

# MATH 1240: Pre-Calculus

#### Instructor

**Dr. Ariel Ramirez** aramirez8@unm.edu Office: LRC 172

### **Class Details**

Tuesday/Thursday Class Time: 1:30-2:45pm Room: Zoom Online **ZOOM ID: 910 7188 4829** 

#### **Tutoring Hours**

M/T/W/Th 10:00am-11:30am Or by Appointment **ZOOM ID: 926 9130 0553 Code: f2020** 



"Laboratory Still Life 02" - Don Shank

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## **Course Description**

In-depth study of polynomial, rational, exponential and logarithmic functions and their graphs. Includes the fundamental theorem of algebra, systems of equations, conic sections, parametric equations and applications in geometry. Exploration of the graphing calculator. May be taken concurrently with 1230. Meets New Mexico Lower-Division General Education Common Core Curriculum Area II: Mathematics. *(3 Credit Hours).* 



**Prerequisites:** A grade of C or better in Math 1220 or ACT Math =>25 or SAT Math Section =>570 or ACCUPLACER Next-Generation Advanced Algebra and Functions =249-283 or A in Pre-calculus, Trigonometry, Calculus. Check with your adviser to make sure you meet the requirements.

## **Course Outcomes**

In this course, we will investigate polynomial, rational, exponential and logarithmic functions and their graphs, systems of equations, and conic sections, A complete list of the Student Learning Objectives for this course is given at the end of this syllabus.

## **Course Materials**

#### Textbook:

Stewart, Redlin, & Watson's Pre-Calculus, 7th edition, 2016. Cengage Learning.

#### **Technical Skills:**

To participate and succeed in this class, you will need to be able to perform the following basic technical tasks:

- Use email including attaching files, opening files, downloading attachments
- Copy and paste within applications including Microsoft Office
- Open a hyperlink (click on a hyperlink to access a website or online resource)
- Use Microsoft Office applications

### Technical Skills (continued):

- Create, download, update, save and upload MS Word documents
- Download, annotate, save and upload PDF files
- Access MS Teams
- Use the in-course web conferencing tool (Collaborate Web Conferencing software in UNM Learn) or use Zoom or other web conferencing tool
- Download and install an application or plugin required for participating in web conferencing sessions
- Use UNM Learn (help documentation located in the "How to Use Learn" link on the left course menu, and also at <u>Online Student Documentation</u>). Also, UNM-Valencia provides a Blackboard Learn Jumpstart self-learning module to give you practice with the most commonly used tools in UNM Learn. Ask your instructor if you do not see the UNM-Valencia Blackboard Learn Jumpstart in your list of classes in UNM Learn.



#### **Technical Requirements:** *Computer*

A high-speed Internet connection is highly recommended. Supported browsers include Chrome, Edge, Firefox, Safari, and Internet Explorer.

Any computer capable of running a recently updated web browser should be sufficient to access your online course. However, bear in mind that processor speed, amount of RAM, and Internet connection speed can *greatly* affect performance. *Be aware, some programs that use mathematics will not work well on mobile devices such as smartphones or tablets.* 

Microsoft Office products are available free for all UNM students (more information on the UNM IT Software Distribution and Downloads page) Please update your contact information in Loboweb: MyUNM. When you log into MyUNM, Enter LoboWeb. Click on the Personal Information link to make sure your contact information is up to date.

Laptops may be available for checkout for the Fall semester from the UNM-Valencia Library. Contact the librarians for more information.

## Web Conferencing

Web conferencing via ZOOM will be used in this course: For the online sessions, you will need:

- A USB headset with a microphone. Headsets are widely available at stores that sell electronics, at the UNM Bookstore or online.
- A high-speed internet connection is highly recommended for these sessions. A wireless Internet connection may be used if successfully tested for audio quality before web conferencing.
- You should also dress as you would when attending an in-person class, even if you do not turn on your video camera.

