended Software)</td>
</tr>
<tr>
<td>Office Location:</td>
<td>Jackson-Davis Hall, 412</td>
<td>Term and Year:</td>
<td></td>
</tr>
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</tr>
<tr>
<td>Office Hours</td>
<td>Monday</td>
<td>Tuesday</td>
<td>Wednesday</td>
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**Course Description**

This course is designed to assist students in developing skills for solving problems that include vectors and geometry of space, vector-valued functions, and functions of several variables. In addition, students will investigate the application of multiple integration and vector fields.

**Conceptual Framework**

The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term “exemplary” refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework.

The Conceptual Framework for the FAMU Professional Education Unit is grounded in a combination of directed, constructivist, developmental, and social learning theories derived from the writings of system theorists, educational philosophers, social scientists, practitioner and developmental theorists. Concepts from these writers and from the varied educational learned societies help form the knowledge base for the unit’s curriculum components and principles of its Conceptual Framework.

**F=Florida Educator Accomplished Practices Standards (FEAPS)**

**I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)**

(K)=Knowledge (S)=Skill (D)=Disposition

Approved/Revised 10/30/07
TECHNOLOGY

•CF 2

•Through this focal area, the FAMU professional education candidate will:

<table>
<thead>
<tr>
<th>CF: 2.1 (S)</th>
<th>Use of available technology and software to support student learning.</th>
<th>F: 4,12</th>
<th>I: 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF: 2.3 (K)</td>
<td>Know fundamental concepts in technology.</td>
<td>F: 12</td>
<td>I: 1,6</td>
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<tr>
<td>CF: 2.4 (K)</td>
<td>Understand fundamental concepts in technology.</td>
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<td>I: 6</td>
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<tr>
<td>CF: 2.5 (S)</td>
<td>Use fundamental concepts in technology.</td>
<td>F: 12</td>
<td>I: 6</td>
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CRITICAL THINKING

• CF4

• Through this focal area, the FAMU professional education candidate will:

| CF: 4.1 (K) | Understand a variety of instructional/professional strategies to encourage student development of critical thinking and performance. | F:4,7 I: 4 |
| CF: 4.4 (K) | Acquire performance assessment techniques and strategies that measure higher order thinking skills of student. | F:1,4 I: 1.8 |
| CF: 4.5 (S) | Demonstrate the use of higher order thinking skills. | F: 8 I: 4 |

PROFESSIONALISM

• CF 5

• Through this focal area, the FAMU professional education candidate will:

| CF: 5.1 (K) | Know the content | F: 8 I: 1 |

Overall Goals of the Course

The overall goals of the course are to develop the necessary skills for solving functions of several variables, including plotting, differentiating and integrating as well as limit calculations, vector-valued functions, three dimensional (3D) curves, 3D surfaces, and scalar fields, vector fields, gradient, divergence, curl. Students will also need to become competent in the understanding and manipulation of 3D objects including their drawing, the many types of integrals seen in 3D, mappings from one domain to another, maxima/minima techniques, and a Computer Algebra System (CAS) platform such as Maple for computational purposes.

Specific Behavioral Objectives

To successfully complete Calculus III, the student will be required to meet the following objectives with at least 70% proficiency. At the end of the course the student will be able to:

**Vectors:**
- add, subtract and sketch vectors in 2 and 3 dimensions
- perform dot and cross products
- write the parametric and vector equations of a line
- find the equation of a plane
- sketch quadric surfaces
- move between rectangular, polar, cylindrical and spherical coordinate systems

**Vector-Valued Functions:**
- find the limits, derivatives and integrals of vector-valued functions
- calculate the arc length, unit tangents and normals in 2 and 3 dimensions
- calculate curvature, velocity and the components of acceleration

**Functions of two or more Variables:**
- sketch the domain of multivariable functions
- use CAS to plot multivariable functions and their contours
- find the limits of multivariable functions
- differentiate multivariable functions
- find the equation of tangent planes and calculate the total derivatives

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• find the directional derivatives and the gradient of functions
• calculate the extrema of a function using the 2nd Partials test and Lagrange Multipliers

**Multiple Integrals:**
• evaluate double integrals over a regions using rectangular and polar coordinates
• calculate surface area
• evaluate triple integrals using rectangular, cylindrical and spherical coordinates
• calculate centroids and centers of gravity
• evaluate triple integrals using a change of variables

**Topics in Vector Calculus:**
• sketch vector fields
• calculate the divergence and curl of a vector field
• evaluate line integrals
• understand path independence and the Fundamental Theorem of Line Integrals
• utilize Green’s Theorem to evaluate line integrals around and to calculate areas of closed regions
• evaluate surface integrals
• utilize the Divergence Theorem to calculate the flux across a surface
• understand Stokes’ Theorem as a generalization of Green’s Theorem

**National, State, and PEU Standards Addressed in the Course**

**Interstate New Teacher Assessment and Support Consortium (INTASC) Standards**

**Standard 1: Subject Matter**
The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

**Standard 6: Communication**
The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.

**Professional Organization/Learned Society Standards**

**NCATE/NCTM Program Standards for Secondary Mathematics:**

**Standard 1: Knowledge of Mathematical Problem Solving**
Candidates know, understand, and apply the process of mathematical problem solving.

**Standard 3: Knowledge of Mathematical Communication**
Candidates communicate their mathematical thinking orally and in writing to peers, faculty, and others.

**Standard 4: Knowledge of Mathematical Connections**
Candidates recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding.

**Standard 5: Knowledge of Mathematical Representation**
Candidates use varied representations of mathematical ideas to support and deepen students’ mathematical understanding.

