**Penn State Berks Division of Science**

**Math 22: College Algebra Section 003 Hybrid Course**

 **Spring 2016 Blended Learning**

**Instructor:** Ms. JoAnne B. Pumariega

**Classroom:** Luerssen 021

**Class Meeting Times**: MWF 12:00 pm to 12:50 pm

**Office and Phone:** Luerssen #201-J*; phone: 610-396-6007*

**E-mail:** jbp12@psu.edu

The **best** way to contact me is via e-mail. I check it at least once a day.  If you e-mail me, I will respond within 24 hours except during the weekend which my response time may be longer.

In addition, the best time to reach me is in my office W from 9 am to 9:50 am. in 201-J. You may leave a voice message any time with a contact number to reach you.

**Catalog Description and Course Objectives:** College Algebra II and Analytic

Geometry (3 credits). Relations, functions, graphs, polynomial and rational

functions; Word problems; nonlinear inequalities; inverse functions; and

Logarithmic functions; conic sections; simultaneous equations.

**Prerequisites:** Math 21 or satisfactory performance on the mathematics proficiency

examination. Students who do not meet the prerequisites and who do not drop the

course will be disenrolled.

**Course Format:**

 Daily class prep is listed under LESSONS on ANGEL. (See \*\*\* on page 10)

**Text:** Blitzer, R. College Algebra, Sixth Edition. Pearson/ Prentice Hall, 2013.

 The e-book may be purchased on-line with the package.

**Required/ Allowed Materials:** A non-graphing calculator with trigonometric functions

may be used for homework, quizzes, tests, or exams. Graphing calculators are not

permitted during quizzes, tests, or exams. Computers and cell phones are not

permitted in the classroom during exams. All **cell phones** must be turned off and

**no text messaging** during the class period is permitted under any circumstances

 during regular classes. Graph paper would be useful for class and homework. **No**

 **Course Compass** homework on the computer may be completed in class.

**Class Attendance:** Class attendance is mandatory. Please initial your name on each class

date space on the attendance sheet provided at the beginning of each class. It is

your responsibility to sign in. Grades will be reduced for poor attendance, depending on the number of absences as follows: three absences- one grade lower; six absences: two grades lower, nine absences: failing grade. Athletes and others who miss class on school-related activities must let me know of such absences in advance through a written note from your coach or sponsor.

Emergency and/or inclement weather phone line is (610) 396-6375.

**Hybrid Courses and How this Hybrid Course is Run:**
A formal definition of hybrid courses is as follows: “Hybrid courses are specific packages of online and face-to-face content and processes organized to reduce or replace the number of required class sessions in order to improve effectiveness and flexibility for instructors and students and/or to achieve other efficiencies.” (Office of the University Registrar ARUAC - Schedule Course Section - <http://www.registrar.psu.edu/staff/isis/aruac.cfm>)

This course reduces the class sessions on some Friday’s for students who are currently doing well in the course.  These are titled “Friday Work Sessions” and are different than the “Friday Work Sessions & Quiz” days and the “Exam” days since the quizzes and exams require you to show up in person.

For Friday Work Sessions, these will be required for all students through the first exam.  After the first exam, if you have more than a 75% on the previous exam grade the attendance for the Friday Work Sessions is optional. But if you have less than a B average , it is highly recommended that the student attend the Friday work session. **If you have less than a 75% on the previous exam grade the Friday Work** **Session is mandatory**.  The most recent exam will be used to determine who needs to attend.

**Office Hours and Assistance:** My office is in Luerssen #201-J. I will be available on M & W

 for help in the Learning Center Room # 163 in the Franco Building from 3:30pm to 6pm.

 Also, free tutoring is available at the Learning Center in the Franco Building. Ask me

 about this service provided on campus for the mathematics courses.

**Late Drop:** January 20, 2016 is the last day to drop a course and receive a “W” in it.

 However, any course dropped after January 20, 2016 will be listed on

 your Penn State academic record. Students who drop a class between January 21, 2016

 and April 8, 2016 use drop credits; 4 year students are permitted a

 maximum of 16 drop credits.

# Disability Services:

Penn State welcomes students with disabilities into the University’s educational programs. Every Penn State campus has an office for students with disabilities. Please contact Michelle Strawley, Disability Services Coordinator, at mns136@psu.edu. or610-396-6410.  Her office is located in room 169 Franco. For further information, please visit the Office for Disability Services Web site: <http://equity.psu.edu/ods>.

