

Instructor's office & hours: Room 126A: **MW** 3:15-4:15p, **T** 4:15-5:30p, **Th** 11:45-12:15p, 1:15-2:45p, 4:15-5:15p.  
[wcmurray@unm.edu](mailto:wcmurray@unm.edu) 505-925-8727

*Prerequisite:* C or better in Math 1520 (Calculus II).

*Required materials:* Text Thomas' Calculus 14th ed., by Weir & Hass .

*Sometimes useful:* Scientific graphing calculator.

*Disabilities:* If you have a documented disability, please provide me with a copy of your letter from Equal Access Services , so that appropriate accommodations can be made.

*Academic Dishonesty*, as defined in the UNM-Valencia catalog, includes copying work from other students. Any student found doing this is subject to disciplinary action, ranging from "a reduced or failing grade for the work in question and/or the course..." thru being dropped from the course to being dropped from the University.

*Persistent disruptive behavior* which interferes with students' education—such as loud, distracting talking, insulting classmates or the instructor, repeated interruption of students' or the instructor's work, etc., may result in the student being dropped from the class.

Any *Sexual Misconduct or Gender Discrimination* brought to a faculty member's attention must, per UNM policy, be reported by the faculty member to the Office of Equal Opportunity and the Title IX Coordinator. For information regarding what comprises sexual misconduct see <https://policy.unm.edu/university-policies/2000/2740.html>

*Electronic Communication Devices*, incl. cell phones, laptops and such: Must be **Off** at all times during class. If you must text message, please leave the classroom.

*Children are not permitted in Class*, due to liability concerns.

*Penalty for missing a test:* Default policy is No "makeup" tests, so a missed test will be the one and only dropped score for the semester. If prior notice is given (phone or email message), or a verified emergency occurs before the test, the instructor may or may not, at his discretion, allow a late makeup test to be taken. Up to 20% reduction in score may be applied, depending on circumstances. If you know in advance you cannot take a test at the appointed time, see the instructor before test day; an early test may be arranged without penalty.

Calc III Syllabus, contin...

*Homework:* Homework assignments are *due the next class day, at the beginning of class*. Staple the day's homework together as a **single packet**, with problems and sections arranged in order as they appear on the green calendar. Also, please make the separation between main problems (#3, 6, 18, e.g, NOT a, b, c,...) extra obvious. This makes the Professor's work go a little faster, Thanks.

*Late homework:* 1 day late, -50%; 2 days late, -100%.

*Attendance:* After four accumulated absences, the student may be dropped by the instructor without further notice. If the student knows she or he must miss more than 4 classes, please discuss with the instructor; depending on circumstances, this policy may be relaxed.

| <i>Grading</i>   | Max possible points           |
|--|-------------------------------|
| Homework   | 100                           |
| 4 tests  | 400                           |
| Drop lowest one of tests or homework   | -100                          |
| Final exam (not dropped, comprehensive, <b>min 65% to pass course</b> ) <u>150</u> |                               |
|  | 550     max poss course total |

("x" represents student's total course score)

|                       |   |
|-----------------------|---|
| $532 \leq x \leq 550$ | A+ (unless a test is missed, or homework score is less than 50%.) |
| $512 \leq x < 532$    | A (unless a test is missed)                                       |
| $495 \leq x < 512$    | A-  |
| $477 \leq x < 495$    | B+  |
| $457 \leq x < 477$    | B   |
| $440 \leq x < 457$    | B-  |
| $422 \leq x < 440$    | C+  |
| $402 \leq x < 422$    | C   |
| $385 \leq x < 402$    | C-*   |
| $330 \leq x < 385$    | D   |
| $0 \leq x < 330$      | F   |

\*Note that a C- (or below) may not satisfy requirements for certain courses and/or degree programs. It is the student's responsibility to know whether this applies to her or his particular area of study.

\*\*No "Incomplete" (I) grades will be assigned.

...Calc III Syllabus, continued....

*Course Objectives/Student Learning Outcomes:* A student who earns a B or higher in the course should be able to:

1. Interpret and construct graphs of lines and surfaces in 3-D.
2. Calculate Dot and Cross Products of 3-D vectors.
3. Match equations of cylindrical and quadric surfaces to their graphs.
4. Perform derivative and integral calculations on vector functions.
5. Solve projectile motion problems using vector equations.
6. Identify and calculate arc length, unit tangent vectors, and curvature.
7. Identify and calculate the unit normal vector, and also the unit binormal vector, to a 3D curve.
8. Graph functions of two variables, e.g.  $z = f(x,y)$ .
9. Find limits of functions of more than one variable.
10. Find derivatives of functions of more than one variable.
11. Calculate directional derivatives and the gradient for functions of two and three variables.
12. Construct normal lines and tangent planes to a point on a surface  $z = f(x,y)$ .
13. Estimate the change in a function  $z = f(x,y)$  due to a small change  $\Delta x$  or  $\Delta y$ , using differentials.
14. Find extrema of functions of two variables using the 1st & 2nd derivative tests.
15. Find extrema of functions of two variables using the method of Lagrange multipliers.
16. Perform integration of functions of two variables (double integrals), in
  - a) rectangular coordinates, and
  - b) polar coordinates.
17. Perform integration of functions of three variables (triple integrals), in
  - a) rectangular, b) cylindrical, and
  - c) spherical coordinates.
18. Calculate the work done by a vector force-field in 3-D space over a variable path (line integrals).
19. Calculate, and explain the concepts of, circulation and flux of a vector field.
20. Use Green's theorem to calculate circulation in a 2-D vector field.
21. Calculate surface integrals.
22. Using Stoke's theorem, calculate circulation in a 3-D vector field.
23. Find the divergence of 2-D and 3-D vector fields.
24. Calculate the curl at a point in a 3-D vector field
25. Find the Laplacian of a function.

