 COURSE SYLLABUS

<table>
<thead>
<tr>
<th>Course Number: MTG 4212</th>
<th>Course Title: Modern Pure Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite(s): Calculus III and Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>Course Credit: 3</td>
<td>Course Hours: Lecture 3 hours</td>
</tr>
<tr>
<td>College: Arts &amp; Sciences</td>
<td>Required Text(s): Elementary Geometry From an Advanced Standpoint, latest edition, by Edwin E. Moise</td>
</tr>
<tr>
<td>Department: Mathematics</td>
<td>Supplies:</td>
</tr>
<tr>
<td>Faculty Name: Dr. Roselyn E. Williams</td>
<td>Term and Year: Fall 2008</td>
</tr>
<tr>
<td>Office Location: 403 Jackson Davis Hall</td>
<td>Place and Time:</td>
</tr>
<tr>
<td>Faculty Name: Dr. Roselyn E. Williams</td>
<td>Office Location: 403 Jackson Davis Hall</td>
</tr>
<tr>
<td>Telephone: 850-412-5236</td>
<td>Supplies:</td>
</tr>
<tr>
<td>e-mail: <a href="mailto:Roselyn.Williams@famu.edu">Roselyn.Williams@famu.edu</a></td>
<td></td>
</tr>
</tbody>
</table>

Office Hours

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
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</thead>
<tbody>
<tr>
<td>3:30-5:00</td>
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Course Description

This course introduces major topics that include a comprehensive study of geometry. Students will examine the historical development of geometry, abstract, and concrete treatments of the subject. In addition, students will investigate examples of various geometries, proving geometric theorems, solving geometric problems, and applications.

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
CRITICAL THINKING

• CF 4
• Through this focal area, the FAMU professional education candidate will:

<table>
<thead>
<tr>
<th>CF: 4.1 (K)</th>
<th>Understand a variety of instructional/professional strategies to encourage student development of critical thinking and performance.</th>
<th>F:4,7</th>
<th>I: 4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CF: 4.4 (K)</th>
<th>Acquire performance assessment techniques and strategies that measure higher order thinking skills of student.</th>
<th>F:1,4</th>
<th>I: 1,8</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF: 4.5 (S)</td>
<td>Demonstrate the use of higher order thinking skills.</td>
<td>F: 8</td>
<td>I: 4</td>
</tr>
</tbody>
</table>

PROFESSIONALISM

• CF 5
• Through this focal area, the FAMU professional education candidate will:

<table>
<thead>
<tr>
<th>CF: 5.1 (K)</th>
<th>Know the content</th>
<th>F: 8</th>
<th>I: 1</th>
</tr>
</thead>
</table>

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Approved/Revised 10/30/07
**Overall Goals of the Course**

The overall goals of the course are to develop the ability of the student to distinguish between Euclidean and non-Euclidean geometry, to study the complete theory of Euclidean Geometry from an axiomatic approach, and to recognize reasoning and proof-writing as fundamental aspects of mathematics.

**Specific Behavioral Objectives**

To successfully complete Modern Pure Geometry 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:

1. Develop both the conceptual understanding and the analytical skills necessary to experience success in mathematics
2. Use the language of mathematics to express ideas precisely
3. Recognize reasoning and proof as fundamental aspects of mathematics
4. Develop and evaluate mathematical arguments and proofs

**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.

**Standard 8: Assessment**
The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

**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 2: Knowledge of Reasoning and Proof**
Candidates reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry.

**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.

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

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 11: Knowledge of Geometries
Candidates use spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties.

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.

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

3 Knowledge of geometry from a synthetic perspective
5. Determine the measures of interior and exterior angles of any polygon.
11. Use 30-60-90 or 45-45-90 triangle relationships to determine the lengths of the sides of triangles.
13. Apply the theorems pertaining to the relationships of chords, secants, diameters, radii, and tangents with respect to circles and to each other.
14. Apply the theorems pertaining to the measures of inscribed angles and angles formed by chords, secants, and tangents.
15. Identify basic geometric constructions (e.g., bisecting angles or line segments, constructing parallels or perpendiculars).
16. Identify the converse, inverse, and contrapositive of a conditional statement.
17. Identify valid conclusions from given statements.
18. Classify examples of reasoning processes as inductive or deductive.

