Math 2531: Calculus 3

Remote-Scheduled: M/T/W/TR: 1pm-2:45pm

(Class Zoom Meeting Link in Canvas)

Instructor: Andy Taylor

Please note: This syllabus is subject to change, if needed.

Office and Contact Information:

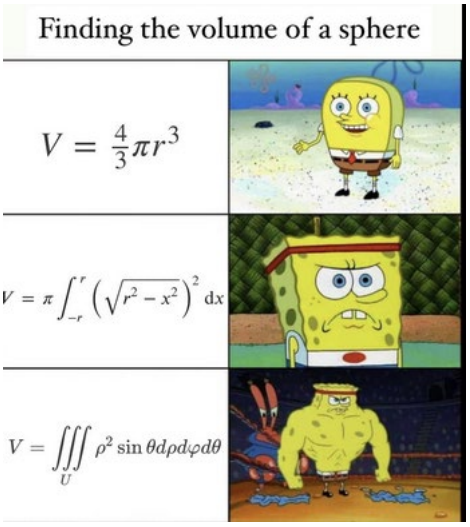
Office: LRC-133

Email: ataylor19@unm.edu (this is the absolute best way to get in touch with me, quickly!)

Student Hours (Instructor-Led Help Sessions):

- ***Mondays, Tuesdays, Wednesdays & Thursdays:***
  11:45am -1:00 pm in Zoom! We'll meet in the Zoom room indicated, below, as well as briefly after class in class zoom room:
  https://unm.zoom.us/j/92227051917
  (Opened by email request, no passcode, authenticated UNM Zoom account required)

- **OR BY APPOINTMENT!**



UNM Course Description:

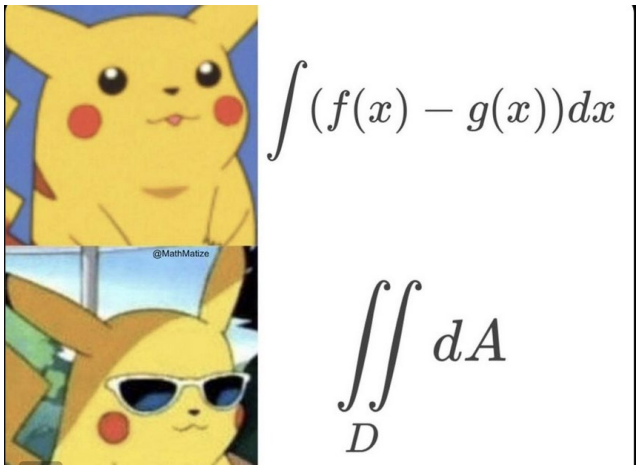
Welcome to Math 2531! Here is the UNM course description:

Vector operations, vector representation of planes and curves, functions of several variables, partial derivatives, gradient, tangent planes, optimization, multiple integrals in Cartesian cylindrical and spherical coordinates, vector fields, line integrals and Green's theorem.

Prerequisite: C or better in Math 1522

Student Learning Outcomes (SLOs):

By the end of the course, students will be able to:



Vectors and the Geometry of Space:

1. Write component form of a vector; perform vector operations and interpret results geometrically; write a vector as a linear combination of standard unit vectors.

2. Understand the three-dimensional rectangular coordinate system; analyze vectors in space.

3. Use properties of dot product of two vectors to find the angle between vectors, the direction cosines of a vector in space, the projection of one vector onto another vector, and the work done by a constant force.

4. Find the cross product of two vectors in space, and use the triple scalar product of three vectors in space.

5. Write a set of parametric equations for a line in space; write a linear equation to represent a plane in space; sketch the plane given by a linear equation; find the distances between points, planes, and lines in space.