### Technical Support

- For UNM Learn Technical Support: (505) 277-0857 (24/7) or use the "Create a Tech Support Ticket" link in your course.
- For UNM-Valencia IT Support: (505)925-8911
- For UNM Web Conference Technical Help: (505) 277-0857

#### **Other Requirements:**

- Administrative rights to download free software or plug-ins or add-ons on the computer you plan to use for this course.
- Access to Microsoft Teams will use your UNM NetID to log into UNM Learn. This is available as part of your Office 365 package.
- Standard or Scientific calculator. This cannot be an app on your cell phone.
- Adobe Reader (a free download), preferably version 11.0 or better.

## **Classroom Policies**

### Attendance / Participation (10%)

You are expected to be <u>on time</u> to each class and stay the <u>entire</u> class, have the necessary course materials on hand, and participate in the lecture and/or group activities to receive full credit for attendance each day.

**Absences:** If you know ahead of time you will miss a class, send me an email indicating the date of the absence.

Arrange before the next class meeting to get notes from a classmate. The student bears full responsibility for the material and information covered in class.

Each student starts with 100 attendance points. Attendance is taken at the **beginning** of class.



The Persistence of Memory-1931 Dali

#### Homework (30%)

Homework is assigned nearly every week based on the course outline. A list of problems is assigned in the relevant sections covered in class. You are responsible for submitting a few of those problems as indicated in the homework list. The purpose of the written homework is to determine if you are understanding the concepts correctly. Illegible homework will not be graded. **Each homework assignment is worth 25 points. Late homework may be graded. If graded, it receives a 20% penalty.** *The lowest homework grade will be dropped.* 

## **Classroom Policies**



### **Project Assignments (20%)**

During the semester, four projects will be assigned. If available, you may have some class time to begin or work on the project, but it will be designed for you to complete at home. If you are working on this project in groups, you must demonstrate that you contributed to the group answer. I also require *individual* submissions of the project, not one group paper. Each project will be worth 50 points toward your course grade. Late projects may be graded. If graded, it receives a 20% penalty.

## Exam (20%)

There will be one exam during the semester based on the overall homework assigned in the course. If you are ill or an unexpected event happens, and you cannot make it to the exam, you have one week to make it up.

## Final Exam (20%)

The final exam will cover all the topics in the course. It will be based on the exam, and homework.

#### John Napier,

(1550—1617), A Scottish landowner for whom mathematics was a hobby. We know him today because of his key invention: logarithms, which he published in 1614 under the title *A Description of the Marvelous Rule of Logarithms*. In Napier's time, logarithms were used exclusively for simplifying complicated calculations.

**Time for This Course:** Plan to spend a *minimum* of 9 to 12 hours per week for this class. There is no guarantee you will pass if you dedicate this amount of time, you still need to learn the material and use your time wisely, but those who pass generally are the ones who spend the time needed to learn the material.

## Netiquette

One of the overriding principles in online conversations is to "craft your responses effectively." It is sometimes difficult to remember that real people are reading posted messages. This is especially true of online communication where others do not have the opportunity to see body language or hear the tone of voice; therefore, misunderstandings are more likely.

Please, follow these guidelines in *all* of your online responses and discussion postings.

- Honor everyone's right to an opinion.
- Respect the right of each person to disagree with others.
- Respond honestly but thoughtfully and respectfully; use language that others will not consider foul or abusive. You may also use emoticons to convey a lighter tone.
- Respect your privacy and the privacy of others by not revealing information which you deem private and which you feel might embarrass you or others
- Be prepared to clarify statements that might be misunderstood or misinterpreted by others

#### A Special Note about Anger

- Do not send messages that you have written when you are angry, even anonymous ones. In the online world, angry messages are known as "flaming" and are considered bad behavior.
  Venting and flaming are two different things. It is possible to vent without becoming "ugly." Stick to the facts of what is causing you frustration.
- Do not send messages that are written all in upper case; this is the visual equivalent of SHOUTING. It is considered aggressive and is considered bad behavior. If you ever feel like shouting a message, take a deep breath, and wait until you have calmed down before responding. Then, respond calmly and factually.