4 Knowledge of geometry from an algebraic perspective
5. Use translations, rotations, dilations, or reflections on a coordinate plane to identify the images of geometric objects under such transformations.

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5. **Knowledge of trigonometry**

5. Use tangent, sine, and cosine ratios to solve right triangle problems.

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).

3. Identify simple valid arguments according to the laws of logic.
4. Identify proofs for mathematical assertions, including direct and indirect proofs, proofs by mathematical induction, and proofs on a coordinate plane.
5. Identify process skills: induction, deduction, questioning techniques, and observation-inference.

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*Approved/Revised 10/30/07*
**Teaching Methods**

Teaching method will be lecture.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>Professional Organization</th>
<th>FEAPs</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematical Supplementary Problem 3 (Homework)</td>
<td>Determine the measures of interior and exterior angles of any polygon</td>
<td>INTASC: 1.0, 8.0</td>
<td>NCTM: 1.1, 1.3, 3.2, 4.1, 11.1, 11.3</td>
<td>FEAPs: 1.1, 4.1, 4.1a, 4.1d, 4.1g, 8.1, 8.1a, 8.1b</td>
<td>FTCE: 3.5, 3.11, 5.5, 11.1, 11.2, 11.3, 12.1</td>
<td>CF 4.1, CF 4.3, CF 4.5, CF 5.1</td>
</tr>
<tr>
<td>Mathematical Supplementary Problem 4 (Homework)</td>
<td>Apply the theorems pertaining to the measures of inscribed angles and angles formed by chords, secants, and tangents</td>
<td>INTASC: 1.0, 8.0</td>
<td>NCTM: 1.1, 1.3, 3.2, 4.1, 11.1, 11.3</td>
<td>FEAPs: 1.1, 4.1, 4.1a, 4.1d, 4.1g, 8.1, 8.1a, 8.1b</td>
<td>FTCE: 3.5, 3.14, 11.1, 11.2, 11.3, 12.1</td>
<td>CF 4.1, CF 4.3, CF 4.5, CF 5.1</td>
</tr>
<tr>
<td>Mathematical Supplementary Problem 5 (Homework)</td>
<td>Use 30-60-90 or 45-45-90 triangle relationships to determine the lengths of the sides of triangles</td>
<td>INTASC: 1.0, 8.0</td>
<td>NCTM: 1.1, 1.3, 3.2, 4.1, 11.1, 11.3</td>
<td>FEAPs: 1.1, 4.1, 4.1a, 4.1d, 4.1g, 8.1, 8.1a, 8.1b</td>
<td>FTCE: 3.5, 3.11, 5.5, 11.1, 11.2, 11.3, 12.1</td>
<td>CF 4.1, CF 4.3, CF 4.5, CF 5.1</td>
</tr>
</tbody>
</table>

**Course Evaluation**

Your course grade will be:

Maximum number of points
Test (average of the highest three of four test) 100
Assignments and quizzes 10
Total 110

**Grading**

The scale will be:

- 90% and above A
- 80%-89% B
- 70%-79% C
- 60%-69% D
- 59% and below F

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Topical Outline

Test One

Fields
Order relations and ordered fields
Induction Principle
Integers and Rational Numbers
Archimedian Postulate; Euclidean Completeness
Set Theory and Incidence Geometry in planes and space
The distance function
Betweenness
Segments, rays, angles, and triangles
Congruence of segments
Convexity and the Plane Separation Postulate
Angular measure
Congruences between triangles
The SAS Postulate