6. Recognize and write equations of cylindrical surfaces, quadric surfaces, and surfaces of revolution.

Vector-Valued Functions:

1. Analyze and sketch a space curve given by a vector-valued function.

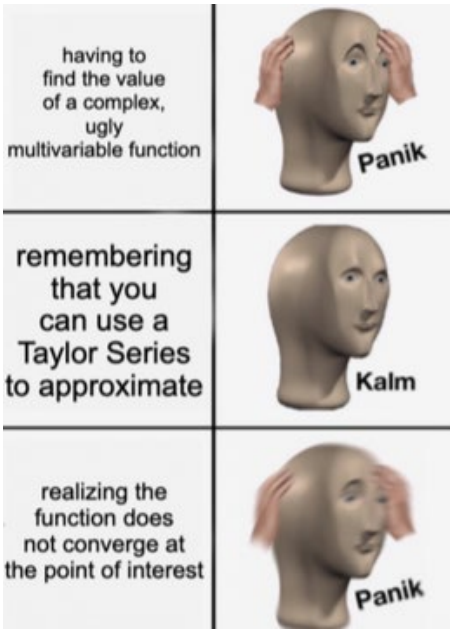
2. Extend the concepts of limits and continuity to vector-valued functions. Differentiate/integrate a vector-valued function.

3. Describe the velocity and acceleration associated with a vector-valued function.

4. Use a vector-valued function to analyze projectile motion.

5. Find a unit tangent vector and a principal unit normal vector at a point on a space curve; find the tangential and normal components of acceleration.

6. Find the arc length of a space curve; use the arc length parameter to describe a plane curve or space curve; find the curvature of a curve at a point on the curve.



Functions of Several Variables:

1. Understand the notation for a function of several variables; sketch the graph, level curves/surfaces for functions of two/three variables.

2. Understand the definition of a neighborhood in the plane; understand and use the definition of the limit of a function in two variables; extend the concept of continuity to a function of two/three variables.

3. Find and use partial derivatives of two/three or more variables; find higher-order partial derivatives of a function of multiple variables. Use the Chain Rules for functions of several variables; find partial derivatives implicitly.

4. Find, use, and apply directional derivatives and gradient for a function of two or three variables.

5. Determine equations of tangent planes and normal lines to surfaces; find the angle of inclination of a plane in space.

6. Determine absolute and relative extrema of a function of two variables; use the second partials test to find relative extrema of a function of two variables.

7. Solve optimization problems on open/closed and bounded domains.

8. Understand and use the method of Lagrange Multipliers to solve constrained optimization problems.

Multiple Integration:

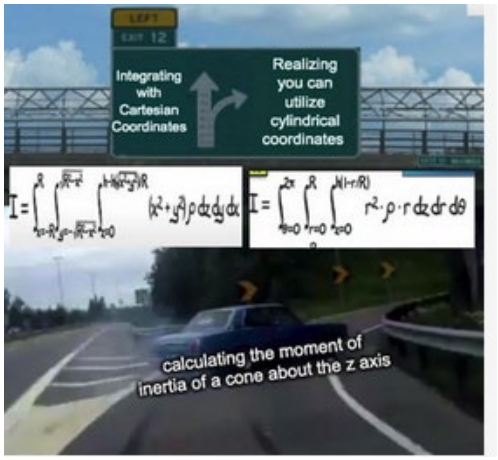
1. Evaluate an iterated integral and use to find the area of a plane region.

2. Use a double integral to represent the volume of a solid region and use properties of double integrals; evaluate a double integral as an iterated integral; find the average value of a function over a region.

3. Write and evaluate double integrals in polar coordinates.

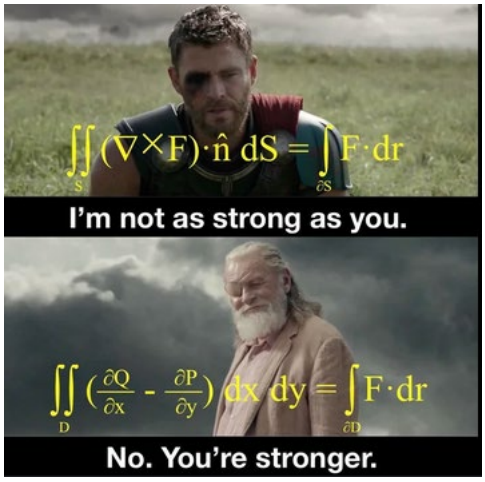
4. Find the mass, center of mass, and moments of inertia of a planar lamina using double integrals.

5. Use triple integral to find volume, center of mass and moments of inertia of a solid region.



Vector Fields:

1. Understand the concept of a vector field; determine whether a vector field is conservative; find the curl and divergence of a vector field.
2. Write and evaluate a line integral, a line integral of a vector field, including in differential form.
3. Use the Fundamental Theorem of Line Integrals; understand the concepts of independence of path and conservation of energy.
4. Use Green's Theorem to evaluate a line integral.



