Mathematics 2163 – Calculus III, Section 2
Spring 2012

MWF 9:30 am – 10:20 am in HSCI 316

Instructor: Oleksandr Tovstolis

Office: MSCS 532

Office Phone: 405-744-1804

E-mail: *atovstolis@math.okstate.edu*

Office Hours: Monday, Wednesday 3:30 pm – 5:00 pm and by appointment

Textbook: ***Calculus (Early Transendentials)*** by James Stewart, 6th Edition (Custom Edition for Oklahoma State University), Cengage Publishing. – 2008.

Website: *http://www.math.okstate.edu/~atovstolis/calculus3.htm*

Objectives: The course should familiarize students with main concepts and technique of mathematical analysis in several variables. It includes basic notions and methods of vector operations, functions of several variables and vector-valued functions, limits and continuity properties of functions of several variables, partial derivatives. Various types of standard surfaces are also discussed. In addition, several types of multivariate Riemann integrals will be studied. It is double and triple integrals over various domains, surface integrals, as well as line integrals. These instruments are crucial tools in modern mathematics, physics, engineering and technology. Although the course's presentation is provided for $\mathbb{R}^2$ or $\mathbb{R}^3$ vector spaces, the general case of $\mathbb{R}^n$ will also be investigated when appropriate.

Topics Covered. The course covers topics 12 – 16 of the textbook. In addition, some supplemental materials and real-world examples should be given as time permits.

Preliminary Requirements: I expect that the students are familiar with univariate Calculus (Calculus I and II), especially with the following topics:

- Limit of a sequence.
- Limit of a function at a given point or at the infinity.
- Continuity of a function.
- Derivatives (the definition of derivative, derivatives of elementary functions, basic operations with derivatives including the chain rule, higher order derivatives). In particular, I expect that the students are able to find $f'(x)$ if $f(x) = x^x$ or $f(x) = \begin{cases} e^{-1/x^2}, & x \neq 0, \\ 0, & x = 0. \end{cases}$
- Antiderivative and indefinite integral. Basic operations, integration by parts, changing variables.
- Riemann integral. The Fundamental Theorem of Calculus and reasons for applying it. To check your knowledge, you could find the following Riemann integrals:
$$\int_1^2 x^3 \sin x^2 \, dx, \qquad \int_{-1}^1 2^{\sin\left(\frac{1}{1+x^2}\right)} x^5 \ln(|x| + 3) \, dx, \qquad \int_0^1 \frac{1}{1+e^x} dx, \qquad \int_{-1}^1 \frac{\cos x}{1+e^x} dx.$$
- Power Series (Taylor expansions, Taylor formula, radius of convergence, differentiation and integration of a power series). Have answers to the following questions: Could a power series have the following domain of convergence: $(-1,2] \cup (3,7)$? Is it possible to find an infinitely differentiable on the real line function f that cannot be expanded into Taylor series in any non-trivial neighborhood of a given point?

I also expect a high level of 'mathematical culture', e.g., dealing with radicals, solving algebraic, logarithmic and trigonometric equations, etc.

If you have some difficulties with the aforementioned topics, please let me know as soon as possible. We could schedule additional classes for covering this material.

Attendance. Attendance of our classes is mandatory. It is one of the university's requirements. In addition to the regular classes, we may schedule additional lectures for covering some gaps in previous material that is required for successful study of our course. The attendance of these classes is non-mandatory but highly recommended for anybody who is not familiar with the topics covered there. On mandatory classes, an attendance list should be filled in each time.

Calculators. Use of calculators will be permitted for doing homework assignments, but not on exams and quizzes. The students could borrow a graphic calculator from the Math Department's Front Office (MSCS 401).

Homework. The homework assignments are mandatory. Almost all your homework will require using of WebAssign.net. The assignments are graded electronically. They also have deadline for submissions. I will supply you with a class key that should be used to register for this section. The address of the WebAssign website is https://www.webassign.net/login.html

Running List of Homework Problems. Some problems that require special attention will be published on the course's webpage. They should emphasize an importance of the main notions and methods of the course. As usual, these problems require a bit more effort than usual homework problems graded online. The students are required to write down complete and clear solutions to the running list's problems into a separate notebook. This notebook will be exempted periodically and graded selectively.

Exams: There will be three midterm in-class exams:

- Exam 1 (Monday, 02/13/2012)
- Exam 2 (Wednesday, 03/14/2012)
- Exam 3 (Monday, 04/16/2012)

Before each exam, we will have a special review class that should help to revise for the exam.
The Final Exam will be provided on the finals week: April 30 – May 4, 2012.
The full OSU Academic Calendar could be found at
http://registrar.okstate.edu/index.php?option=com_content&view=article&id=331&Itemid=3 .
No make-up midterm or final exams will be given, and only official university excuses will be accepted as reasons for missing an exam.
In addition, several in-class quizzes may be given on selected days. They will be announced in advance.

Grading. The final grade will be calculated as follows:

- Homework Assignments – 100 points
- Quizzes – 50 points
- Running List of Homework Problems – 50 points
- Three Midterm Exams – 100 point each
- Final Exam – 200 points

Thus, **total number of points is 700**. In addition, a **special bonus of 25 points** will be granted to students that missed no more than one regular class and **passed** all three midterm exams and the final exam (with a score of at least 50% of points awarded for an exam). The final grade will be based on the total score:

- "A" – 630+ points
- "B" – 560-629 points
- "C" – 490-559 points
- "D" – 420-489 points
- "E" – 350-419 points
- "F" – 349 or less points.

