Math 129 – Pre-Calculus
(4 Credits)

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Note: When sending an e-mail, include "Math 129" in the subject.

Lecture Section/Time/Room:				
	129-402	MTWR 8:00 – 8:50	ESB 211	Schraeder
	129-001	MTWR 8:30 – 9:20	HOD 252	Hopkins
	129-002	MTWR 10:30 – 11:20	BKH 125	Hopkins
	129-004	MTWR 11:30 – 12:20	STA 46A	Hopkins
	129-006	MTWR 11:30 – 12:20	HOD 301	Schraeder
	129-404	MW 12:00 – 12:50 TR 12:30 – 1:20	ESB 411	Metz
	129-008	MTWR 2:30 – 3:20	HOD 301	Hopkins
	129-009	MTWR 2:30 – 3:20	HOD 302	Schraeder

Lecture Section/Time/Room:			
	129-403	F 8:30 – 9:20	ARM 421
	129-003	F 10:30 – 11:20	ARM 421
	129-005	F 11:30 – 12:20	ARM 421
	129-007	F 11:30 – 12:20	ARM 421
	129-405	F 11:30 – 12:20	ARM 421
	129-011	F 2:30 – 3:20	ARM 421

Textbook: 1) Sullivan, <u>College Algebra and Trigonometry: Enhanced with Graphing Utilities</u>, WVU Edition (5th Edition). Upper Saddle River, NJ, Prentice-Hall. (ISBN: 126919884X)
2) Pyzdrowski, <u>Interactive Computer Laboratories for College Algebra and Precalculus</u>, Pearson.
3) MyLabsPlus (Recommended) (ISBN: 1269199978)

Pre-Requisites: Two units of algebra and one unit of geometry, and satisfactory performance on the departmental placement test (QRA). Not open to students who have credit for the equivalent of either Math 126 or Math 128.

Technology: Either a scientific or graphing calculator is **required** for this course. *Only those calculators permitted for use on the ACT test are permitted.* Please see your instructor if you have any questions.

This course is part of WVU's General Education Curriculum and focuses on Basic Mathematics and has been certified as part of WVU's Liberal Studies Program, Math and Natural Sciences (Cluster C). The course will focus, in part, on developing your ability to communicate effectively, understand alternative views and cultures, and use quantitative and scientific knowledge accurately.

Course Objectives: The general goals of this course are common to all courses in the Institute for Math Learning at WVU:

- **Conceptual Understanding**: rather than just rote memorization of algorithms
- **Multiple Approaches**: To examine problems from analytical, geometric, and numerical perspectives, to make judgments about the appropriateness of the choice of formal or approximate methods of solution.
- **Technology as a Tool**: Use technology as an integral part of the process of formulation, solution, and communication, to gain experience in selecting the proper tool for a given problem.
- **Active Student Learning**: To engage in the exploration and discovery of concepts and to learn to work cooperatively to solve problems.
- **Communication of Ideas**: To demonstrate understanding, by explaining in written or oral form, the meanings and applications of concepts.
- **Applications**: Use math to model and solve real-world problems.
- **Problem Solving**: Gain experience as a problem solver, to analyze problems in an organized manner.

The specific goals of the Math 129 will be to stress an algebraic, graphic, and numeric approach to the study of:

- Understanding and using the concept of functions
- Mathematical application problems
- Solving equations and inequalities in one variable using multiple representations
- Graphing equations and functions
- Lines, parabolas, and circles
- Higher order polynomial, rational, radical, absolute value, exponential, and logarithmic functions
- Systems of equations and matrices
- Right triangle and unit circle approaches to trigonometry
- Trigonometric identities and equations

To accomplish course goals, the class incorporates interactive laboratories which use technology and student activities that emphasize writing and student collaboration. Students will work in pairs or triads on the laboratories and in-class exercises in order to develop mathematical communication skills. **The development of your communication skills is an integral part of this course.**

Academic Dishonesty: Failure to comply with any written rules or regulations set forth in the course will result in a zero on that activity and may result in reporting the action to the Dean of Arts and Sciences.

