MATH 301: Calculus III

Spring 2012 Section 001 4 Credit Hours

Instructor:	Tom Polaski	**Course Time and Location:**
Office:	Bancroft 158	MWF 12:30-1:45 p.m., Kinard 305
Office Phone:	803-323-4604	**Office Hours:**
Math Department Phone:	803-323-2175	MW 10:00-10:50 a.m. and 2:00-3:00 p.m. TR 1:00-2:00 p.m. F 10:00-10:50 a.m.
Campus Email:	polaskit@winthrop.edu	Other times may be arranged by appointment.

The instructor reserves the right to make modifications to this syllabus. Students will be notified in class and by email.

Student Learning Objectives – Mathematics Department

1. Students apply fundamental mathematical concepts and techniques to solve problems and evaluate results.
2. Students demonstrate the ability to apply appropriate technologies to the study of mathematics and effectively use such technologies to investigate and develop an understanding of mathematical ideas.

Student Learning Objectives – Calculus III

1. Students will use the language of vectors, vector operations and parametric equations to express the ideas of calculus in two-dimensional and three-dimensional space.
2. Students will master the differentiation of functions of more than one variable by computing partial derivatives, interpreting the gradient, and applying these concepts to optimization problems.
3. Students will use iterated integrals to compute double and triple integrals, and will use integration to find volumes and surface areas of three-dimensional regions.
4. Students will gain a working knowledge of vector fields and their physical interpretation, including the divergence and curl operators.
5. Students will use technology to visualize curves and surfaces and to apply calculus concepts to them.

Links to the Touchstone Program

This course meets the Logic, Language, and Semiotics requirement through activities and requirements that require students to use logic and mathematical information to draw reasonable conclusions and to use the symbols and language of mathematics to communicate about problems and to present solutions.

For purposes of departmental assessment of student learning in this course, sections of the final exam will be tabulated for all students and cover the objectives listed above. In addition,

the common technology rubric will be implemented to evaluate students' ability to implement the use of *Mathematica* and other technology as appropriate for course assignments.

Text, Materials and Learning Aids

- Required Text: *Calculus* by Howard Anton, Irl Bivins, and Stephen Davis. Ninth Edition. Hoboken: John Wiley and Sons, 2009.
- The ability to use *Mathematica* is a prerequisite skill for this course.

Homework Assignments

At the end of each class session, a homework assignment will be made. You are expected to complete the assignment by the next class session. These assignments will not be collected or graded. Use of *Mathematica* is encouraged for these assignments.

Tests and Grading

There will be four 100-point tests given along with a 200-point cumulative final examination. No make-up tests will be given unless prior arrangements have been made with the instructor. A point system will determine your final grade. There are 600 points possible: 400 from the tests and 200 from the final. An approximate grading scale for each test will be determined after it is graded. The semester grading scale will be based upon these grading scales and on the scale for the final examination. Plusses and minuses are awarded at the discretion of the instructor.

Attendance Policy

Attendance at all scheduled class meetings is strongly encouraged. Your number of absences will not be counted, and will not be used directly to determine your grade. However, attendance is mandatory for those class sessions which include a test. If no prior arrangements are made with the instructor, a zero will be recorded for a test not taken due to absence.

Equal Access to Education

Winthrop University is dedicated to providing access to education. If you have a disability and need specific accommodations to complete this course, please contact the Office of Disability Services (ODS) at 323-3290 as early as possible in the semester. Once you have your official notice of accommodations from the Office of Disability Services, please inform your instructor.

Academic Integrity

Review the student code of conduct for university polices on academic misconduct. Academic misconduct will not be tolerated and will result in a failing grade on the assignment and/or in the course. The full handbook is available online at http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf.

Electronic Devices

All electronic devices (including cell phones) other than a calculator should be on silent and kept in your book bag or purse throughout class time unless otherwise instructed. NOTE: if you have some educational, health, or physical reason for an electronic device you must notify your instructor of this accommodation.

