



## University of International Business and Economics International Summer School

### MAT 110 Calculus I

**Term:** May 28<sup>th</sup> – June 28<sup>th</sup>, 2018

**Instructor:** Dr. Sergei V. Shabanov

**Home Institution:** University of Florida, Gainesville, USA

**Office hours:** to be announced

**Discussion sessions:** each Wednesday, time TBD

**Email:** [shabanov@ufl.edu](mailto:shabanov@ufl.edu)

**Webpage:** [people.clas.ufl.edu/shabanov](http://people.clas.ufl.edu/shabanov)

**Total Contact Hours:** 66 contact hours (45 minutes each)

**Credit:** 4 units

#### Course Description:

The course covers the following concepts: Functions of a real variable; Basics functions such as polynomial, exponential, logarithmic, and trigonometric functions; Limits and continuity; The derivative of a function of a real variable; The derivative as a function; Continuous and differentiable functions; Rules of differentiation; Implicit functions and their derivatives; Extreme values of a functions; The mean value theorem; First and Second derivative tests; Analyzing the shape of a graph of a function using derivatives; l'Hospital's rule for computing limits; Tangent line to the graph of a function; Taylor polynomials of a function; Analyzing the behavior of a function near a point using Taylor polynomials; Antiderivatives; Definite integral of a function; Geometrical significance of the definite integral of a continuous function over an interval; Indefinite integrals; The fundamental theorem of Calculus; Basic methods to compute integrals; The substitution rule.

#### Course Goals:

A student who satisfactorily completes this course should be able to:

- ✧ Differentiate and integrate basic functions;
- ✧ Analyze the shape of the graph of a function using derivatives of the function;
- ✧ Investigate the extreme value problem for a function of a real variable;
- ✧ Approximate a function by its Taylor polynomials near a point

#### Required Text:

M. Bona and S.V. Shabanov, Concepts in Calculus I, Second Edition, ISBN 978-1-61610-160-6, University Press of Florida, 2012.

A free PDF file of the latest 2014 edition of the textbook will be provided to all students enrolled into the course. Please do not buy a beta version of the book available online.

#### Prerequisites:

Students are expected to be familiar with basic algebra and trigonometry studied in high school.

**Exams:**

There will be five one-hour exams. 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. 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.

**Grading Scale:**

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

<b>A</b>	90 and above	<b>C+</b>	65-69
<b>A-</b>	85-89	<b>C</b>	60-64
<b>B+</b>	80-84	<b>C-</b>	55-59
<b>B</b>	75-79	<b>D</b>	50-54
<b>B-</b>	70-74	<b>F</b>	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 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 every class. 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 28 – May 31): Functions

**Mon:** Sections 1-3, Assignment: 1.1 (1-4, 6-8, 13-19), 2.7 (1-4, 7, 9, 10, 12, 16), 3.3 (1-3, 5, 6, 13, 19, 20),

**Tues:** Sections 4-5, Assignment: 4.2 (12-16, 19, 20), 5.3 (1-3, 5, 8-12)

**Wed:** Sections 5-6, Assignment: 5.3 (1-3, 5, 8-12, 15-17), 6.3 (1, 3, 7, 19, 20)

**Thurs:** Section 7-8, Assignment: 7.5 (1-7, 13, 14, 18), 8.4 (2, 4, 7, 10, 11, 16, 17)

#### WEEK TWO (June 4 – June 7): Limits and Derivatives

**Mon:** **Exam 1 covers Sections 1-6 (one hour)**, Section 9, Assignment: 9.6 (1-3, 10-14, 17-19)

**Tues:** Sections 10-11, Assignment: 10.4 (1-12), 11.4 (1-3, 6, 7, 11, 19),

**Wed:** Sections 11-12, Assignment: 11.4 (1-3, 6, 7, 11, 19), 12.5 (1-3, 7-10, 12)

**Thurs:** Sections 13-14, Assignment: 13.3(3, 4, 6-9, 15, 16, 18), 14.3 (1-12, 14-18)

#### WEEK THREE (June 11 – June 14): Rules of Differentiation

**Mon:** **Exam 2 covers Sections 7-12 (one hour)**, Section 15, Assignment: 15.1 (5-12),

**Tues:** Sections 16-17, Assignment: 16.4 (1-13, 18-20), 17.3 (1-3, 8-12, 17, 18)

**Wed:** Sections 18-19, Assignment: 18.6 (4-10, 15-16), 19.3 (3-6, 8, 12, 17)

**Thurs:** Sections 20-21, Assignment: 20.7 (2-7, 10, 19, 20), 21.7 (1, 3(i-iii), 4(i-iii), 8(i), 11, 19)

#### WEEK FOUR (June 18 – June 21): Applications of Differentiation

**Mon:** **Exam 3 covers Sections 13-21 (one hour)**, Sections 22, Assignment: 22.3 (1(i-vii), 2(i-iv), 3(i-iii), 7),

**Tues:** Sections 23-24, Assignment: 23.3 (3,4, 8(i-iii), 9, 18(i-vi), 22, 23(i-ii), 24), 24.3 (1(vi-xii, xix-xxii), 2(i-iii), 7-8)

**Wed:** Sections 25-26, Assignment: 25.7 (1,3, 5,6, 9, 14, 17(i-iii), 18(i, ii)), 26.5 (1(i-x, xiii-xv), 2(i-ii, v)

**Thurs:** Sections 27-28, Assignment: 27.4 (1(i-x, xxx-xxxii), 28.2 (1-5, 7, 8, 10)



**WEEK FIVE (June 25 – June 28): Integration**

**Mon: Exam 4 covers Sections 22-28 (one hour)**, Sections 30, Assignment: 30.5 (1(i-vii, x-xiv), 3(i-iii, v)),

**Tues:** Sections 31-33, Assignment: 31.7 (1, 2, 5(i-iii), 8(i-iii), 10, 13), 32.9 (2, 3, 9(i-v)), 33.3 (1, 2, 5, 6, 8(i-x)))

**Wed:** Sections 34-35, Assignment: 34.2 (1(i-vii, x-xv, xix-xxi), 4(I, iv), 5, 6), 35.4 (1(i-x), 2(i-iv), 3(iv-vi, xi-xiii))

**Thurs:** Discussion and **Exam 5 covers Sections 30-35 (one hour).**