University of International Business and Economics
International Summer School

MAT 230 Multivariable Calculus (Calculus III)

Term: May 27th – June 27th, 2018
Instructor: Dr. Sergei V. Shabanov
Home Institution: University of Florida, Gainesville, USA
Office hours: to be announced
Discussion sessions: each Wednesday, time TBD
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Teaching Assistant: TBD
Total Contact Hours: 66 contact hours (45 minutes each)
Credit: 4 units

Course Description：

The course covers the following concepts: vector algebra, lines, planes, curves, and surfaces in space, functions of several variables, multivariable limits and continuity, partial derivatives and differentiation of functions of several variables, extreme values of functions of several variables and the method of Lagrange multipliers, double and triple integrals, change of variables in multiple integrals, line and surface integrals, and applications of differentiation and multiple integration to vector fields (line and surface (flux) integrals of vector fields, fundamental theorem for line integrals, etc.).

Course Goals：

A student who satisfactorily completes this course should be able to:
  1. Use the rules of vector algebra to describe lines, planes, and curves in space;
  2. Analyze functions of several variables using rules of differentiation;
  3. Investigate extreme values of functions of several variables;
  4. Evaluate multiple integrals;
  5. Evaluate line and surface integrals of vector fields.

Required Text：

S.V. Shabanov, Concepts in Calculus III. Multivariable Calculus,
ISBN 978-1-61610-162-6, Edition of 2018.
A free PDF file of the latest (2018) edition of the textbook will be provided to all students enrolled into the course. Please do not buy a beta version (2011) of the book online. The students are expected to read ALL examples and recommended Study Problems in the textbook.

Prerequisites：

The course is based on Calculus 1 and 2 (or their equivalents). Students are expected to know basic concepts of calculus for functions of a single real variable. Good technical skills in differentiation and integration are necessary. Particular topics of Calculus 2, such as numerical series, power series, planar curves, are not mandatory for the course.

Exams：

There will be five one-hour exams (one per each chapter of the course). The exam dates are given in the course schedule below. Each exam contains 8 problems, 5-6 of which are taken directly from the homework assignment for the week prior to the exam or from Examples discussed in the textbook. The other 3-2 problems are conceptually similar to the homework problems. There will be one non-standard extra credit problem in each exam. A good way to prepare for such problems is to read the solutions of the Study Problems in the textbook. All exams are free-response assignments. No credit for plain answers. The logic and technical details of solutions must be given in order to get a credit. No notes, no books, no calculators or any other electronic devices are permitted on the exams. One formula sheet is permitted. Makeups for missed exams are only with a written medical excuse approved by the school administration.

Grading Policy：

In five written assignments, there are total 40 problems. Each problem is worth a point if it is solved correctly. So the perfect score is 40 for regular problems (and 45 with all extra credit problems). There is a small partial credit for incomplete solutions (a fraction of a point). If P is the total number of points, then the course score G=100(P/40), that is, G=100 if P=40 and G=50 if P=20, etc.

If G is the course score as defined above, then the grade thresholds are

A	90 and above	C+	65-69
A-	85-89	C	60-64
B+	80-84	C-	55-59
B	75-79	D	50-54
B-	70-74	F	below 50

It should be noted that in many US colleges **C-** is not a passing grade if the course is required for a major.

General expectations：

Students are expected to:
- Do the homework regularly, even though the homework is not to be turned in. Remember that to get points toward your grade, every week you have to solve 5-6 problems randomly chosen from homework problems and 3-2 problems very similar to

those in the homework or Examples in the textbook. So, read Examples and Study Problems in the textbook while doing the homework and review your solutions before exams.

- Review class notes and, if necessary, read the corresponding sections in the textbook, clarify questions about basic concepts of the course during office hours.
- Attend all classes and be responsible for all material covered in class and otherwise assigned. Any unexcused absence may impact a student's grade.
- Refrain from texting, phoning or engaging in computer activities unrelated to class during class. Students who do not do this will be asked to leave the class
- Participate in class discussions and complete required written work on time. While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Attendance policy：

Summer school is very intense and to be successful, students need to attend <u>every class</u>. Occasionally, due to illness or other unavoidable circumstance, a student may need to miss a class. A medical certificate is required to be excused. Any absence may impact on the student's grade. Arriving late or leaving early will count as a partial absence. If a student is missing less than a point for a better grade, the better grade will be given, provided the student had no unexcused absences during the course.