Social Justice and Disability: West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (304-293-6700).

Grade Disputes: All extreme-case situations are reviewed and decided upon by the Math 129 instructional team during Finals week. Such cases require written documentation from the student outlining the request and circumstances surrounding the request. Committee Forms are due to your instructor by the last day of class and within 2 weeks of the posting of the grade to be reviewed. Each student is to fill out his/her own Committee Form in the event of a group circumstance. Please contact your instructor for more information.

Evaluation: Multiple forms of assessment will be used to measure your understanding of algebra and trigonometry concepts and problem solving. The distribution of these assessments is:

	Assessment	Number	Points	Percent of Grade
1	Participation	74	100	10%
2	Quizzes	10	100	10%
3	Labs	10	200	20%
4	Tests	4	400	40%
5	Comprehensive Final	1	200	20%
TOTAL			1000	100%

Grading Scale:

Course Points	Percent	Letter Grade
$[900, \infty)$	90% – 100%	A
$[800, 900)$	80% – 89%	B
$[700, 800)$	70% – 79%	C
$[600, 700)$	60% – 69%	D
$[0, 600)$	0% – 59%	F

1. **Participation and Attendance:** Attending and participating is expected from every student during every class. Your instructor may take attendance in any way he/she may choose, including participation activities. Participation activities cannot be made up later. If you miss class for any reason, then you lose attendance points for that day. Attendance will be taken for all class and Lab sessions. The 100 points for Participation are calculated from accumulated total points from Class and Lab Participation. ALL missed classes will be treated the same, REGARDLESS of the reason. If you leave early, then you will not receive any points for that day. Students are permitted to miss up to 5 classes without affecting their attendance grade. These days are intended to allow for any *Days of Special Concern*, University-sponsored activities, or any unforeseen circumstances that may arise.

2. **Quizzes:** The Quizzes are taken on E-Campus and assess mastery of skills and concepts. These Quizzes are <u>taken outside of class and Lab time</u> and can be taken on any computer connected to the Internet. You **MUST** get a **perfect score** on the Quiz Release **(by the listed Due Date)** before any of the Quizzes will be available to you. (The Quiz Release does NOT count towards your grade.) **If you submit at least one attempt of a Quiz by <u>8:00 AM</u> on the scheduled due-date (and score at least 1 point), then you will be given 2 more attempts for that Quiz (that can be taken until the Quizzes close). If you do NOT submit an attempt before the scheduled due-date, then you will ONLY get one attempt for that Quiz (that can be taken until the Quizzes close).** The highest score on a Quiz will count as part of your grade. You must complete the Quizzes in ORDER. (Quiz 1, then Quiz 2, then Quiz 3, etc.) You may seek help from others (not from your instructor during class). You must submit your own work. The Quiz portion of the course will be "turned off" at **5:00 PM** on **<u>Tuesday, December 10</u>**.

3. **Laboratories:** Labs will be one hour in length and attendance will be recorded. Computer Labs are held on Fridays in Armstrong 421. There will be 10 computer laboratory assignments. The laboratory scores will be averaged. You will be awarded Laboratory Points that are 2 times your Laboratory Average. Laboratory assignments should be done groups of 2-3 in the Lab during the scheduled Lab time. Laboratory points are awarded for the ability to do and communicate about mathematics, as well as for your ability to manage your time, follow directions, and follow a schedule. Any laboratories not submitted as a team effort, will not be awarded communication points. An E-Campus component (Lab Check-In) that is available only in the Lab must be completed. **If you do NOT complete the E-Campus component (Lab Check-In), then you will NOT receive points for the laboratory.** (The Lab Check-In does not count towards your grade, but it acts as a "release" for your actual Lab Grade.)

No late Labs will be accepted. They must be turned in by the Monday following the assignment, and ONLY during class time.