Technical Requirements:

- A Laptop/tablet/personal computer, preferably with a touchscreen that you can use a digital pencil to write on. We will be using a collaborative whiteboard at times to practice in class, and that may be tedious, but not impossible, with a mouse. If you don't have one, laptops are available to rent for free in the UNM Valencia Library: http://valencia.unm.edu/library/index.html, and there are computers available for use throughout the LRC on UNM Valencia Campus.
- High-Speed Internet Connection (highly recommended)

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 smart phones or tablets.

Microsoft Office products are available free for all UNM students!
UNM IT Software Distribution and Downloads page: http://it.unm.edu/software/index.html

Please update your contact information in LoboWeb: http://my.unm.edu/home
When you log into MyUNM, Enter LoboWeb. Click on the Personal Information link to make sure your contact information is up to date.

Web Conferencing

Web conferencing may be used in this course if needed for office hour appointments. If you are utilizing web conferencing:

- A USB headset with microphone is recommended. 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 prior to 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 (mistakes happen -- please be properly clothed).
- To create a UNM supported Zoom account, visit https://unm.zoom.us

Class Text and Program:

The text (or eText) for this course is:

- **Calculus, 11th Edition (Larson, Edwards)**
- **Cengage's WebAssign access will be required in order to complete homework assignments.** You will have access to this through your automatic enrollment in RedShelf: please click the link in the Modules tab in Canvas to route to our class in WebAssign. There will be some suggested problems to practice in addition to the online work.

Note: WebAssign is a paid access program. RedShelf will charge your Bursar's account for the e-book + WebAssign access, billed after the add/drop deadline on June 6, 2025. If you wish to OPT OUT, you must do so before the add/drop deadline. If you obtained longer-term access in a previous course, and that access hasn't expired, you will still have access to WebAssign and will not be billed again until the expiration of that access.

Attendance Policy:

Attendance is **highly** recommended, but there is no direct attendance grade. I do understand that sometimes life circumstances can prevent students from performing with perfect consistency every week. ***That being said, staying active in the class every week, spreading your studying and class effort throughout the week, is one of the best ways to help ensure your success in passing***. Being present, participating, and staying on top of the material are great contributors to success. *Now the fine print… being present and participating in class regularly with your camera and microphone on may net you a secret participation bonus on one or more assessments, such as quizzes.*

Submitting Assignments/Exams (VERY IMPORTANT – READ CAREFULLY):

You must submit all written assignments and assessments by the due date. All assignments/assessments and work therein should be neat, legible, appropriately organized, and include detailed and well-justified work. ***Any work that is***

illegible, or that lacks proper substance/explanation/justification will not receive credit. Please make sure to show ALL your work so that partial credit can be awarded for simple mistakes. Remember, you can use words to explain your thinking alongside your mathematics. Conveying your thought process to me is the most important element in your written work; if you understand the process and the idea, and mess up on arithmetic somewhere, you will earn the vast majority of the credit for a given problem. However, if you just have an answer (which is the result of an arithmetic error), and you haven't explained your thought process, I have nothing to award credit for without evidence of your understanding.

Written Quizzes/Projects:

All written quizzes/projects must be submitted in the appropriate Canvas dropbox**, in the correct format (PDF of the original document)**, on time in order to be accepted. If the file link is broken or doesn't otherwise open properly on my end, it will be considered missing and receive a 0 grade. Please prevent this by double checking your submission before you walk away and make SURE it is what you want to submit. You will have two attempts if you accidentally mess up one submission (both submissions must still be before the due date). Only a late pass can allow for late submission of a project.

In order to convert your file to a PDF, you have a couple easy options:

1) Use a traditional printer/scanner (some available on UNM Valencia/UNM Main Campus) in order to create the PDF of your work, download to your computer/storage device, and upload the file in the appropriate dropbox.
2) Download the free `Adobe Scan' app for your smartphone, create a PDF using your phone's camera in the app, send a copy to your email, download the file on your computer/storage device, and upload the file in the Canvas dropbox.

The following methods will NOT be accepted:

1) Copying and pasting an image of your work into a Microsoft Word document, saving as a PDF, then submitting this file. This method often makes your work VERY difficult to read and looks very unprofessional in the submission.
2) Submitting your assignment to my email because the dropbox didn't accept a non-PDF document, or your quiz wasn't submitted by the due time.