Academic honesty：

Students are expected to maintain high standards of academic honesty. Specifically, no notes, no electronic devices, no books are permitted on Exams. One formula sheet on a piece of paper of a standard format (e.g., A4) is allowed on Exams. Admission to Exams is only with a picture ID. Zero tolerance to any kind of cheating (e.g., copying solutions from classmates, use of unauthorized materials or devices). Failure to abide by this will result in a zero score on the examination, or even failure in the course.

Course schedules and homework assignments：

The planned schedule sketched out below may be modified to suit the interests or abilities of the enrolled students or to take advantage of special opportunities or events that may arise during the term.

WEEK ONE (May 27 – May 30): Vector algebra, lines and planes in space

Mon: Sections 1-3, Assignment: 1.10 (1, 6, 7, 9, 11, 19, 21), 2.5 (3, 4, 8, 9, 11), 3.8 (2, 4, 5, 9, 11, 15),
Tues: Sections 4-5, Assignment: 4.6 (2, 3, 4, 11, 16, 19, 26), 5.5 (2, 4, 6, 8, 9, 13)
Wed: Sections 6-7, Assignment: 6.5 (1, 3, 7, 9, 11, 21), 7.5 (2, 7, 9, 10, 11, 12, 18, 23), **Thurs:** Sections 9-11, Assignment: 9.6 (1-5, 11-15, 25, 26). 10.4 (1-10), 11.4 (1-3, 6, 7, 11, 19),

WEEK TWO (June 3 – June 6): Curves in space and vector functions

Mon: Exam 1 covers Sections 1-9 (one hour), Section 12, Assignment: 12.5 (1-3, 7-10, 12)
Tues: Sections 13-14, Assignment: 13.3(1, 3, 4, 8-9, 16, 17), 14.3 (1-7, 14-17)
Wed: Sections 16-18, Assignment: 16.4 (4-12, 18-21), 17.3 (1, 2, 8, 9, 23, 24), 18.6 (4-8, 15, 16),
Thurs: Exam 2 covers Sections 10-14 (one hour), Section 19, Assignment: 19.3 (3-6, 8, 12, 17)

WEEK THREE (June 10 – June 13): Differentiation of functions of several variables

Mon: Sections 20-22, Assignment: 20.4 (2-6, 10, 14, 20), 21.6 (1, 5, 7-10, 14, 15, 23), 22.7(2, 6, 7, 11, 25, 26, 31)
Tues: Sections 23-24, Assignment: 23.7 (1-3, 9, 10, 27, 28), 24.5(4-6, 9, 11, 15, 24, 28, 29, 45)
Wed: Sections 25- 26, Assignment: 25.6(1, 6-10, 13-15), 26.6(1-3, 27-29),
Thurs: Sections 27-29, Assignment: 27.6(3-6, 9, 11), 28.6(2, 10, 11, 15, 16), 29.1(3, 4, 8-10)

WEEK FOUR (June 17 – June 20): Multiple integrals

Mon: Exam 3 covers Sections 15-27 (one hour), Sections 30-31; Assignment: 30.3(1-8), 31.6(1-3, 6-13, 28-33)
Tues: Sections 32-33, Assignment: 32.5(1-3, 9-11, 17-19, 27, 28), 33.5(11-13, 19, 21-23)
Wed: Sections 34-35, Assignment: 34.6(1, 2, 4, 7, 8, 13, 18, 21-23), 35.6(4-6, 9-11, 18-27)
Thurs: Sections 36, 38-39, Assignment: 38.3(1, 3, 5, 14, 18), 39.5(2-4, 6, 7, 9, 28)

WEEK FIVE (June 24 – June 27): Vector fields and vector calculus

Mon: Exam 4 covers Sections 28-39 (one hour), Sections 41-42, Assignment: 41.6(1-3, 7, 11, 17-19), 42.6(9-12, 17, 18)
Tues: Sections 44-45, Assignment: 44.5 (1-5, 8-11, 15), 45.7 (4-8)
Wed: Sections 43, 46, Assignment: 43.5(4-10), 46.6 (18-25)
Thurs: Discussion and Exam 5 covers Sections 41-46 (one hour).