CALCULUS III
MATH 2110

Class Hours: 4.0   **Credit Hours: 4.0**

Laboratory Hours: 0.0   **Revised: Spring 2011**

Catalog Course Description:

Calculus of functions in two or more dimensions. Topics include solid analytic geometry, partial differentiation, multiple integration, and selected topics in vector calculus.

Entry Level Standards:

A thorough knowledge of algebraic, trigonometric, and beginning and intermediate calculus functions is necessary for entrance to this course.

Prerequisites:

MATH 1920

Textbook(s) and Other Course Materials:

I. Week/Unit/Topic Basis:

Textbook:
Calculus: Early Transcendentals by Jon Rogawski,, First Edition, W.H. Freeman and   Company, 2008

References:
Calculus: Early Transcendentals by George B. Thomas, Eleventh Edition, Pearson Education,   2008
Calculus: Early Transcendentals by James Stewart, Sixth Edition, Thomson Learning, 2008
    Calculus: Early Transcendentals by Larson, Hostetler, and Edwards, Fourth Edition,   Houghton Mifflin
Company, 2007

Week	Topic
1	Three dimensional coordinate systems and vectors; 9.1-9.2
2	Dot product, cross product and equations of lines and planes; 9.3-9.5
3	Functions and surfaces; cylindrical and spherical coordinates; 9.6-9.7
4	Vector-valued functions: space curves, derivatives and integrals, arc length and curvature, motion in space; 10.1-10.4
5	Partial differentiation: functions of several variables, limits and continuity, partial derivatives;

11.1-11.3

6	Tangent planes and linear approximations, the chain rule; 11.4-11.5
7	Directional derivatives and the gradient vector, maximum and minimum values, Lagrange multipliers; 11.6-11.8
8	Multiple integrals: double integrals, iterated integrals; 12.1-12.2
9	Double integrals over general regions, double integrals in polar coordinates, applications of double integrals; 12.3-12.5
10	Surface area, triple integrals; 12.6-12.7
11	Triple integrals in cylindrical and spherical coordinates, change of variables in multiple integrals; 12.8-12.9
12	Vector calculus: vector fields, line integrals, the fundamental theorem for line integrals; 13.1-13.3
13	Green's theorem, curl and divergence, surface integrals; 13.4-13.6
14	Stokes' Theorem, the divergence theorem; 13.7-13.8
15	Final Exam

II. Course Goals*:

The course will:

    A.   Expand the student's knowledge of vectors and solid analytic geometry. VI. 1-4,6

    B.   Expand the student's knowledge of functions to include vector-valued functions, functions of several variables, and vector fields. VI. 1-6

    C.   Build the skills to calculate partial derivatives and multiple integrals. VI. 1,3,5,6

    D.   Enhance the student's knowledge of partial derivatives and multiple integrals to solve applications from engineering, physics, and other sciences. VI. 1-6

    E.   Enhance the student's knowledge of vector calculus to solve applications from engineering, physics, and other sciences. VI. 1-6

 *Roman numerals after course objectives reference the general education goals.

III. Expected Student Learning Outcomes*:

The student will be able to:

    1.   Solve real life problems such as: using tangential and normal components of acceleration to justify banking curved roads, analyze the forces placed on beams, poles, etc. used in engineering constructions, calculate flux through semi-permeable membranes. A,B,E

    2.   Investigate and justify the engineering concepts contained in statics and dynamics courses. A,B,C,D,E

    3.   Draw vectors, use vector operations, find the magnitude of a vector, and find a unit vector in two-space and three space. A,B,E

4. Determine whether two vectors are orthogonal; determine the angle between two vectors. A,B,E

5. Find the equations of lines and planes in three-space. A

6. Sketch and/or analyze the graph of (rectangular, cylindrical, or spherical) equations in three-space. A,B

7. Sketch and/or analyze the graph of vector-valued functions and find the length of curves. B

8. Differentiate and integrate vector-valued functions. B,E

9. Calculate velocity, acceleration, and speed from a position vector. B,E

10. Calculate unit tangential and unit normal vectors and calculate curvature. B,E

11. Calculate tangential and normal components of acceleration. B,E

12. Find the limit of functions of several variables. C,D

13. Calculate the first and higher order partial derivatives. C,D

14. Apply the chain rule to find partial derivatives and use partials to differentiate implicit functions. C,D

15. Calculate the gradient and directional derivative of multivariable functions. C,D

16. Compute equations of tangent planes and normal lines to a surface and calculate the extrema of the surface. A,C,D

17. Apply Lagrange multipliers to find local extrema. D

18. Evaluate iterated integrals. C

19. Calculate areas, surface areas, and volumes using double integrals. D

20. Calculate volumes using triple integrals. D

21. Find mass, moments, center of mass and moments of inertia. D

22. Find the divergence and curl of vector fields. E

23. Evaluate line integrals. E

24. Determine if a line integral is independent of path and calculate a potential function for a vector function. E

25. Employ Green's Theorem to evaluate a line integral. E

26. Calculate work integrals, surface integrals, and flux. E

27. Use the Divergence Theorem to calculate flux. E

* Capital letters after Expected Student Learning Outcomes reference the course goals listed above.

IV. Evaluation:

A. Testing Procedures: 100% of grade or instructor discretion if lab work and/or section projects are utilized.

Students are evaluated primarily on the basis of tests, quizzes, homework, and a comprehensive final exam. A minimum of four major tests is recommended.

B. Laboratory Expectations: 0% of grade or instructor descretion

Instructor discretion on case studies, lab, and/or section projects.

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

93% - 100%   A
88 - 92   B+
83 - 87   B
78 - 82   C+
70 - 77   C
60 - 69   D
Below 60   F

V. Policies:

A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of the Learning Division, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of the Learning Division.

B. Academic Misconduct:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:
• Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
• Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
• Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
• Taking an exam for another student.
• Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
• Any of the above occurring within the Web or distance learning environment.

C. Accommodations for Disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at www.pstcc.edu/departments/swd/.

D. Other Policies:

 Make-up work: Instructor discretion about make-up tests and/or assignments.

Cell phones: Cell phones are to be either turned off or put in vibration mode while in class. Instructor discretion as to penalty.