Late Passes:

You have 4 late passes for the semester. Using a late pass grants you up to 5 additional days to submit an assignment. You may use them on **any homework or project, but NOT assessments such as quizzes and exams.** In order to use a late pass for a homework assignment, you must let me know *in advance* of the due date by submitting a request via WebAssign. You can request an extension for a project via email. You do not need to present me with a doctor's note, or provide any reason for using a late pass (it doesn't matter whether you're sick or going to a concert – that's up to you). However, I'd highly recommend saving them until you really **need** them. Once you've used your passes, that's all you get. If you have incredibly emergent circumstances (long-term stay in hospital, etc.), just let me know, and I will examine those circumstances on a case-by-case basis. In those cases, if approved, you may be asked to provide evidence of that circumstance.

Submitting Exams: (VERY IMPORTANT: Please read carefully!)

We will have two **in-person, handwritten** exams at UNM Valencia Workforce Training Center, this semester, detailed in the `Course Structure' section of the syllabus. You may schedule to take these with a proctor at a UNM Testing Center (UNM branch campus testing centers are fine, as well). You must email the appropriate contact for the testing center with me CC'd and set an appointment for the same day that our exam is scheduled (below) (it does not need to be during the exact same window of time).

For those of you that would like to take it in person with me, I will offer a sitting for each exam at UNM Valencia Workforce Training Center in Los Lunas (15-20 minutes south of Albuquerque on I-25) (room TBA via Canvas announcements closer to the exam):

Midterm Exam: Wednesday, June 25th, 2025 from 1pm-2:45pm
Final Exam: Tuesday, July 29th, 2025 from 3-5pm

During these exams, you will **NOT** have access to the following: calculator, phone/tablet/computer/other device capable of perusing the internet, notes/textbook. You may occasionally be provided a formula, if deemed necessary.

You **WILL** be able to bring in a standard 3 inch by 5 inch notecard, covered front and back, that YOU have created during your studying process. Otherwise, all you need is a pencil or two, and your knowledge of the material.

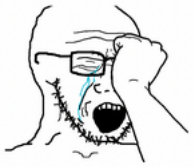
If you must miss an exam due to a family/medical EMERGENCY (i.e. absolutely cannot take it on the day scheduled in the syllabus), it is your responsibility to let me know ***before*** the assessment, so that you can take it early either during my office hours, or with a proctor at UNM-VC or a UNM Testing Center. I will examine these circumstances on a case-by-case basis. In those cases, if the makeup is approved, you may be asked to provide evidence of that circumstance.

Communication with Instructor:

The absolute MOST RELIABLE way to communicate with me as quickly as possible is to **send me an email**. If you ask a question via the homework platform, or via Canvas messages, I won't see it as quickly as if you send me an email. I routinely check for student emails, Monday through Friday, at various times throughout the morning, afternoon and evening, as well as occasionally on weekends. Expect a response no later than 24-48 hours. If I haven't responded within 48 hours, please resend your email, as it may have (accidentally) been overlooked!

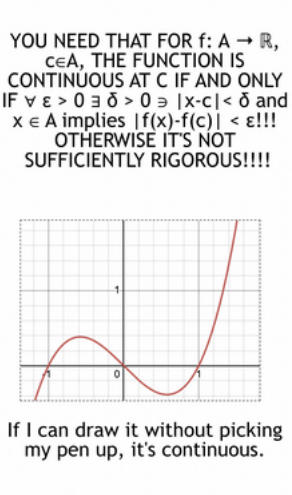
Expectations for Students:

Please note that in order to be successful in this course, and in mathematics courses in general, you will need to spend a fair amount of time each week working on this course.



Real Analysis Student

Precalculus Student



Here are my recommendations for the **minimum** amount of time you should be spending in this course, each week.

WebAssign Homework: 8-12 hours/week
Student Hours: 1 to 3 hours per week.
General Studying: 2 to 6 hours/week outside of homework and office hours. Can include looking over notes from class, looking over notes posted in Canvas, practicing additional written problems, practicing quiz prep problems.

I'd highly recommend taking notes over things that stand out to you in class: examples, impactful things that are said that make sense to you, or interesting questions posed by students and discussed in class. There will be a fair amount of discussion of problems from the text.