In order to receive consideration for reasonable accommodations, you must contact Michelle Strawley, participate in an intake interview, and provide documentation: <http://equity.psu.edu/ods/guidelines>. If the documentation supports your request for reasonable accommodations, the Disability Services Office at Penn State Berks will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations

**Evaluation and Grading Policy:** All tests and quizzes will be announced in advance.

 There will be no make-up quizzes. Tests will be made up only under serious

circumstances. The date of the comprehensive final exam will be announced in

class. Your grade will be based on the following points earned:

 Homework = 100 points

 Quizzes/projects = 60 points

 Reviews = 40 points (3 unit reviews @ 10 + final rev @ 10 = 40)

 Tests = 300 points (3 @ 100 = 300)

 Final Exam = 150 points

 TOTAL POINTS 650

All Math 22 classes have the same point calculation formula. Total points out of

650 points will determine the final grade for each student:

A 650-605 (93-100%) C+ 519-501 (77-79%)

1. 604-585 (90-92%) C 500-455 (70-76%)

B+ 584-566 (87-89%) D 454-390 (60-69%)

B 565-540 (83-86%) F 389 and below (0-59%)

1. 539-520 (80-82%)

**Notes and Assignments:** Please record your notes in a neat and organized manner. Homework problems should be kept separate from class notes. Use pencil for all

written work handed in. No late work will be accepted. The online homework is **Course Compass** for which you will need to register. It will be thoroughly explained in class on the first day. Your section course identification number is located under Lessons on the

ANGEL site and will be posted on the board on the first day of class.

**Academic Integrity:** (From the Penn State Berks website) “Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at Penn State, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts. Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.” All work submitted (tests, quizzes, etc.) must be your original work. It may not be copied in whole or in part from any textbook, website, other student, or other outside source. Group collaboration on certain assignments is encouraged, but the final work must be recorded individually. Failure to comply with these rules and guidelines will result in a failing grade.

**MATH 22**

**College Algebra II and Analytic Geometry:** Relations, functions, graphs, polynomial and rational functions, graphics, word problems, nonlinear inequalities, inverse functions, exponential and logarithmic functions, conic sections, simultaneous equations.

**Prerequisites:** Math 21 or satisfactory performance on the mathematics proficiency examination.

**Text:** College Algebra, Sixth Edition, Robert Blitzer

 **TOPICS**

CHAPTER 1 EQUATIONS AND INEQUALITIES

* 1. Graphs and Graphing Utilities
	2. Linear Equations and Rational Equations
	3. Models and Applications
	4. Complex Numbers

1.5 Quadratic Equations

1.6 Other Types of Equations

1.7 Linear Inequalities and Absolute Value Inequalities

CHAPTER 2 FUNCTIONS AND GRAPHS

* 1. Basics of Functions and Their Graphs
	2. More on Functions and Their Graphs
	3. Linear Functions and slope
	4. More on Slope
	5. Transformations of functions
	6. Combinations of Functions; Composite Functions
	7. Inverse Functions
	8. Distance and Midpoint Formulas; Circles

CHAPTER 3 POLYNOMIAL AND RATIONAL FUNCTIONS

* 1. Quadratic Functions
	2. Polynomial Functions and Their Graphs
	3. Dividing Polynomials; Remainder and Factor Theorems
	4. Zeros of Polynomial Functions
	5. Rational Functions and Their Graphs
	6. Polynomial and rational Inequalities
	7. Modeling Using Variation (Optional)

CHAPTER 4 EXPONENTIAL AND LOGARITHMIC FUNCTIONS

* 1. Exponential Functions
	2. Logarithmic Functions
	3. Properties of Logarithms
	4. Exponential and Logarithmic Equations
	5. Exponential Growth and Decay; Modeling Data

CHAPTER 7 THE CONIC SECTIONS

* 1. The Ellipse
	2. The Hyperbola
	3. The Parabola

CHAPTER 5 SYSTEMS OF EQUATIONS AND INEQUALITIES

* 1. Systems of Linear Equations in Two Variables
	2. Systems of Linear Equations in Three Variables
	3. Partial Fractions (Optional)
	4. Systems of nonlinear Equations in Two Variables

**MATH 22**

**LEARNING OBJECTIVES**

Upon successful completion of Math 22, the student should be able to:

**UNIT ONE:**

**1.1** 1. Graph equations by plotting points.

2.Use a graph to determine - and - intercepts.