- You must attend the Laboratory Section that you are registered for and you must work with a laboratory partners from your lecture section in order to receive Participation Points on a Lab.
- Labs must be turned in only to YOUR instructor and are due IN YOUR CLASS on the Monday following the Lab day. As a courtesy to students, Labs will be accepted on Tuesday IN YOUR CLASS with no penalty. After that, NO LATE LABS WILL BE ACCEPTED. Only Labs turned in to your instructor during regularly scheduled class time will be accepted. If you must miss class, then make plans to get your Lab turned in.
- Each student should complete his/her own copy of the Lab Report. Be prepared to turn in your copy of the Lab if your partner is absent the day that it is due. NO EXCUSES will be accepted for a Lab not turned in because the Lab partner did not do it.
- Only one Lab per team (2 – 3 students) will be graded; if more than one Lab is turned in, then only one will be graded and returned.
- Each Lab Report MUST have the Lecture time AND Lecture Room in the upper, right-hand corner of the front page. If this information is missing, or if the Lab Report is turned in with the wrong group, then a penalty of 5 points will be assessed.

4. **Tests:** Tests will be given in the IML Computer Center during your assigned Lab time. They will be completed on both the computer and on paper. Any outside assistance on the Tests is considered cheating and will result in a 0 for that Test, if not worse. As per IML policy, you must present you WVU ID on Test days. If you do not have your WVU ID, then you will NOT be allowed to take the Test. The Final Exam will be given on Thursday, December 12 in Armstrong 421 (Sign up you're your instructor).

Make-Up Test: If a student contacts the instructor prior to the Test, a make-up Test tentatively scheduled to be given during Lab in Armstrong 421 on the date on your schedule. Missed Tests WILL affect Mid-Term grades. Instructors reserve the right to refuse Make-Up Tests.

ACT Quiz: There will be two ACT Quizzes given, which can allow you to earn bonus course points:

Number Correct	Bonus Awarded	Number Correct	Bonus Awarded
1 – 21	1 point	40 – 41	6 points
22 – 28	2 points	42 – 44	7 points
29 – 31	3 points	45 – 47	8 points
32 – 34	4 points	48 – 49	9 points
35 – 39	5 points	50 – 60	10 points

Homework: Homework problems are listed for each section and students are strongly recommended to try them. However, homework problems will NOT be collected. They are for the benefit of the student only. Practice is essential to master the material, and the homework problems are an excellent way to get that practice. The answers to the odd problems are in the back of the book, so students can check their answers. Students can also try the problems at the end of each chapter as a Review for Tests and Exams. The homework problems can also be worked on-line by using MyLabsPlus (**https://secure.ecollege.com/wvu**).

MyLabsPlus Log-In Info: **Username:** YourMixID   **Password:** YourMixID2013

Help: On an average, you should expect to spend 2-3 hours outside of class for each hour in class. (That means, for this course, it is expected for you to spend approximately 8 – 12 hours per week outside of class working on this course.) If you are spending more, then you may need to seek help. There are several excellent sources. Seek help from classmates; often they can explain a problem since they've been working on it, too. Seek help from the Math Learning Center in Armstrong 301 or the Institute for Math Learning (IML) Computer Lab located in Armstrong 215. Additionally, seek help from your instructor during Office Hours, a commonly under-utilized resource.

