Syllabus: MTH 139 Plane Analytic Geometry

Spring 2019 - Sections 1 & 2

Instructor: Dr. Matthew Beauregard  
Class Times & Place: Sec 1 MWF 9:00-9:50, MTH 203  
Sec 2 MWF 11-11:50, MTH 214

E-mail address: beauregama@sfasu.edu
Office Phone: 936.468.1702  
Office Location: MTH 354

Office Hours:

<table>
<thead>
<tr>
<th>Monday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30-3:30</td>
<td>1:30-3:30</td>
<td>By Appt.</td>
<td>By Appt.</td>
</tr>
</tbody>
</table>

Book Appts: https://calendly.com/drbeauregard

Materials
- **Remind.com:** Steps - 1) Download the Remind App; 2) Click on Join a Class; 3) Enter code s19MTH139

Course Description
This course emphasizes the correspondence between geometric curves and algebraic equations. Many problems in geometry are equivalent to that in algebra, and vice versa. Straight lines, circles, rational functions, parabolas, ellipses, and hyperbolas, and certain coordinate transformations are studied.

Grade Components

<table>
<thead>
<tr>
<th>Grade Components</th>
<th>Grading Scale</th>
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<tbody>
<tr>
<td>25% Exam 1, Fri. 02/15</td>
<td>90% - 100% A</td>
</tr>
<tr>
<td>25% Exam 2, Fri. 03/15</td>
<td>80% - 90% B</td>
</tr>
<tr>
<td>25% Exam 3, Mon. 04/22</td>
<td>70% - 80% C</td>
</tr>
<tr>
<td>25% Final Exam</td>
<td>60% - 70% D</td>
</tr>
</tbody>
</table>

Final Exam for Section 1: Wednesday, 5/15 @ 8:00am in MTH 203
Final Exam for Section 2: Wednesday, 5/15 @ 10:30am in MTH 214

Attendance Policy
Class attendance is mandatory. An absence maybe recorded in the event of leaving early or arriving late, lack of participation in class, or cell phone use during class. The table below details the rewards for attendance. The points reflect an overall change in your course grade:

<table>
<thead>
<tr>
<th>Total Absences</th>
<th>Grade Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+3</td>
</tr>
<tr>
<td>1-2</td>
<td>+2.5</td>
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<tr>
<td>3-5</td>
<td>+2</td>
</tr>
<tr>
<td>6-9</td>
<td>+0</td>
</tr>
<tr>
<td>10-12</td>
<td>-3</td>
</tr>
<tr>
<td>&gt;12</td>
<td>-50</td>
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</tbody>
</table>

Testing & Assessment
- **Grading of exams** will look a bit different in this course. I am attempting to make clear the study habits that lead to success in mathematics and the grading of exams reflects this. Each exam grade will follow:
  - 20% homework & quizzes leading up to the exam
  - 10% creating a study plan for the exam, then following it
  - 10% taking the practice exam/practice problems
  - 10% identifying and correcting your mistakes on a practice exam
  - 50% the score you actually make on the in-class exam

This grading can help you or hurt you. If you take care of business in preparation for an exam, you can already have half the points before you even sit for the exam. However, if you do nothing to prepare, it is possible to have failed the exam before you have even started taking it.
General Policies and Information

- At the beginning of class, you may ask questions on material covered the previous class period.
- You earn your grade by communicating your understanding of the material through the assignments and tests. Clearly communicating mathematics will be essential in this course.
- To contact me, you may call my office, drop by my office, or e-mail me. I will do my best to reply quickly.
- If you want me to reconsider a score on your work then you can return the document to me with a written explanation within three days of receipt of the work.
- Missed examinations caused by a documented and valid excuse within 24 hours of an examination may be made up at a later date OR replaced by your final exam. Since you have a full semester to arrange any travel plans, there is not an excuse for missing the final.
- Late HW will not be accepted, unless permission is given otherwise. Missed quizzes will be dropped upon receipt of a valid excuse given no less than 12 hours prior or after the scheduled quiz time.
- Options for additional help:
  - Attend office hours or make an appointment to see me
  - Use Remind to dialogue virtually with me
  - AARC walk-in table: M-TH 1-8pm, Su 4-8pm (6-8pm is specific to MTH 139)

Tips for a Successful math class

- Measure success as understanding and being able to do problems, not just as having completed the assignment.
- Try to understand definitions and solving approaches. See if you can find examples that work and examples that don’t.
- Take the time to read the textbook and review your notes before and after class.
- Practice homework problems until you can do it without referring to examples or help from your notes.
- Practice explaining big ideas and problem solving procedures in your own words, using complete sentences.
- Have someone check your work after you have finished it to help eliminate mistakes that you do not know you are making. Treat mistakes as a learning experience.
- Realize that math is hard. Some parts are harder for some people than others. Successful people learn to go back and refresh the basics and keep working.