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| 19 AUG 12-1 3-D COORDINATES<br>#1, 3, 5, 7, 11, 17, 19, 27, 53  | 21 AUG 12.2 VECTORS<br>#1, 7, 13, 21, 23, 25, 33, 45, 47   |
| 26 AUG 12.3 DOT PRODUCT OF VECTORS $\vec{A} \cdot \vec{B}$<br>#1, 9, 15 a & b, 16, 25, 43             | 28 AUG EQUATIONS OF CYL & QUADRIC SURFACES -<br>I.O.D. & SKETCH<br>#1, 3, 5, 7, 9, 11, 13, 17, 21, 25, 27, 31              |
| 12.4 VECTOR CROSS PRODUCT $\vec{A} \times \vec{B}$ #2, 3, 5, 6, 11, 23, 25                            |  |
| 2 SEP<br>LABOR DAY  | 4 SEP<br>RVW   |
| 9 SEP<br>TEST # 1 3-D COORDS<br>VECTOR BASICS<br>3-D SURFACES   | 11 SEP 13.1 VECTOR FUNCTIONS, DERIVATIVES,<br>VECTOR DESCRIPTION OF MOTION<br>#5, 7, 9, 11, 15, 19.                        |
| 16 SEP 13.2 INTEGRALS OF VECTOR FUNCTIONS,<br>2-D PROJECTIVE MOTION.<br>#1, 3, 5, 11, 23, 25          | 18 SEP 13.3 UNIT TANGENT VECTOR #1, 3, 15<br>13.4 UNIT NORMAL VECTOR, CURVATURE<br>#1, 3, 19                               |
| 23 SEP 13.5 ACCELERATION - UNIT BINORMAL<br>VECTOR. TORSION. #1, 3, 7, 9, 17, 19<br>REVISIT 13.2: #40 | 25 SEP<br>RVW  |
| 30 SEP<br>TEST # 2 CALCULUS WITH VECTORS,<br>DESCRIPTION OF MOTION<br>WITH VECTORS.                   | 2 OCT 14.1 FUNCTIONS OF TWO VARIABLES.<br>#1, 3a, 14, 37, 49.<br>14.2 LIMITS OF MULTIVBL FNS #1, 5, 11, 13, 25, 29, 41, 43 |
| 7 OCT 14.3 PARTIAL DERIVATIVES<br>#1, 2, 5, 23, 31, 41, 43, 55, 75, 83, 91                            | 9 OCT 14.4 CHAIN RULE FOR MV FNS. #1, 9, 25, 47<br>14.5 DIRECTIONAL DERIV. GRADIENT. #1, 7, 11, 19                         |
| 14 OCT 14.6 DIFFERENTIALS OF MV FNS #23, 27, 53<br>14.7 EXTREMA, MV FNS #1, 2                         | 16 OCT 14.7 EXTREMA CONTIN. #3, 41<br>14.8 SOLVING EXTREMA PROBS WITH<br>LAGRANGE MULTIPLIERS #1                           |
| 21 OCT<br>RVW   | 23 OCT<br>TEST # 3 MULTIVARIATE FUNCTIONS,<br>PARTIAL DERIVS.<br>EXTREMA OF MV FNS.  |
| 28 OCT 15.1 DOUBLE INTEGRALS #1, 3, 17<br>15.2 #9, 11, 13, 19, 27<br>15.3 #1, 5                       | 30 OCT 15.4 POLAR COORDS & SS #9, 11, 27, 29<br>15.5 TRIPLE INTEGRALS, RECTANG. COORDS<br>#7, 9, 17, 21, 22a, 23           |
| 4 NOV FINISH #15.5, SSS RECT.<br>15.7 SSS CYL COORDS #25, 29, 31, 37, 39                              | 6 NOV 15.7 SSS SPHERICAL COORDS<br>#43, 49, 54a, 55, 56  |
| 11 NOV<br>RVW   | 13 NOV<br>TEST # 4 DOUBLE & TRIPLE<br>INTEGRALS, POLAR/CYL<br>& SPHERICAL COORD SYSTEMS                                    |
| 18 NOV 16.1 PATH INTEGRALS #1, 3, 5, 9, 11, 27<br>16.2 VECTOR FIELDS. WORK. #1, 3, 7, 19              | 20 NOV 16.2 FLUX, CIRCULATION. #29a, 55<br>16.4 DIVERGENCE, CURL IN 2-D,<br>GREEN'S THEOREM #7, 11, 27                     |
| 25 NOV 16.5 CURVED SURFACE AREA #37, 49<br>16.6 INTEGRATING OVER $\uparrow$ #31                       | 27 NOV 16.8 DIV, CURL IN 3-D #1, 2<br>16.7 STOKES THEOREM #1, 2<br>LAPLACIAN (INSTRUCTOR'S HWK HANDOUT)                    |
| 2 DEC<br>RVW FOR FINAL  | 4 DEC<br>RVW FOR FINAL   |
| 9 DEC FINAL EXAM 1:30 - 3:30 p  | 11 DEC   |