A Note About Plagiarism/Cheating:

Cheating is any behavior that short circuits your learning. This can range from mindlessly mimicking what you see in the readings or examples, to simply copying someone else's solution (including AI), to paying someone to complete the assignment or course for you. The use of any program or app like Chegg, Wolfram Alpha, PhotoMath, Apple Math AI, ChatGPT and others on your computer or phone to copy down solutions for homework, quiz, or exam questions constitutes plagiarism. The penalties for plagiarism may include being given a '0' on the plagiarized assignment/exam, which could result in a significantly lowered/failing grade in the course.

If you ask for help from someone other than the instructor or a tutor and then just copy down what they tell you, that is also cheating. In all of your assignments/assessments you should demonstrate what YOU understand. If you do not understand, ask for help from your instructor!

Course Structure:

This course will consist of the following graded components:

Homework (15%):
(WebAssign Homework Assignments)
- You'll have ~4 assignments per week.
- Your lowest 2 homework scores will be dropped.
- Late homework can only be accepted with the "4 late pass policy."

Projects (15%):
You'll have 2 projects this semester, each worth 7.5% of your grade.

Quizzes (15%):
Expect 4-6 in-class quizzes throughout the semester, typically taken at the beginning of class on the day scheduled and turned in between 1:30pm and 2:00pm in the appropriate Canvas dropbox. Your lowest quiz grade will be dropped. Quizzes will only cover material where the homework due date has lapsed by the day of the quiz and a tentative schedule of quizzes is in the material schedule. Please look over any practice quizzes posted in Canvas to get an idea of what may come up on a quiz. Quizzes may NOT be made up after the fact or submitted late using a late pass, hence the dropped quiz as a safety net. Quizzes may only be made up beforehand if the situation warrants it – this will be examined on a case by case basis.

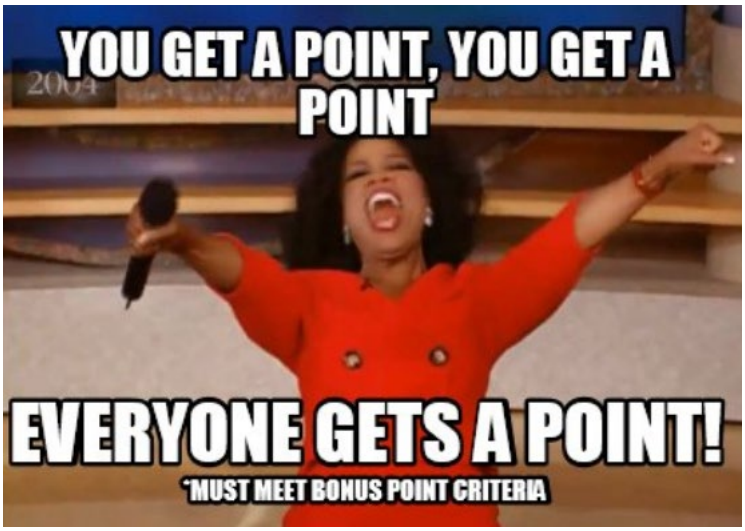
Midterm Exam (25%):
The midterm exam will be given on **Wednesday, June 25th, 2025 from 1pm-2:45pm** on the UNM Valencia Workforce Training Center Campus (1020 Huning Ranch, East Loop SW, Los Lunas, NM 87031) (room TBA via Canvas announcement closer to exam date) or a UNM Testing Center with a proctor at a time which your appointment is scheduled **for that day (must be same day stated above, unless otherwise approved).**

Final Exam (30%):
The comprehensive final exam will be given in class **on Tuesday, July 29th, 2025 from 3pm-5pm** on the UNM Valencia Workforce Training Center Campus (1020 Huning Ranch, East Loop SW, Los Lunas, NM 87031) (room TBA via Canvas announcement closer to exam date) or a UNM Testing Center with a proctor at a time which your appointment is scheduled **for that day (must be same day stated above, unless otherwise approved).**

For written assessment submissions such as exams/projects, you should typically expect your grades within one week. Sometimes I fall behind and it may take me slightly longer. If grading takes longer than two weeks, you're eligible for a "delayed grading bonus" of 5% on the assignment being graded. Assignments through WebAssign should offer immediate grading upon submission, and solutions, where available, should be viewable in WebAssign after the assignment's due date.