**1.2** 3.Solve linear equations with or without fractions.

 4. Solve rational equations.

**1.3** 5.Solve word problems involving linear equations such as simple interest

 investments.

 6. Solve a formula for a variable.

**1.4** 7. Add, subtract, multiply, and divide complex numbers and express the results

 in standard form.

8. Perform operations involving square roots of negative numbers.

**1.5** 9. Solve quadratic equations by the methods of factoring, the square root

 property, completing the square, and using the quadratic formula.

 10. Use the discriminant to determine the number and type of solutions for a

 quadratic equation.

 11. Solve word problems involving quadratic equations.

**1.6** 12. Solve third and fourth degree polynomial equations that may be factored.

 13. Solve radical equations that have one or two square root radicals.

 14. Solve equations with rational exponents.

 15. Solve equations that are quadratic in form.

 16. Solve equations involving absolute value.

**1.7** 17. Solve linear, compound, and absolute value inequalities, then graph the

 solution on a number line and use interval notation to express the solution set.

**2.1** 18. Determine whether a relation is a function.

 19. Determine whether an equation represents a function.

 20. Use a vertical line test to identify graphs in whichis a function of .

 21. Use function notation to evaluate function values.

 22. Identify the domain, range, intercepts, and values of a function from its graph.

**2.2** 23. Find and simplify the difference quotient of a function.

 24. Use graphs to locate relative maxima or minima, and to identify intervals on

 which a function is increasing, decreasing, or constant.

 25. Use definition to determine whether a function is even, odd, or neither.

 26. Use symmetry of the graph to determine whether a function is even, odd, or neither.

27. Graph and evaluate function values of piecewise functions.

**2.3** 28. Write the point-slope form and the slope- intercept of the equation of a line

 from two given points or the slope and one point.

 29. Write equations of horizontal or vertical lines and sketch their graphs.

 30. Rewrite the equation of a line in slope-intercept form and sketch its graph.

31. Use intercepts to graph the standard form of the equation of a line.

**2.4** 32. Find the slopes and equations of parallel and perpendicular lines.

 33. Find the average rate of change of a function.

**UNIT TWO:**

**2.5** 34.Graph functions involving a sequence of transformations.

**2.6** 35. Combine functions using addition, subtraction, multiplication, division, or

 composition, and find their domains.

**2.7** 36. Use the horizontal line test to determine if the function has an inverse.

 37. Use the graph of a one-to-one function to draw the graph of its inverse and

 to find the domain and range of its inverse.

38. Find the inverse of a function algebraically.

**2.8** 39. Find the distance between two points.

 40. Find the midpoint of a line segment joining two given points.

 41. Find the standard form of the equation of a circle with given center and radius

 and vice versa.

 42. Convert the general form of the equation of a circle to standard form and give

 its center, radius, domain, range, and graph.

**3.1** 43. Determine the vertex, intercepts, axis of symmetry, domain, range, max/min

 value and graph of a quadratic function.

44. Solve word problems involving the max or min value of a quadratic function.

**3.2** 45. Use the leading coefficient test to determine the end behavior and the graph of

a polynomial function.

46. Use factoring to find zeros of polynomial functions and identify their

 multiplicities.

47.Find the - and - intercepts of linear and quadratic functions.

48. Determine whether the graph crosses the -axis or touches the -axis and

 turns around at each zero of the polynomial.

**3.3** 49. Use long division to divide polynomials.

 50. Use synthetic division to divide a polynomial by a first-degree polynomial.

 51. Use synthetic division and the Remainder Theorem to evaluate the

 polynomial.

 52. Use the Factor Theorem to determine whether a first degree polynomial is a

 factor of another polynomial.

53. Use a given zero and the Factor Theorem to solve a third degree polynomial

 equation.

**UNIT THREE:**

**3.4** 54. State the Fundamental Theorem of Algebra.

 55. Use the Rational Zero Theorem to find all the possible rational zeros of a

 polynomial.

 56. Use the Rational Zero Theorem and synthetic division to find all the zeros of a

 polynomial function or to solve a polynomial equation.