Course Objectives

At the end of MTH 139, a student who has studied and learned the material should be able to:

- Solve problems involving lengths and distances in the plane, including midpoint and point-of-division formulas.
- Demonstrate understanding of the notions of slope and inclination of lines, including angles between lines, parallel lines, and perpendicular lines.
- Recognize the relationship between equations in two variables and graphs in the plane and use the equations to find pertinent information such as points of intersection, and intercepts.
- Perform arithmetical and geometric operations involving vectors in the plane.
- Use vectors to solve geometric and physical problems.
- Sketch graphs of and discuss relevant features of curves in the plane determined by certain equations (including lines, circles, parabolas, ellipses, hyperbolas, polynomial functions, rational functions, and features such as slope, inclination, center, radius, vertices, foci, axes, eccentricity, intercepts, asymptotes).
- Determine equations of curves when given information that determines the curves.
- Perform translations and rotations of the coordinate axes to eliminate certain terms from equations.
- Model real world situations with equations of conics.
- Use the polar coordinate system, relate it to the rectangular coordinate system, and graph equations using polar coordinates.
- Sketch graphs in the plane determined by parametric equations by direct sketching as well as elimination of the parameter to obtain a rectangular equation.
University Policies

- **Academic Integrity (A-9.1)** Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty** Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at [http://www.sfasu.edu/policies/academic_integrity.asp](http://www.sfasu.edu/policies/academic_integrity.asp).

- **Withheld Grades Semester Grades Policy (A-54)** Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

- **Students with Disabilities** To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to [http://www.sfasu.edu/disabilityservices/](http://www.sfasu.edu/disabilityservices/).

- **Acceptable Student Behavior** Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

The following is an excerpt from SFA Policy 5.4:

*The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:*

1. **Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;**

2. **At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.**

To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.
<table>
<thead>
<tr>
<th>Section</th>
<th>Homework Exercises</th>
<th>Due</th>
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<tbody>
<tr>
<td><strong>Exam 1 Material</strong></td>
<td></td>
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</tr>
<tr>
<td>1.1 Cartesian Plane</td>
<td></td>
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<tr>
<td>1.2 Distance formula</td>
<td>5, 6, 13, 17, 21, 24, 25, 26, 27, 28</td>
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<tr>
<td>1.3 Point of division, midpoint formulas</td>
<td>3, 9, 11, 17, 19, 20, 24</td>
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<tr>
<td>1.4 Inclination and slope</td>
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<tr>
<td>1.5 Parallel and perpendicular lines</td>
<td>3, 5, 7, 9, 11, 13, 17, 19, 23, 25, 27, 31, 33</td>
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<tr>
<td>1.6 Angles between lines</td>
<td>3, 11, 19, 31</td>
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<tr>
<td>1.7 Graphs and points of intersection</td>
<td></td>
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<tr>
<td>1.8 An equation of a locus (not Locust)</td>
<td>1, 3, 7, 9, 15, 21</td>
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<tr>
<td>2.1 Directed line segments and vectors</td>
<td>3, 7, 11, 15, 19, 23, 27, 31, 37, 39</td>
<td></td>
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<tr>
<td>2.2 The dot product</td>
<td>3, 7, 11, 15, 19, 21, 27, 29</td>
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<tr>
<td><strong>Exam 2 Material</strong></td>
<td></td>
<td></td>
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<tr>
<td>2.3 Application of vectors</td>
<td>7, 11, 13, 19, 25</td>
<td></td>
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<tr>
<td>3.1 Point-slope and two-point forms</td>
<td>1, 9, 17, 23, 25, 50</td>
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<tr>
<td>3.2 Slope-intercept and intercept forms</td>
<td>1, 9, 17, 27, 33</td>
<td></td>
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<tr>
<td>3.3 Distance from a point to a line</td>
<td>1, 9, 15, 25, 27, 39</td>
<td></td>
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<tr>
<td>3.4 Families of lines</td>
<td>3, 9, 15, 17, 25, 29</td>
<td></td>
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<tr>
<td>7.1 Symmetry and intercepts</td>
<td>2, 5, 11, 15, 21, 27</td>
<td></td>
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<tr>
<td>7.2 Sketching Polynomials</td>
<td>17, 27, 31</td>
<td></td>
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<tr>
<td>7.3 Asymptotes and rational functions</td>
<td>1, 3, 7, 17</td>
<td></td>
</tr>
<tr>
<td>7.4 Sketching rational functions</td>
<td>1, 7, 13, 19, 25</td>
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<tr>
<td><strong>Exam 3 Material</strong></td>
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<tr>
<td>5.1 Introduction to conic sections</td>
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<td></td>
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<tr>
<td>4.1 Standard form for an eq. of a circle</td>
<td>3, 9, 13, 17, 21, 27, 31, 56</td>
<td></td>
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<tr>
<td>4.2 Condition to determine a circle</td>
<td>1, 9, 21, 29</td>
<td></td>
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<tr>
<td>5.2 The parabola</td>
<td>1, 5, 9, 11, 13, 17, 19, 23, 25, 39, 43</td>
<td></td>
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<tr>
<td>5.3 The ellipse</td>
<td>1, 5, 9, 11, 13, 17, 19, 33, 37, 41</td>
<td></td>
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<tr>
<td>5.4 The hyperbola</td>
<td>1, 5, 7, 13, 15, 17, 23, 25, 45, 47</td>
<td></td>
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<tr>
<td>6.1 Translation of conic equations</td>
<td>1, 5, 11, 19, 21, 23, 2, 9, 39, 41</td>
<td></td>
</tr>
<tr>
<td><strong>Post Exam 3 Material</strong></td>
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<td></td>
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<tr>
<td>6.2 Translation of general equations</td>
<td>1, 5, 11</td>
<td></td>
</tr>
<tr>
<td>6.3 Rotation</td>
<td>1, 7, 13</td>
<td></td>
</tr>
<tr>
<td>6.4 General equation of second degree</td>
<td>1, 11, 13</td>
<td></td>
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<tr>
<td>8.1 Polar coordinates</td>
<td></td>
<td></td>
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<tr>
<td>8.2 Graphs in polar coordinates</td>
<td>1, 7, 8, 13, 17</td>
<td></td>
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<tr>
<td>8.4 Relationship between rect. and polar</td>
<td>1, 5, 9, 14, 18, 20, 24, 26, 28</td>
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<tr>
<td><strong>CUMULATIVE FINAL EXAM</strong></td>
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</table>
Course description: Beginning course in plane analytic geometry including the straight line, the circle, parabola, hyperbola, and the transformation of coordinates.