Tentative Course Schedule

Date		Section	Topic
M	1/9	11.1,11.2	Rectangular Coordinates in Space; Spheres; Cylindrical Surfaces; Vectors
W	1/11	11.2,11.3	Vectors; Dot Product; Projections
F	1/13	11.4	Cross Product
W	1/18	11.5	Parametric Equations of Lines
F	1/20	11.6	Planes in 3-Space
M	1/23	11.7,12.1	Quadric Surfaces; Vector-Valued Functions
W	1/25	12.2,12.3	Calculus of Vector-Valued Functions; Arc Length
F	1/27	12.4	Unit Tangent, Normal, and Binormal Vectors
M	1/30	12.5	Curvature
W	2/1	12.6	Motion Along a Curve
F	2/3	13.1	Functions of Two or More Variables
M	2/6		**Test 1**
W	2/8	13.2,13.3	Limits and Continuity; Partial Derivatives
F	2/10	13.4	Differentiability, Differentials, and Local Linearity
M	2/13	13.5,13.6	The Chain Rule ; Directional Derivatives and Gradients
W	2/15	13.6	Directional Derivatives and Gradients
F	2/17	13.7	Tangent Planes and Normal Vectors
M	2/20	13.8	Maxima and Minima of Functions of Two Variables
W	2/22	13.8,13.9	Maxima and Minima of Functions of Two Variables; Lagrange Multipliers
F	2/24	13.9	Lagrange Multipliers
M	2/27	14.1	Double Integrals
W	2/29		**Test 2**
F	3/2	14.1,14.2	Double Integrals; Double Integrals over Nonrectangular Regions
M	3/5	14.2,10.2	Double Integrals over Nonrectangular Regions; Review of Polar Coordinates
W	3/7	14.3	Double Integrals in Polar Coordinates
F	3/9	14.5	Triple Integrals
M	3/19	11.8	Cylindrical and Spherical Coordinates
W	3/21	14.6	Triple Integrals in Cylindrical and Spherical Coordinates
F	3/23	14.8	Centers of Gravity Using Multiple Integrals
M	3/26	15.1	Vector Fields
W	3/28		**Test 3**
F	3/30	15.2	Line Integrals
M	4/2	15.2	Line Integrals
W	4/4	15.4	Green's Theorem
F	4/6	14.4	Surface Area
M	4/9	14.4	Parametric Surfaces
W	4/11	15.5	Surface Integrals
F	4/13	15.6	Applications of Surface Integrals; Flux
M	4/16	15.7,15.8	The Divergence Theorem; Stokes' Theorem
W	4/18	15.3	Independence of Path; Conservative Vector Fields
F	4/20		**Test 4**
M	4/23		Review and Evaluation

SU Deadline: T 1/24 **Course Withdraw Date:** F 10/21
Spring Break: M 3/12 to F 3/16 **Final Exam:** TBA

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Suggested Homework Exercises

Text: *Calculus* by Howard Anton, Irl Bivins, and Stephen Davis. Ninth Edition. Hoboken: John Wiley and Sons, 2009.

Section	Exercises
11.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 23, 25, 27, 29, 31, 35, 39, 43, 47, 51, 55
11.2	1, 3, 5, 7, 9, 11, 13, 15, 21, 23, 25, 27, 29, 31, 33, 41, 43, 45, 47, 49, 51, 53, 55, 59
11.3	1, 3, 5, 7, 9, 11, 13, 25, 27, 33, 35, 37, 39, 41, 47
11.4	1, 3, 5, 7, 11, 17, 19, 21, 23, 25, 27, 29, 31, 39, 41, 43, 47, 49
11.5	1, 3, 5, 7, 9, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 43, 45, 47, 49, 51, 59
11.6	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 25, 27, 29, 31, 33, 35, 37, 41, 43, 45, 47, 49
11.7	1, 5, 7, 9, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
12.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29, 35, 37, 39
12.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 45, 47, 49, 51, 53, 54, 55, 57
12.3	1, 3, 5, 7, 9, 11, 13, 15, 21, 23, 25, 27, 29, 31, 33, 43
12.4	1, 3, 5, 7, 9, 11, 13, 15, 17, 19
12.5	1, 3, 5, 7, 9, 13, 15, 17, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 58, 59, 60, 61, 62, 63, 65
12.6	1, 3, 5, 7, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 53, 55, 57, 59, 61, 63, 65, 67, 69
13.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65
13.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 33, 35, 37
13.3	1, 3, 5, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 97, 99, 101, 103
13.4	1, 3, 9, 11, 13, 15, 17, 19, 21, 23, 25, 31, 33, 35, 37, 39, 41, 43, 53, 55, 57, 59, 61
13.5	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 39, 41, 43, 45, 47, 49, 51, 53
13.6	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59
13.7	1, 3, 5, 7, 9, 11, 13, 15, 21, 23, 25, 27, 29, 31
13.8	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53
13.9	1, 3, 5, 7, 9, 11, 17, 19, 21, 23, 25, 27, 29, 31
14.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 29, 30, 31, 32, 33, 35, 37, 39, 41
14.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65
10.2	1, 3, 7, 9, 11
14.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 39, 41, 43, 45
14.5	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 31, 33, 35, 37, 39
11.8	1, 3, 5, 7, 9, 11, 13, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53
14.6	1, 3, 5, 7, 9, 11, 13, 15, 16, 17, 18, 19, 25, 27, 29
14.8	1, 3, 5, 7, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43
15.1	1, 2, 3, 4, 5, 7, 9, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45
15.2	1, 3, 5, 7, 9, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47
15.4	1, 3, 5, 7, 9, 11, 13, 19, 21, 23, 25, 27, 29, 31, 39
14.4	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 51, 53, 55, 57
15.5	1, 3, 5, 7, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
15.6	1, 3, 5, 7, 9, 11, 13, 15, 17, 23, 25
15.7	1, 3, 9, 11, 13, 15, 17, 19, 33, 35
15.8	1, 3, 5, 7, 9, 11, 17
15.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 23, 25, 27, 31, 33, 35