Homework Assignments for Pre-Calculus

Section	Name	Problems
R.1	Real Numbers	1, 21 – 27 odd, 33, 35, 39, 41, 45, 51, 57, 59, 65, 69, 75, 81, 87, 91, 93
R.2	Algebra Essentials	4, 11, 15, 23, 24, 31, 37, 41, 45 – 49 odd, 57 – 61 odd, 65, 73 – 77, 87, 89, 91, 93
R.3	Geometry Essentials	11, 21, 25 – 31 odd, 37, 39
R.4	Polynomials	7, 9, 17, 21, 29, 31, 34, 39, 47, 55, 69, 93, 97
R.5	Factoring Polynomials	5, 13, 17, 25, 33, 39, 45, 51, 57, 61, 65, 85, 91, 95, 105, 107, 121
R.6	Synthetic Division	5, 9, 17
R.7	Rational Expressions	5, 13, 19, 25, 31, 47, 53, 63, 73
R.8	nth Roots; Rational Exponents	1, 2, 7, 15, 17, 21, 23, 31, 43, 47, 55, 63, 71, 75
1.1	Rectangular Coordinates; Graphing Utilities	5 – 9 odd, 13, 33, 39, 49, 57, 64, 75 – 79 odd, 83, 95, 105
1.2	Solving Equations Using Graphing Utilities	41 – 45 odd, 51 – 55 odd, 61, 71, 77, 89, 95, 99, 101, 105, 107, 109
1.3	Quadratic Equations	5, 6, 13 – 17 odd, 23, 25, 37 – 41 odd, 45, 49, 51, 63, 67, 79, 85, 97, 99, 105
1.4	Complex Numbers	9, 13, 19, 26, 27, 31 – 35 odd, 49 – 53 odd, 59, 73, 79
1.5	Radical Equations	11, 15, 23, 25, 31, 35, 51, 57, 61, 67, 69, 86, 89, 116
1.7	Solving Inequalities	11, 12, 14, 23, 27, 31, 35, 47, 49, 59, 64, 69, 71, 73, 77, 79, 83, 107, 109
2.1	Symmetry; Graph Key Equations	13, 21, 27, 31, 39, 41, 45, 51, 69, 71
2.2	Lines	13, 17, 27, 29, 31, 41 – 45 odd, 59, 65, 77, 83, 85, 97, 121, 127, 128
2.3	Circles	6, 9, 11, 17, 23, 27, 31, 32, 37, 39, 43
3.1	Functions	15, 19, 27, 33, 39, 41, 53 – 57 odd, 61, 65, 73, 75, 89, 98
3.2	The Graph of a Function	9, 13, 15, 23, 25, 37
3.3	Properties of Functions	11 – 21 odd, 29, 33, 53, 63, 64
3.4	Library of Function; Piecewise	9 – 16, 25, 29, 35, 41, 43
3.5	Graphing Techniques: Transformations	7 – 19 odd, 27, 31, 41, 59, 65
3.6	Mathematical Models	3, 7 – 9, 11, 13 – 15, 29, 31
4.3	Quadratic Functions and Their Properties	11 – 17 odd, 27, 45, 51, 53, 59, 71, 79, 81, 85
4.4	Building Quadratic Models	3, 7 – 9, 11, 15
5.1	Polynomial Functions and Models	11, 15, 23, 25, 32, 37, 43, 55, 61, 69, 71 79, 91
5.2	Properties of Rational Functions	13, 23, 25, 31, 41, 45, 51
5.3	Graph of Rational Function	7, 15, 27, 33, 35, 51, 61
5.5	Real Zeroes of Polynomial Function	11, 13, 21, 27, 39, 43, 63, 73