**Standard 6: Knowledge of Technology**
Candidates embrace technology as an essential tool for teaching and learning.

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Standard 9: Knowledge of Number and Operation
Candidates demonstrate computational proficiency, including a conceptual understanding of numbers, ways of representing number, relationships among number and number systems, and meanings of operations.

Standard 12: Knowledge of Calculus
Candidates demonstrate a conceptual understanding of limit, continuity, differentiation, and integration and a thorough background in the techniques and application of the calculus.

Florida Educator Accomplished Practices (FEAPs)

ASSESSMENT
The preprofessional teacher collects and uses data gathered from a variety of sources. These sources include both traditional and alternate assessment strategies. Furthermore, the teacher can identify and match the students’ instructional plans with their cognitive, social, linguistic, cultural, emotional, and physical needs.

COMMUNICATION
The preprofessional teacher recognizes the need for effective communication in the classroom and is in the process of acquiring techniques which she/he will use in the classroom.

CRITICAL THINKING
The preprofessional teacher is acquiring performance assessment techniques and strategies that measure higher order thinking skills in students and is building a repertoire of realistic projects and problem-solving activities designed to assist all students in demonstrating their ability to think creatively.

KNOWLEDGE OF SUBJECT MATTER
The preprofessional teacher has a basic understanding of the subject field and is beginning to understand that the subject is linked to other disciplines and can be applied to real-world integrated settings. The teacher’s repertoire of teaching skills includes a variety of means to assist student acquisition of new knowledge and skills using that knowledge.

TECHNOLOGY
The preprofessional teacher uses technology as available at the school site and as appropriate to the learner. She/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills

1 Knowledge of algebra
23. Perform vector addition, subtraction, and scalar multiplication on the plane.

2 Knowledge of functions
3. Identify the domain and range of a given function.

3 Knowledge of geometry from a synthetic perspective
4. Classify geometric figures (e.g., lines, planes, angles, polygons, solids) according to their properties.
9 Knowledge of calculus
1. Solve problems using the limit theorems concerning sums, products, and quotients of functions.
3. Find the derivative of the sum, product, quotient, or the composition of functions.
8. Find relative and absolute maxima and minima.
15. Evaluate an integral by use of the fundamental theorem of calculus.

11 Knowledge of mathematics as communication
1. Identify statements that correctly communicate mathematical definitions or concepts.
2. Interpret written presentations of mathematics.
3. Select or interpret appropriate concrete examples, pictorial illustrations, and symbolic representations in developing mathematical concepts.

12 Knowledge of mathematics as reasoning
1. Identify reasonable conjectures.

13 Knowledge of mathematical connections
1. Identify equivalent representations of the same concept or procedure (e.g., graphical, algebraic, verbal, numeric).

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<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>Professional Organization</th>
<th>FEAPs Standards</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
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<tbody>
<tr>
<td>Quiz (Sections 12.1-12.3)</td>
<td>Perform vector addition, subtraction, and scalar multiplication on the plane</td>
<td>INTASC: 1.0, 8.0</td>
<td>NCTM: 1.1, 1.3, 3.2, 4.1, 9.9, 12.2</td>
<td>FEAPs: 1.1, 4.1, 4.1a, 4.1d, 4.1g, 8.1, 8.1a, 8.1b</td>
<td>FTCE: 1.23, 11.1, 11.2, 12.1</td>
<td>CF 4.1, CF 4.3, CF 4.5, CF 5.1</td>
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<td>Quiz (Sections 12.6-13.2)</td>
<td>Find relative and absolute maxima and minima</td>
<td>INTASC: 1.0, 8.0</td>
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<td>FTCE: 3.4, 9.8, 11.1, 11.2, 12.1</td>
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<td>Quiz (Sections 14.1-14.3)</td>
<td>Find the derivative of the sum, product, quotient, or the composition of functions</td>
<td>INTASC: 1.0, 8.0</td>
<td>NCTM: 1.1, 1.3, 3.2, 4.1, 12.1</td>
<td>FEAPs: 1.1, 4.1, 4.1a, 4.1d, 4.1g, 8.1, 8.1a, 8.1b</td>
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<td>CF 4.1, CF 4.3, CF 4.5, CF 5.1</td>
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**Teaching Methods**

Teaching method will be lecture.

**Course Evaluation**

Homework  
Quiz/Projects  
4 Tests (Cumulative)  
Final (Cumulative)

**Grading**

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<th>Grade</th>
<th>Percentage</th>
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<tr>
<td>A</td>
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<tr>
<td>B</td>
<td>80 TO 89</td>
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<td>C</td>
<td>65 TO 79</td>
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<td>D</td>
<td>55 TO 64</td>
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<tr>
<td>F</td>
<td>BELOW 55</td>
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**Course Policies**

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**Policy Statement on Non-Discrimination** It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

**Academic Honor Policy** The University’s Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct- Regulation 2.012 section, beginning on page 55-56.

**ADA Compliance** To comply with the provisions of the Americans with Disabilities Act (ADA), please advise instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

**References**


www.coursecompass.com

www.ncate.org

www.fldoe.org

http://tutorial.math.lamar.edu/

**Tentative Course Calendar**

<table>
<thead>
<tr>
<th>Week</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
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<tr>
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<td>3</td>
<td>M. L. King, Jr.</td>
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<td>Test 1 26-Jan</td>
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<td>30-Mar</td>
<td>31-Mar</td>
<td>1-Apr</td>
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Approved/Revised 10/30/07
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