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## Beijing Jiaotong University

### 2020 Summer Program

### MATH 122 Calculus 2

### Course Outline

**Term:** June 01-July 03,2020

**Course Code:** MATH 122

**Instructor:** Professor Vadim Olshevsky

**Home Institution:** University of Connecticut

**Office Hours:** TBA and By Appointment

**Email:** olshevsky@gmail.com

**Credit:** 4

**Course Description:** Calculus 2 is the second of a sequence of three courses in calculus covering basic concepts of calculus. The course covers integration techniques, applications of integrals, basic differential equations, sequences, and power series.

**Course Objectives:** The objective of the course is to build an understanding of the fundamental principles and applications of integral calculus through lectures, homework, discussions, quizzes and exams.

**Required Textbooks:**

*Calculus: Early Transcendentals*, 8th Edition, by James Stewart with WebAssign Access Code. Can be purchased directly at

<https://www.cengage.com/c/calculus-early-transcendentals-8e-stewart/9781337771498#compare-buying-options>

It is important that you purchase both the textbook and the WebAssign code, the latter is necessary for the homework assignments.

**Homework:** There will be online WebAssign homework assignments for each section of the text. Each assignment will be made available on several days before the section is covered in class. The due date for each assignment will be set by your instructor and will generally be two or three days after the material is covered in class. You will get five attempts for each question.

### Grading & Evaluation

Attendance and participation: 10%  
Homework: 30%  
Midterm: 30%  
Final: 30%

Grade	Range
A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

### Course Schedule

**Week1** *Integration:* Anti-derivative, indefinite integrals, approximating areas, definite integrals, Fundamental Theorem of Calculus, integration formulas, substitutions, integration of logarithmic and exponential functions.

**Week2** *Integration:* Integration by parts, trigonometric integrals and substitutions, rational fractions, other strategies, improper integrals.

**Week3** *Applications of integration:* Arclength and surface area, area and volume of revolution, work, moment, center of mass, ordinary differential equations (basic concepts, direction fields, separable equations)

**Week4** *Applications of integration:* exponential growth and decay, the logistic equation. *Sequences and series:* Sequences, infinite series, comparison and limit comparison test, divergence and integral tests

**Week5** *Sequences and series:* Alternating series and ratio tests, power series, radius and interval of convergence, Taylor and Maclaurin series



**Detailed Course Outline:**

Week	Chapter	Topic
1	1 Integration	1.1 Anti-derivatives
		1.2 Indefinite integrals
		1.3 Approximating areas
		1.4 The definite integral
		1.5 Fundamental Theorem of Calculus
2	2 Integration techniques	1.6 Integration formulas
		1.7 Substitutions
		1.8 Integration of logarithmic and exponential functions
		1.9 Integrals resulting in inverse trigonometric functions
		2.1 Integration by parts
3	3 Applications of integration	2.2 Trigonometric integrals
		2.3 Trigonometric substitutions
		2.4 Integrating rational fractions (partial fractions)
		2.5 Other strategies
		2.6 Improper integrals
4	4 First order Equations	Exam 1
		3.1 Arc length of a curve and surface area
		3.2 Area and volume of revolution
		3.3 work, moments and centers of mass
		4.1 Basics of differential equations
5	5 Sequences and series	4.2 Direction fields
		4.3 Separable equations
		4.4 Exponential growth and decay, logistic equation
		5.1 Sequences
		5.2 Infinite series
6	6 Sequences and series	5.3 Comparison and limit comparison test
		5.4 Divergence and integral test



		Exam 2
		5.6 Alternating series test 5.7 Ratio and root tests
5		5.8 Power series 5.9 Radius and interval of convergence 5.10 Taylor and Maclaurin series
		Final Exam
		Discussion of final exam

**Student responsibilities/expectations:** The main course material will be presented through lectures. A discussion session, to be held every Friday will offer an opportunity for students to discuss course material and assigned problems with a teaching assistant (TA). Students are advised to keep pace with the course material as it is being presented. Consequently, students should endeavor to attend class and discussion sessions, and spend sufficient time working on assigned homework problems. If for any reason a student misses a class, he/she should endeavor to obtain the notes and learn the missed material. Students should not hesitate to ask questions or seek additional assistance to ensure that they are staying on pace with the class.

**Examinations:** There will be two midterm exams plus one cumulative final exam. The exams will contain problems to solve and definitions, brief explanations of concepts, and simple proofs.