BONUS Opportunity!

There may be bonus points available on select assignments/assessments.



You can earn up to 5 bonus points on each of your midterm/final exams (1 point per visit reflection) by either:

1) Visiting my Instructor-Led Help Sessions and working with me for at least 1 hour
2) Visiting a tutoring center and working with a tutor for at least 1 hour

You can claim these points by creating a tutoring reflection for each visit and sending the cumulative summary of your visits to me. Your reflection summary should include the following (all visit reflections in one document):

Visit 1: Date:_____, Time In-Time Out:_____, Tutoring Center: _____, Specific material I studied:_____, Something I learned (at least one full sentence): _____, Something I still need to practice:_____, Tutor/Prof. Signature: _____, Student Signature: _____

Visit 2: Date_____, Time:_____, Tutoring Center:_____, Specific material I studied:_____, Something I learned (at least one full sentence): _____, Something I still need to practice:_____, Tutor/Prof. Signature: _____, Student Signature: _____

…etc.

If you complete 5 visits and reflections between June 2, 2025 and June 24, 2025, and submit them to me by June 24, 2025, you will earn 5 bonus points on your midterm exam.

If you complete 5 visits and reflections between June 25, 2025 and July 28, 2025 and submit them to me by July 28, 2025, you will earn 5 bonus points on your final exam.

Grading Policy:

Cumulative Average at End-of-Course	Final Grade in Class
$96.5 \leq Avg \leq 100+$	A+
$93 \leq Avg < 96.5$	A
$89.5 \leq Avg < 93$	A-
$86.5 \leq Avg < 89.5$	B+
$83 \leq Avg < 86.5$	B
$79.5 \leq Avg < 83$	B-
$76.5 \leq Avg < 79.5$	C+
$69.5 \leq Avg < 76.5$	C
$66.5 \leq Avg < 69.5$	D+
$63.5 \leq Avg < 66.5$	D
$59.5 \leq Avg < 63.5$	D-
$Avg < 59.5$	F

Important Semester Deadlines:

Spring 2025: 16-week classes (deadlines will be different for first and second 8-week classes)

• Tuesday, June 2: First day of class, class available in Canvas.
• Friday, June 6, by 5:00 PM: Last day to add a class or to change credit hours or grade mode in LoboWEB.
• Friday, June 13, 5:00 PM: Last day to drop without “W" grade and with 100% refund on LoboWEB
• Friday, July 11, by 5:00 PM: Last day to drop without Dean’s permission on LoboWEB. Will receive “W” grade and will be responsible for tuition for the course.
• Friday, July 25, by 5:00 PM: Last day to drop with Dean’s permission. Will receive “W" grade and will be responsible for tuition for the course.

UNM Valencia Resources & Support:

Student Support:

Student Health and Counseling (SHAC) at (505) 277-3136.
TimelyCare: Free 24/7 virtual care services (medical, emotional support, health coaching, self-care, basic needs support).
LoboRESPECT Advocacy Center (505) 277-2911: help with contacting faculty and managing challenges that impact your UNM experience.

PASOS Resource Center (505) 925-8546, mailto:pasos@unm.edu. The Resource Center is an on-campus center that serves as a "one-stop" for all non-academic needs of UNM-Valencia students.

Accommodations:

UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact the UNM-Valencia Equal Access Services (Sarah Clawson, Coordinator), at (505) 925-8840 or by email at sjclawson@unm.edu. Or the UNM-Albuquerque Accessibility Resource Center (https://arc.unm.edu/) at arcsrvs@unm.edu or by phone at 505-277-3506.

Tutoring:

Resources to support study skill and time management are available through
UNM-Valencia Learning Commons (Tutoring).

Tutoring is available to you in math, science, writing, and other subjects through the Learning Commons: Learning and STEM Centers and Writing Center. In person tutoring is in these centers in the LRC (the building that also has the library). Tutoring in Zoom and, for writing, through email, is also available.
Making use of tutoring is a fantastic way to use your resources and set yourself up to learn deeply and well in your courses.
To schedule an appointment, please go to: Learning Commons Bookings

If you are making an email appointment with the Writing Center, email your draft to tutor@unm.edu after you fill out the form above.
If you have difficulty with the scheduling link above, would like an appointment in a subject not listed at that link, or have a question, email tutor@unm.edu. You'll get answers during business hours Monday through Friday.
The webpage, with more details about available hours, is here: Learning Commons: Tutoring Services webpage.