Test Two

Geometric inequalities
Examples of Geometries
Euclid's Geometry
The Poincare model for Lobachevskian geometry
The spherical model for Riemannian geometry
The Parallel Postulate and parallel projection
The comparison theorem The Basic Similarity Theorem
Proportionalities
Similarities between triangles
The Pythagorean Theorem
Circles
Solid Geometry

Test Three

Cartesian coordinate systems
Rigid motion Isometries
Dilations and similarities
Constructions with ruler and compass
How to do algebra with ruler and compass
Solving equations with ruler and compass

Assignments Each student will submit a problem that she/he solved using the assistance of the computer. Assignments are turned in daily. Assignments are due one week after they are given. For each problem, state the question, provide the solution and answer. There is a 1 point penalty for not stating the question. The tentative schedule is as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Section</th>
<th>Assignment</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-Aug</td>
<td>1.1-1.3</td>
<td>Sup 3</td>
<td>Sup 4</td>
</tr>
<tr>
<td>27-Aug</td>
<td>1.4-1.6</td>
<td>Sup 6</td>
<td>Sup 7</td>
</tr>
<tr>
<td>29-Aug</td>
<td>Convocation</td>
<td>1.3.2</td>
<td>1.3.4</td>
</tr>
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</table>

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1-Sep Labor Day
3-Sep 1.7-1.9 Sup 20 1.4.2 1.4.13
5-Sep 2 Sup 21 1.5.6 1.7.11
8-Sep 3.1-3.2 Sup 24 1.8.9 1.8.10
10-Sep 3.3-3.4 2.1.4 2.1.6 3.4.2
12-Sep 3.5-3.6 3.2.2 Thm 3.3.2 3.4.2
15-Sep 4.1-2 3.4.3 3.5.3 Thm 3.6.C-4
17-Sep 4.3-4 4.1.3 4.1.4 Sup 54
19-Sep 5 Thm 4.2.9 4.3.1 Thm 4.2.2
22-Sep 5 4.4.2 4.4.4 Thm 4.5.2
24-Sep 6.1 Sup 44 4.5.1 Thm 5.1.4.
26-Sep 6.2 Sup 45.a 6.1.2 Sup 45.b
29-Sep 6.2 Sup 46.a Sup 46.b Cor 6.2.1-1
1-Oct Review
3-Oct Test 1
6-Oct 6.3 Cor 6.2.2-2 6.2.1
8-Oct 6.5 Sup 47 Sup 62
10-Oct 7 Sup 64 Sup 81
13-Oct 7 6.1.2 Cor 6.2.1-1
15-Oct 7 6.2.1 Cor 6.2.2-2
17-Oct MSRI Sup 90 Sup 82
20-Oct 9 Sup 42 Sup 48
22-Oct 10.1 Thm 10.1.3 Thm 10.1.5 Thm 10.2.2
24-Oct 10.2 Sup 68 Sup 102 Thm 11.1.6
27-Oct 11.1
29-Oct 11.2 Thm 11.1.8 Thm 11.1.10 Thm 11.1.12
31-Oct Convocation
3-Nov 11.3 Sup 56.a Sup 56.b Sup 56.c, d
5-Nov 11.4
7-Nov Review
10-Nov Test 2
12-Nov 12.1 Sup 71.a Sup 71 Sup 72
14-Nov MATHFest
17-Nov 12.2 Sup 66 Sup 67
19-Nov 12.3 Sup 63 Sup 65 Sup 68
21-Nov 13 Thm 12.2.5 Thm 13.2.6 Thm 13.2.7
24-Nov 16 16.4.5 Thm16.4.6 Thm16.4.4
26-Nov 16 Sup 78 Sup 84 Sup 90
28-Nov Thanksgiving
1-Dec 17 Sup 88 3-Apr Sup 115
3-Dec 18 17.1.2 17.1.4 18.1.2
5-Dec Test 3
10-Dec Comprehensive 12:30-2:30

**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.ncate.org](http://www.ncate.org)

[www.fldoe.org](http://www.fldoe.org)

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