 57. Use Descartes’ Rule of Signs to determine the possible number of positive zeros,

 negative zeros, and imaginary zeros of a polynomial. (Optional)

58. Use the Linear Factorization Theorem to factor a polynomial into linear factors

 and to find a polynomial with given zeros and degree.**3.5** 59. Use set builder notation to write the domains of rational functions.

 60. Determine the behavior of a rational function near the values excluded from its

 domain.

 61. Identify the vertical and horizontal asymptotes for rational functions.

**3.6** 62. Solve polynomial and rational inequalities, graph the solution sets on a number

 line, and use interval notation to express the solution set.

**3.7** 63. Solve word problems involving a direct variation or an inverse variation. (Optional)

**4.1** 64. Graph exponential functions.

 65. Use compound interest formulas.

**4.2** 66. Change from exponential to logarithmic form.

 67. Change from logarithmic to exponential form and evaluate the logarithm without

 the calculator.

68. Graph logarithmic functions.

69. Find the domain of a logarithmic function.

**4.3** 70. Expand or condense logarithmic expressions by using the product rule, quotient

 rule, and the power rule.

71. Use the change-of-base property and a scientific calculator to evaluate logarithms.

**4.4** 72. Use like bases or logarithms to solve exponential equations.

73. Use the definition of a logarithm or the one-to-one property of logarithms to solve

 logarithmic equations.

**4.5** 74. Set up and solve exponential and logarithmic application problems.

**UNIT FOUR:**

**7.1** 75. Graph ellipses centered at the origin and find the vertices and foci.

 76. Write the equation of an ellipse in standard form from its graph or from given

 conditions.

**7.2** 77. Graph hyperbolas centered at the origin and find the vertices, foci, and equations

 of the asymptotes.

 78. Write the equation of a hyperbola in standard form from its graph or from given

 conditions.

**7.3** 79. Graph parabolas with vertices at the origin and find the foci and the equations of

 the directrix.

80. Write the equation of the parabola in standard form from its graph or from given

 conditions.

81. Use the equation to identify if the graph is a circle, an ellipse, a hyperbola, or a

 parabola and find its domain and range.

**5.1** 82. Solve systems of linear equations in two variables by the substitution method or

 addition method.

83. Solve word problems involving system of linear equations, e.g. find break-even

 points.

**5.2** 84. Solve systems of linear equations in three variables by the substitution method or

 the addition method.

**5.3** 85. Find the partial fraction decomposition of rational expressions. (Optional)

**5.4** 86. Solve systems of nonlinear equations in two variables.

**Math 22 Course Schedule for Spring 2016\*\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
| **January** | 11 | 12 | 13 | 14 | 15 |
| **Week 1** |  1.1, 1.2, 1.3 |  | 1.4, 1.5, 1.6 |   | Work Session  |
|  | 18  | 19 | 20 | 21 | 22 |
| **Week 2** | No class MLK DAY |  | **1.6-1.7****Hw 1.1 – 1.5 due** |  | **2.1**  |
|  | 25 | 26 | 27 | 28 | 29 |
| **Week 3** | **Quiz 1****(1.1-1.7) &**Work Session**Hw 1.6 – 1.7 due** |  | 2.22.3 |  | Work Session |
| **February** | 1 | 2 | 3 | 4 | 5 |
| **Week 4** | 2.3, 2.4 Hw 2.1 – 2.2 due |  | QUIZ 2(2.1-2.3)Review |  |  TEST 1 (1.1 - 2.4)   |
|  | 8 | 9 | 10 | 11 | 12 |
| **Week 5** | 2.5, 2.6Hw 2.3 – 2.4 due  |  |  2.6, 2.7 |  |  Work Session  |
|  | 15 | 16 | 17  | 18 | 19 |
| **Week 6** | 2.7,2.8Hw 2.5 – 2.6 due |  | QUIZ 3REVIEW/QUIZ (2.5 -2.8) |  | Work Session |
|  | 22 | 23 | 24 | 25 | 26 |
| **Week 7** | 3.1Hw 2.7 – 2.8 due |  | 3.2 |  | Work Session |
| **March** | 29 | 1 | 2 | 3 | 4 |
| **Week 8** | 3.3Hw 3.1 – 3.2 due |  | REVIEW |  | TEST 2(2.5-3.3)  |
| **SPRING BREAK --- March 6th --12th**  |
| **Week 9** |  14  | 15 | 16 | 17 | 18 |
|  | 3.4/Hw 3.3 due |  | 3.5 |  | Work Session |
|  | 21  | 22 | 23 | 24 | 25  |
| **Week 10** | 3.6 Hw 3.4-3.5due |  | 4.1 (3.4-3.6)Review |  | Quiz 4 &Work Session  |
|  **April** | 28  | 29 | 30 | 31 | 1 |
| **Week 11** | 4.2 Hw 3.6 and 4.1due |  | (3.4-4.2)Review |  | Quiz 5 & Work Session |
|  | 4  | 5 | 6 | 7 | 8 |
| **Week 12** | 4.3Hw 4.2 due  |  | 4.4 |  |  Work Session   |
|  | 11 | 12 | 13  | 14 | 15  |
| **Week 13** | Quiz 6 / 4.5Hw 4.3-4.4 due |   | REVIEW |  | TEST 3(3.4-4.5) |
|  | 18 | 19 | 20 | 21 | 22 |
| **Week 14** |  7.1, 7.2  Hw 4.5 due |  | 7.2, 7.3 |  | Work Session |
|  **May** | 25 | 26 | 27 | 28 | 29 |
| **Week 15** | 5.15.2Hw 7.1 – 7.3due |  | 5.4/Review  |  | REVIEW forFINALHw 5.1 – 5.2 and 5.4 due |