**Student Resources:** If you are struggling in this course, do not be afraid to ask for help!

- Tutoring Hours: See my tutoring hours listed at the beginning of this syllabus.
- Form online study groups: You may work together with other members of our class.
- Free Tutoring: http://valencia.unm.edu/campusresources/the-learning-center/learningcenter.html



## **University Policies**

**Equal Access:** In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as I am not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Contact Accessibility Resource Center at 277-3506 for additional information.

If you need an accommodation based on how course requirement interacts with the impact of a disability, you should contact me to arrange an appointment as soon as possible. At the appointment we can discuss the course format and requirements, anticipate the need for adjustments and explore potential accommodations. I rely on the Disability Services Office for assistance in developing strategies and verifying accommodation needs. If you have not previously contacted them, I encourage you to do so.

If you are a Valencia campus student, contact Equal Access Services at Valencia Campus at (505)925-8560 or <u>Valencia Student Services</u>. If you are a main campus student you can receive documentation from the main campus Accessibility Resource Center. I will not guarantee accommodation without the appropriate documentation.

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Omar Khayyam 1048-1131 Khayyam was an astronomer, astrologer, physician, philosopher, and mathematician. In 1070, he published *Treatise on Demonstration of Problems of Algebra and Balancing*. In it he showed that a cubic equation can have more than one solution. He also showed how the intersections of conic sections such as parabolas and circles can be utilized to yield geometric solutions of cubic equations.

<www.famousscientists.org/omar-khayyam/>.

## **Copyright Issues**

All materials in this course fall under copyright laws and should not be downloaded, distributed, or used by students for any purpose outside this course.

The UNM Copyright Guide has additional helpful information on this topic. https://copyright.unm.edu

### **Accessibility Statements**

<u>Blackboard's Accessibility statement</u> https://www.blackboard.com/blackboard-accessibility-commitment <u>Microsoft's Accessibility statement</u> https://www.microsoft.com/en-us/accessibility/

### Academic Integrity

Having academic integrity is paramount to your success in any class. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. Here is the link to the UNM Academic Dishonesty Policy: https://pathfinder.unm.edu/campus-policies/academic-dishonesty.html and student code of conduct: https://pathfinder.unm.edu/code-of-conduct.html

Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

### Academic Dishonesty is defined as:

"Academic dishonesty" includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

## University Policies (continued)

**Title IX Statement**: In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education (see pg. 15 - http:// www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu).

For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university -policies/2000/2740.html



# Grading

#### **COURSE AVERAGES:**

Attendance/Class Participation	10%
Written Homework	30%
Project Assignments	20%
Exam	20%
Final Exam	20%
Total	100%

#### Cavalieri's Principle

**Bonaventura Cavalieri**, (1598 — 1647) Italian mathematician who made developments in geometry that were precursors to integral calculus. Cavalieri observed that figures (solids) of equal height and in which all corresponding cross sections match in length (area) are of equal area (volume).

#### **GRADING SCALE:**

Letter Grade	Weighted Average
Α	[90, 100]
В	[80, 90]
С	[70, 80]
D	[60, 70]
F	[0, 60]