Credit hours: 3

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To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

Course Prerequisites and Corequisites: Math 133 and 138, or the equivalent.

Course outline: Approximate time spent

- Introduction to plane analytic geometry 20%
  - Points in the Cartesian plane
    - Distance formulas
    - Point of division formulas
  - Analytic descriptions of lines
    - Inclination
    - Slope
    - Angle from one line to another
  - Graphs of curves
    - Points of intersection of curves
    - Equation of a locus of points

- Vectors in the plane 5%
  - Geometric and component representations of vectors
  - Dot products and angles between vectors
  - Applications of vectors in geometry and physics

- Lines 10%
  - Point-slope and two-point forms
  - Slope-intercept and intercept forms
  - General form
  - Distance from a point to a line
  - Families of lines

- Conic sections 25%
  - Analytic definitions of the conic sections
  - Circles
  - Parabolas
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Syllabus Continuation

- Ellipses
- Hyperbolas

- **Coordinate transformations** 15%
  - Translation of axes
  - Rotation of axes
  - The general second degree equation

- **Curve sketching** 15%
  - Domain, symmetry, intercepts, asymptotes
  - Graphs of polynomials
  - Graphs of rational functions

- **Polar coordinates and parametric equations** 10%
  - Introduction to polar coordinates in the plane
  - Conversion between rectangular and polar coordinates
  - Graphs of polar equations
  - Introduction to parametric equations of curves in the plane

**Academic Integrity**
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work to a grade of F in the course, and may result in additional, more severe disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.

**Definition of Academic Dishonesty (SFA policy 4.1):**
Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to:
- using or attempting to use unauthorized materials on any class assignment or exam;
- falsifying or inventing of any information, including citations, on an assignment;
- helping or attempting to help other student(s) in an act of cheating or plagiarism.

Plagiarism is presenting the words or ideas of another person as if they were one's own. Examples of plagiarism include, but are not limited to:
- submitting an assignment as one's own work when it is at least partly the work of another person;
- submitting a work that has been purchased or otherwise obtained from the Internet or another source;
- incorporating the words or ideas of an author into one's paper or presentation without giving the author credit.

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sfasu.edu/math
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Student Learning Outcomes (SLO): At the end of MTH 139, a student who has studied and learned the material should be able to:

1. Solve problems involving lengths and distances in the plane, including midpoint and point-of-division formulas.
2. Demonstrate understanding of the notions of slope and inclination of lines, including angles between lines, parallel lines, and perpendicular lines.
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4. Perform arithmetical and geometric operations involving vectors in the plane.
5. Use vectors to solve geometric and physical problems.
6. Sketch graphs of and discuss relevant features of curves in the plane determined by certain equations (including lines, circles, parabolas, ellipses, hyperbolas, polynomial functions, rational functions, and features such as slope, inclination, center, radius, vertices, foci, axes, eccentricity, intercepts, asymptotes).
7. Determine equations of curves when given information that determines the curves.
8. Perform translations and rotations of the coordinate axes to eliminate certain terms from equations.
9. Model real world situations with equations of conics.
10. Use the polar coordinate system, relate it to the rectangular coordinate system, and graph equations using polar coordinates.
11. Sketch graphs in the plane determined by parametric equations by direct sketching as well as elimination of the parameter to obtain a rectangular equation.

There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and/or a service course.

Date of document: 01/11/2019