5.6	Complex Zeroes	7, 9, 17, 23, 33
6.1	Composite Functions	7 – 11 odd, 19, 47, 53, 65, 71
6.2	One-to-One Functions; Inverse Functions	11, 15, 19, 21, 35, 43, 50, 63, 65, 90
6.3	Exponential Functions	15, 21 – 23, 25 – 35 odd, 38, 49, 59, 63, 77, 81, 97, 121
6.4	Logarithmic Functions	13, 15, 19, 23, 31, 37, 57, 63, 70, 73, 79, 81, 87, 97
6.5	Properties of Logarithms	2, 13, 15, 23, 27, 41, 49, 51, 53, 61 – 65 odd, 69, 75, 76, 83
6.6	Logarithmic and Exponential Functions	11, 15, 25, 37, 43, 47, 51, 81
6.7	Financial Models	7, 15, 29, 35, 41, 45, 54
6.8	Exponential Growth and Decay	1, 3, 7 – 11 odd
7.1	Angles and Their Measure	11 – 21 odd, 35 – 51 odd, 55
7.2	Right Angle Trigonometry	11– 41 odd
7.3	Compute Values of Trig Functions of Acute Angles	5 – 45 odd
7.4	Trig Functions of General Angles	11, 13, 23, 25, 29, 33 – 75 odd, 89 – 101 odd, 107 – 113 odd
7.5	The Unit Circle: Properties of Trig Functions	5, 13, 59 – 63 odd, 67 – 71 odd, 79, 81
7.6	Graphs of Sine and Cosine Functions	11 – 17 odd, 27, 31 – 37 odd, 41, 43, 47, 51, 55, 57, 67 – 71 odd, 75, 77, 81
7.7	Graphs of Tan, Cot, Csc, and Sec Functions	7 – 39 odd, 49
7.8	Phase Shift; Sinusoidal Curve Fitting	3, 11 – 17 odd, 27, 33 – 37 odd
8.1	Inverse Sin, Cos, Tan	13 – 27 odd, 37 – 49 odd, 61 – 67 odd
8.2	More Inverse Trig Functions	29, 31, 35, 41, 47, 51, 59, 65, 67
8.3	Trig Identities	9 – 31 odd, 37 – 49 odd, 69, 71
8.4	Sum and Difference Formulas	9 – 33 odd, 37, 45, 71 – 75 odd, 83
8.5	Double-Angle and Half-Angle Formulas	7, 9, 15, 19 – 29 odd, 33, 35, 49 – 53 odd, 69 – 77 odd, 95
8.7	Trigonometric Equations I	7 – 17 odd, 21, 27 – 45 odd
8.8	Trigonometric Equations II	5 – 15 odd, 25, 29 – 33 odd, 47 – 53 odd, 57
9.1	Solving Right Triangles	9 – 27 odd, 35
9.2	Law of Sines	9 – 13 odd, 21, 25 – 43 odd, 47, 51
9.3	Law of Cosines	9 – 17 odd, 25, 33, 37, 43, 51
9.4	Area of a Triangle	5 – 15 odd, 19, 35, 37, 41
10.1	Polar Coordinates	11, 15, 19 – 23 odd, 27 – 33 odd, 37, 41 – 45 odd, 59, 61, 67, 73, 75, 79
10.2	Polar Equations and Graphs	13 – 19 odd, 23, 61
10.4	Vectors	7 – 49 odd, 55 – 63 odd
10.5	The Dot Product	7 – 17 odd, 29 – 37 odd
12.1	Systems of Linear Equations	7, 11, 19, 23, 25, 29, 41, 55
12.2	Systems of Linear Equations: Matrices	5, 11, 17, 39, 41, 51