Week	Dates	Sections / Topics	Assignments
1	8/18-8/20 T/Th	Sec. 1.8, 1.9	
		Inequalities, Coordinate Plane	
2	8/25-8/27 T/Th	Sec. 2.1, 2.2	Written Unit 1 homework due
		Functions and their Graphs	
	8/28	Last day to add a course (5 pm)	
3	9/1-9/3	Sec. 2.3, 2.4	Written Unit 2 homework due
	T/Th	Information from Graphs, Average Rate of	
		Change	
	9/4 F	Last day to drop a course without a grade (5 pm)	
	9/7 M	Labor Day – no classes	
4	9/8-9/10 T/Th	Sec. 2.5, Modeling Linear Functions	Written Unit 3 homework due
5	9/15-9/17 T/Th	Sec 27.28	Written Unit 4 homework due
5	<i>y</i> 15 <i>y</i> 17 1/11	Combining Function and One-to-One	Project 1 is Due
6	9/22-9/24	Sec. 1.6. 3.1	Written Unit 5 homework due
Ū	T/Th	Complex Numbers, Quadratic Function	
7	9/29-10/1 T/Th	Sec. 3.2, 3.3	Written Unit 6 homework due
	, , ,	Polynomial Functions and Division	Project 2 is Due
8	10/6 - 10/8	Review	Written Unit 7 homework due
	T/Th	Exam	
	10/7 W	Fall Break Day	
9	10/13-10/15 T/Th	Sec. 3.6. 4.1	Written Unit 8 homework due
	- / / - /	Rational and Exponential Functions	
10	10/20-10/22 T/Th	Sec. 4.2, 4.3	Written Unit 9 homework due
		Natural Exponential and Logarithmic	
11	10/27-10/29 T/Th	Sec. 4.4, 4.5	Project 3 is Due
		Laws of Logarithmic & Exponential	
12	11/3-11/5	Sec. 4.6, 10.1	Written Unit 10 homework due
	T/Th	Modeling and System of Equations	
	11/3 T	Election Day – no classes	
	11/6 F	Last day to drop without Dear	n's Permission (5 pm)
13	11/10-11/12	Sec. 10.8, 11.1	Project 4 is Due
	T/Th	Nonlinear Systems and Parabolas	
14	11/17-11/19 T/Th	Sec. 11.2, 11.3 Ellipses and Hyperbolas	Written Unit 11 homework due
15	11/24 - 11/26	Sec. 13.1, 13.2	Written Unit 12 homework due
	T/Th	Finding Limits	
	11/26 - 11/27	Thanksgiving Break	
16	12/1-12/3 T/Th	Review	Written Unit 13 homework due
	12/4 F	Last day to drop with Dean's permission/change grade mode with form (5 pm)	
17	12/8	Final Exam 1:30-3:30pm	
	'		<b>A</b> *

## **Course Student Learning Outcomes**

Upon successful completion of the course, students will be able to:

Course Goal 1: Communication

SLO 1: Students will be able to use correct mathematical notation and terminology.

SLO 2: Students will be able to read and interpret graphs.

Course Goal 2: Functions

SLO 1: evaluate functions and difference quotients for a variety of functions.

SLO 2: graph some basic functions; this includes power, root, reciprocal, and piecewise defined functions.

SLO 3: calculate an average rate of change of a function and to interpret its meaning.

SLO 4: shift, and reflect graphs, and to compress and stretch graphs horizontally and vertically.

SLO 5: set up models using functions in word problems.

SLO 6: find extreme values of quadratic functions.

SLO 7: compose functions and to express a given functions as a composition of two simpler functions.

SLO 8: identify one-to-one functions and find and graph their inverses.

Course Goal 3: Polynomial and Rational Functions

SLO 1: determine the end behavior and the zeros of polynomial functions. They will be able to use this to graph the function.

SLO 2: divide polynomials and to understand the Division Algorithm. Students will be able to solve quadratic equations with complex roots.

SLO 3: use the Fundamental Theorem of Algebra and the Complete Factorization Theorem.

SLO 5: find horizontal, vertical, and skew asymptotes of rational functions. They will be able to graph rational functions.

Course goal 4: Exponential and Logarithmic Functions

SLO 1: graph exponential and logarithmic functions.

SLO 2: solve a variety of exponential and logarithmic equations.

SLO 3: set up exponential growth and decay models and to solve the

associated word problems.

Course goal 5: Analytic Geometry

SLO 1: identify and graph the conic sections.

SLO 2: graph parametric equations in two dimensions that involve algebraic functions. They will be able to eliminate the parameter.