COURSE SYLLABUS FORM

American University of Beirut
Faculty of Arts and Sciences
Department Mathematics

Course Number and Title: Math 201, Calculus and Analytic Geometry III

1. Course Learning Outcomes

- Define the sum of a series as the limit of a sequence
- Use tests to decide about the convergence of a given series
- Use series to approximate functions
- Define differentiability for functions of several variables
- Find derivative of a function in a given direction
- Maximize or minimize a function subject to a given constraint
- Define the integral of a function of several variables
- Use Fubini’s theorem to evaluate double and triple integrals
- Apply double and triple integrals to find areas, volumes, and centers of mass
- Define line and surface integrals
- Apply line integrals to find work, circulation, or flux of a given vector field along a given curve
- Use Green’s theorem to evaluate line integrals
- Use surface integrals to find surface areas

2. Resources Available to Students


3. Grading Criteria

Two quizzes, 25% each
Comprehensive final exam, 50%

4. Schedule

**Week 1**
Topics: limits of sequences, subsequences, bounded sequences, infinite series
Homework assignment:
Section 8.1 # 1, 4, 7, 10, 12, 16, 22, 23, 26, 28, 31, 32, 40--55, 61, 62, 67, 68
Section 8.2 # 1, 3, 6, 7, 9, 11, 17, 20

**Week 2**
Topics: infinite series, series of nonnegative terms, alternating series
Homework assignment:
Section 8.3 # 3, 5, 10, 12, 15, 17, 19, 24, 32, 35, 41, 43, 49, 57, 63
Section 8.4 # 5, 6, 9, 11, 18, 19, 22, 25, 31, 34, 40, 57, 59, 65, 75, 76

Week 3
Topics: alternating series, power series
Homework assignment:
Section 8.5 # 3, 5, 12, 15, 21, 35, 39, 40, 45, 47, 49
Section 8.6 # 4, 6, 8, 16, 17, 19, 21--23, 30, 31, 37, 38--41, 43

Week 4
Topics: Taylor series, applications of power series
Homework assignment:
Section 8.7 # 2, 4, 8, 10, 14, 18, 20, 22, 25, 33, 34, 36--43, 47
Section 8.8 # 3, 5, 9, 14, 34, 35, 37, 41

Week 5
Quiz 1: Wednesday, October 29, 6:00–7:00 p.m.
Topics: polar coordinates
Homework assignment:
Section 9.5 # 9, 19--21, 23, 26, 32, 35, 36, 46, 48, 49, 52, 56, 58, 67, 69, 82
Section 9.6 # 13, 19, 21, 29, 33, 38, 39

Week 6
Topics: cylinders and quadratic surfaces, functions of several variables, limits and continuity in higher dimensions
Homework assignment:
Section 10.4 # 1--12
Section 11.1 # 2, 6--8, 30, 31, 41, 42
Section 11.2 # 3, 6, 13, 21, 24, 27, 29, 31, 41, 55, 56, 61, 67, 69

Week 7
Topics: partial derivatives, chain rule
Homework assignment:
Section 11.3 # 1, 4, 6--8, 12, 15, 17, 21, 23, 33, 35, 41, 43, 52, 57, 63, 67
Section 11.4 # 1, 3, 7, 9, 13, 17, 23, 25--27, 31--33, 35, 37, 41, 42, 45

Week 8
Topics: directional derivatives, maxima and minima
Homework assignment:
Section 11.5 # 3, 7, 11, 13, 17, 19, 23, 24, 27, 31, 33, 35, 37, 39, 41, 45, 47, 50, 54, 63
Section 11.7 # 1, 3, 5, 7, 13, 17, 21, 23, 27, 29, 41

Week 9
Topics: Lagrange multipliers
Homework assignment:
Section 11.8 # 1, 3, 7, 9, 12, 13, 17, 23, 27, 33, 35

Week 10
Quiz 2: Wednesday, December 3, 6:00–7:00 p.m.
Topics: double integrals, areas
Homework assignment:
Week 11
Topics: double integrals in polar form, triple integrals, centers of mass
Homework assignment:
Section 12.3 # 3, 5, 7, 13, 15, 17, 21, 23, 27, 29, 31, 34, 37, 43
Section 12.4 # 3, 5, 8--10, 13, 15, 17, 25, 29, 32, 33, 41, 43, 47
Section 12.5 # 6, 7, 13, 14, 17, 18

Week 12
Topics: triple integrals in cylindrical and spherical coordinates, change of variable formula
Homework assignment:
Section 12.6 # 3, 5, 7, 9, 11, 15, 17, 21, 23, 27, 29, 31, 34, 37, 43, 50, 61, 77
Section 12.7 # 1, 3, 5, 7, 9, 13--17, 19--22

Week 13
Topics: line integrals
Homework assignment:
Section 13.1 # 1--9, 11, 13, 15--17, 19, 21, 23, 25, 26

Week 14
Topics: work, circulation, flux, path independence, conservative fields, Green’s theorem
Homework assignment:
Section 13.2 # 1, 3--5, 7, 9, 13, 15, 17, 19, 23, 25, 29, 33, 37
Section 13.3 # 3, 5--7, 9, 12--22, 25, 28, 31, 33, 38
Section 13.4 # 1--5, 7--9, 17, 19, 21, 23, 24, 26, 28, 33, 35

Week 15
Topics: surface area and surface integrals, Fourier series
Homework assignment:
Section 13.5 # 1, 3, 5, 11, 13--15
Section 8.9 # 1, 3, 6, 9--11, 15, 16