At UNM Main Campus, you may contact: Center for Academic Program Support (CAPS). Many students have found that time management workshops can help them meet their goals (consult (CAPS) website under "services").

Support: Many students have found that time management workshops or work with peer tutors can help them meet their goals. These and are other resources are available through PASOS (Pathways to Articulation and Sustainable Opportunities for Students), TRIO Student Support Services, and Student Learning Support at the Center for Teaching and Learning.

Connecting to Campus and Finding Support: UNM has many resources and centers to help you thrive, including opportunities to get involved, mental health resources, academic support including tutoring, resource centers for people like you, free food at Valencia Campus Food Pantry, and jobs on campus. Your advisor, staff at the resource centers and Academic Affairs Office, and I can help you find the right opportunities for you.

UNM Statements & Policies:

Land Acknowledgement:

Founded in 1889, the University of New Mexico sits on the traditional homelands of the Pueblo of Sandia. The original peoples of New Mexico Pueblo, Navajo, and Apache since time immemorial, have deep connections to the land and have made significant contributions to the broader community statewide. We honor the land itself and those who remain stewards of this land throughout the generations and also acknowledge our committed relationship to Indigenous peoples. We gratefully recognize our history.

Citizenship and/or Immigration Status:

All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. As for all students in the class, family emergency-related absences are normally excused with reasonable notice to the professor, as noted in the attendance guidelines above. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: http://undocumented.unm.edu/.

Health and Awareness:

If you do need to stay home due to illness or are experiencing a wellness challenge, please take advantage of the resources below. You can communicate with me using my email and I can work with you to provide alternatives for course participation and completion. Let me, an advisor, or another UNM staff member know that you need support so that we can connect you to the right resources. UNM is a mask friendly, but not a mask required, community. If you are experiencing COVID-19 symptoms, please do not come to class.

Credit-hour statement:

This is a four credit-hour course. Class meets for four 105-minute sessions of direct instruction per week via Zoom for eight weeks during the Summer 2025 semester.

Title IX:

UAP 2720 and 2740. Our classroom and university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. If you ever need assistance or have concerns about incidents that violate this principle, please access campus support resources. These include confidential services at LoboRESPECT Advocacy Center, the Women's Resource Center, and the LGBTQ Resource Center. The University of New Mexico prohibits discrimination on the basis of sex (including gender, sex stereotyping, gender expression, and gender identity). UNM faculty and graduate teaching assistants are considered "responsible employees." "Responsible employees" must communicate reports of sexual harassment, sexual misconduct and sexual violence to Compliance, Ethics and Equal Opportunity. For more information on the campus policy regarding sexual misconduct, reporting, and reporting for "responsible employees," please see UAP 2720 and UAP 2740.

If you are pregnant or experiencing a pregnancy-related condition, you may contact UNM's Office of Compliance, Ethics, and Equal Opportunity at ceeo@unm.edu. The CEEO staff will provide you with access to available resources and supportive measures and assist you in understanding your rights. Pregnancy and Parenting Support information is available here.

Respectful and Responsible Learning:

We all have shared responsibility for ensuring that learning occurs safely, honestly, and equitably. Submitting material as your own work that has been generated on a website, in a publication, by an artificial intelligence algorithm, by another person, or by breaking the rules of an assignment constitutes academic dishonesty. It is a student code of conduct violation that can lead to a disciplinary procedure. *Please ask me for help in finding the resources you need to be successful in this course. I can help you use study resources responsibly and effectively.* Off-campus paper writing services, problem-checkers and services, websites, and AIs can be incorrect or misleading. Learning the course material depends on completing and submitting your own work. UNM preserves and protects the integrity of the academic community through multiple policies including policies on student grievances (Faculty Handbook D175 and D176), academic dishonesty (FH D100), and respectful campus (FH CO9). These are in the *Student Pathfinder* (https://pathfinder.unm.edu) and the *Faculty Handbook* (https://handbook.unm.edu).

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://policy.unm.edu/regents-policies/section-4/4-8.html. The policy states:

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or who otherwise fails to meet the expected standards. 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.