Some discretion may be used in deciding 'borderline' cases. It will be based on a general understanding shown by any particular student. Please remember that a general understanding of notions and methods of the course and an ability to apply it to solving problems is crucial.

Academic Integrity. The following information is stated by the Office of Academic Affairs of the university (see *http://ce.okstate.edu/policies.aspx*):
Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration on homework or assignments, plagiarism, multiple submission of the same assignment, cheating on examinations, fabricating information, helping another person cheat, having unauthorized advance access to examinations, altering or destroying the work of others, and fraudulently altering academic records) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: completing a substitute examination, quiz, or assignment; receiving a failing grade on an assignment, examination, or course; receiving a notation of a violation of academic integrity on your transcript ("F!"); and being suspended from the University. You have the right to appeal the charge.
For more information, visit the following website http://academicaffairs.okstate.edu/

OSU Syllabus Attachment. For general university's policies and important dates, see the following resource: http://academicaffairs.okstate.edu/faculty-a-staff/48-syllabus-spring

The Course Schedule

Class	Topic No.	Topic	Date	D	W#	HW Visible	HW Due
1.	12.2	Vectors	01/09/12	M	1	01/09/12	01/16/12
2.	12.3	Dot Product	01/11/12	W		01/09/12	01/18/12
3.	12.4	Cross Product	01/13/12	F		01/09/12	01/20/12
4.	12.5	Equations of Lines and Planes	01/18/12	W	2		
5.	12.5	Continued	01/20/12	F		01/12/12	01/27/12
6.	13	Vector Functions and Space Curves. Derivatives and Integrals of Vector Functions	01/23/12	M	3		
7.	14.1	Functions of Several Variables	01/25/12	W			
8.	14.1	Continued	01/27/12	F		01/20/12	02/03/12
9.	14.2	Limits and Continuity	01/30/12	M	4	01/23/12	02/06/12
10.	14.3	Partial Derivatives	02/01/12	W		01/25/12	02/08/12
11.	14.4	Tangent Planes and Linear Approximations	02/03/12	F			
12.	14.4	Continued	02/06/12	M	5	01/30/12	02/13/12
13.	14.5	The Chain Rule	02/08/12	W		02/01/12	02/15/12
14.		Review for Exam 1	02/10/12	F			
15.		Exam 1 (12.2-12.5, 13, 14.1-14.5)	02/13/12	M	6		
16.	14.6	Directional Derivatives and the Gradient Vector	02/15/12	W			
17.	14.6	Continued	02/17/12	F		02/10/12	02/24/12
18.	14.7	Maximum and Minimum Values	02/20/12	M	7		
19.	14.7	Continued	02/22/12	W		02/15/12	02/29/12
20.	14.8	Lagrange Multipliers	02/24/12	F		02/17/12	03/02/12

21.	15.1	Double Integrals over Rectangles	02/27/12	M	8	02/20/12	03/05/12
22.	15.2	Iterated Integrals	02/29/12	W		02/22/12	03/07/12
23.	12.6	Cylinders and Quadratic Surfaces	03/02/12	F			
24.	12.6	Continued	03/05/12	M	9	02/27/12	03/12/12
25.	15.3	Double Integrals over General Regions	03/07/12	W			
26.	15.3	Continued	03/09/12	F		03/02/12	03/16/12
27.		Review for Exam 2	03/12/12	M	10		
28.		Exam 2 (14.6-14.8, 12.6, 15.1-15.3)	03/14/12	W			
29.	15.4	Double Integrals in Polar Coordinates	03/16/12	F			
30.	15.4	Continued	03/26/12	M	12	03/19/12	04/02/12
31.	15.5	Applications of Double Integrals	03/28/12	W		03/21/12	04/04/12
32.	15.6	Triple Integrals	03/30/12	F			
33.	15.6	Continued	04/02/12	M	13	03/26/12	04/09/12
34.	15.7	Triple Integrals in Cylindrical Coordinates	04/04/12	W			
35.	15.7/15.8	Triple Integrals in Cylindrical and in Spherical Coordinates	04/06/12	F		03/31/12	04/14/12
36.	15.8	Triple Integrals in Spherical Coordinates	04/09/12	M	14	04/02/12	04/16/12
37.	15.9	Change of Variables in Multiple Integrals	04/11/12	W			
38.		Review for Exam 3	04/13/12	F			
39.		Exam 3 (15.4-15.9)	04/16/12	M	15		
40.	16.1	Vector Fields	04/18/12	W		04/09/12	04/23/12
41.	16.2	Line Integrals	04/20/12	F		04/11/12	04/25/12
42.	16.3	The Fundamental Theorem for Line Integrals	04/23/12	M	16		
43.	16.3/16.4	The Fundamental Theorem for Line Integrals / Green's Theorem	04/25/12	W		04/14/12	04/29/12
44.	16.4	Green's Theorem	04/27/12	F			
45.		Review for Final Exam	04/27/12	F			