Week	Date	Day	Text Sections	Topic(s)	Assignments Due
				Tentative Schedule	
1	8/19	M	Syllabus, R.1-R.5	Review Sections	
	8/20	T	R.7,R.8	Review Sections	
	8/21	W	1.1-1.2	Graphing and Solving Equations	
	8/22	R	1.3	Quadratic Equations	Attitude Assessment and Survey (11:59 PM)
	8/23	F	**Extra Credit**	**ACT Quiz 1**	Quiz Release & Quiz 1 Due (8:00 AM)
2	8/26	M	1.5	Radical, Absolute Value, and Factorable Equations	
	8/27	T	1.7, 2.1	Solving Inequalities and Graphing Key Equations	
	8/28	W	2.1-2.2	Lines	Lab 1 Due (Intro. to Basic Graphs)
	8/29	R	2.3, 3.1	Circles and Functions	
	8/30	F	**Lab 2**	**Graphing Techniques Lab**	Quiz 2 Due (8:00 AM)
				Labor Day	
3	9/3	T	3.1-3.2	Functions and Graphs	Lab 2 Due (Graphing Techniques)
	9/4	W	3.3	Properties of Functions	
	9/5	R	3.4	Library of Functions and Piece-wise Functions	
	9/6	F	**Lab 3**	**The Box Lab**	
4	9/9	M	3.5	Transformations	Lab 3 Due (The Box Lab)
	9/10	T	6.1, 4.4	Composite Functions and Quadratic Models	
	9/11	W	3.6, 4.3, 1.4	Math Models, Quadratic Functions, Complex Numbers	
	9/12	R	Review		
	9/13	F		**Test 1**	Quiz 3 Due (8:00 AM)
5	9/16	M	5.1, R.6	Polynomials and Synthetic Division	
	9/17	T	5.5	Real Zeros of a Polynomial	
	9/18	W	5.6	Complex Zeros and the Fundamental Theorem of Algebra	
	9/19	R	5.2-5.3	Rational Functions	
	9/20	F	**Lab 5**	**Polynomial Functions Lab**	
6	9/23	M	5.3	Rational Functions (cont'd)	Lab 5 Due (Polynomials)
	9/24	T	6.2	Inverses	
	9/25	W	6.3-6.4	Exponential and Logarithmic Functions	
	9/26	R	6.5	Properties of logarithms	
	9/27	F	**Lab 6**	**Rational Functions Lab**	Quiz 4 Due (8:00 AM)
7	9/30	M	6.6-6.7	Exponential and Logarithmic Models	Lab 6 Due (Rationals)
	10/1	T	6.8	Exponential Growth and Decay	
	10/2	W	Catch-up		
	10/3	R	Review		
	10/4	F		**Test 2**	Quiz 5 Due (8:00 AM)
8	10/7	M	7.1	Angles and Measures	
	10/8	T	7.2	Right Triangles Trigonometry	
	10/9	W	7.3	Trig Values of Acute Angles	
	10/10	R	7.4	Trigonometric Functions of General Angles	
	10/11	F	**Lab 7**	**Exponential Functions Lab**	
				Fall Recess	
9	10/16	W	7.5	The Unit Circle and Trig Functions	Lab 7 Due (Exponentials)
	10/17	R	7.6	Graphs of Sine and Cosine	
	10/18	F	**Lab 8**	**Logarithmic Functions Lab**	Quiz 6 Due (8:00 AM)
10	10/21	M	7.7-7.8	Graphs of Reciprocal Functions and Phase Shifts	Lab 8 Due (Logarithms)
	10/22	T	7.8	Phase Shifts	
	10/23	W	Catch-up		
	10/24	R	Review		
	10/25	F		**Test 3**	Quiz 7 Due (8:00 AM)
11	10/28	M	8.1-8.2	Inverse Trigonometric Functions	
	10/29	T	8.3	Inverse Trigonometric Functions (cont'd)	
	10/30	W	8.3	Inverse Trigonometric Functions (cont'd)	
	10/31	R	8.4	Sum and Difference Formulas	
	11/1	F	**Lab 9**	**Trigonometric Functions Lab**	
12	11/4	M	8.5	Double and Half Angle Formulas	Lab 9 Due (Trig Functions)
	11/5	T	8.7	Trigonometric Equations (I)	
	11/6	W	8.8	Trigonometric Equations (II)	
	11/7	R	9.1	Applications of Right Triangles	
	11/8	F	**Lab 10**	**Trigonometric Graphs Lab**	Quiz 8 Due (8:00 AM)
13	11/11	M	9.2	Law of Sines	Lab 10 Due (Trig Graphs)
	11/12	T	9.3	Law of Cosines	
	11/13	W	9.4	Area of Triangles	
	11/14	R	Review		
	11/15	F		**Test 4**	Quiz 9 Due (8:00 AM)
14	11/18	M	10.1	Polar Coordinates	
	11/19	T	10.2	Polar Equations and Graphs	
	11/20	W	10.2	Polar Equations and Graphs (cont'd)	
	11/21	R	10.4	Vectors	
	11/22	F	**Lab 4**	**Quadratics Lab**	
				Thanksgiving Recess	
15	12/2	M	10.5	Dot Products	Lab 4 Due (Quadratics)
	12/3	T	11.1-11.4	Conics, Parabolas, Ellipses, Hyperbolas	
	12/4	W	12.1	Systems of Linear Equations	
	12/5	R	12.2	Matrices	
	12/6	F	**Extra Credit**	**ACT Quiz 2/Make-Up Test**	Quiz 10 Due (8:00 AM)
16	12/9	M	Review		
	12/10	T	Review		