 **FINAL EXAM WEEK WILL BE May 2, 2016 to May 6, 2016.**

**\*\*The above Math 22 Course Schedule serves as a guide and is up to the instructor to change any item. Through email any change(s) will be announced, especially changes due to inclement weather during this semester.**

**Please do not leave before the Final Exam week of May 2, 2016 to May 6, 2016 since your exam will be scheduled outside of our regular class meeting time.**

**Please read carefully over the following with regard to Hybrid Algebra.**

**\*\*\*Hybrid Algebra is (1) a different method of learning, (2) only for the self-motivated student with superior organizational skills, and (3) a slight increase in instructional pace which permits extra class practice.**

**All students are required to have daily access to the internet.**

**All students are required to print class notes and problem sets before each class.**

**Our hybrid team in conjunction with our course instructional designer is in agreement with the following policy.**

This course is in compliance with Policy 42-23 which is located at: http://www.senate.psu.edu/policies/separate\_policy/42-23.htm . “To explain this policy, all courses at Penn State have a formal instruction time and an outside preparation time**. For a** **3 credit course this means 37.5 formal hours and 75 outside preparation hours for the semester which are 2.5 formal hours and 5 outside preparation hours** **each week**. Due to this course being a hybrid course, we have moved 50 minutes of the formal hours most weeks to an online format; however, the total amount of instruction time is not reduced.”

**Student Responsibility for Learning (from the Math Dept.)**

As a faculty member of Penn State Berks, I believe that learning is a team effort, and I work diligently to fulfill my responsibilities inside and outside the classroom. Students, however, are the most vital part of this effort. Since you have made the decision to come to college, you have made the simultaneous choice to be responsible for your academic success.

What does taking responsibility for learning mean?

* It means that you attend class regularly and arrive on time.
* It means that you complete all assignments on time.
* It means that you understand that each instructor has different requirements and expectations, that you read each syllabus carefully to discern each instructor’s requirements and expectations, and that you abide by the instructor’s requirements and expectations.
* It means that you participate actively in class.
* It means that you put forth considerable time and effort in your academic work and that you turn in work that reflects your time and effort.
* It means that you take advantage of the College’s resources (e.g., Learning Center, Instructor’s workshops and office hours) to ensure that your skills are at the levels they need to be for college work.
* It means that you continuously assess your progress in each class and immediately take steps to address any deficiencies or weaknesses.
* It means that you accept the consequences when you do not meet your responsibilities as a student.

**Please print out and turn in this page in for class meeting.**

I certify that I have read and I understand the terms and conditions set forth in the Math 22 syllabus. I have reread the academic integrity statement. It is my intention to follow these rules to the best of my ability.

**Print Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Sign Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**E- mail \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Phone \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**How do you best learn math? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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 **Please write a paragraph answering the above question.**