

Instructor: Young-Seon Lee, PhD

Class Hour: M/W 3:30 pm ~ 4:50 pm

Classroom: C103

Office: B609, **Phone:** 032-626-1917

E-mail: young-seon.Lee@stonybrook.edu

Office Hours: Mon/Wed 10:30 am ~ 12:00 pm, and Tue/Thu 5:00 pm ~ 6:30 pm
at B609 or virtual (Zoom), particular times are possible by arrangement.

TA and TA office hours:

- Mincheol Shin: Wed 2:00 pm ~3:00 pm and 5:00 pm ~ 6:00 pm,
Email: mincheol.shin@alumni.stonybrook.edu
- Jongho Lee: Mon/Wed 2:00 pm ~ 3:00 pm, Email: lee.jongho@stonybrook.edu
- Wonwoo Lee: Tue/Thu 10:30 am ~ 11:30 am, Email: wonwoo.lee@stonybrook.edu
- Joo Hyuk Eom: Mon/Wed 5:00 pm ~ 6:00 pm, Email: joohyuk.eom@stonybrook.edu
- Min Jae Lee: Tue/Thu from 1:00 pm ~ 2:00 pm, Email: minjae.lee.2@stonybrook.edu

Welcome to Applied Calculus II!

This is a course designed primarily for science, business, engineering, and technical majors to provide students with analytic and numerical methods of integration; interpretations and applications of integration; differential equations models and elementary solution techniques; phase planes; Taylor series and Fourier series.

Course Description, and Textbooks

Course Title: Applied Calculus II

Course Description: Analytic and numerical methods of integration; interpretations and applications of integration; differential equations models and elementary solution techniques; phase planes; Taylor series and Fourier series. Intended for CEAS majors. Not for credit in addition to MAT 127 or 132 or 142 or 171

Topics

1. Concepts on Integration and Methods of Integration: substitution, integration by parts, volume problems, approximating integrals with Riemann sums, improper integrals
2. Applications of the Integral: volume and other geometric applications, parametric curves, arc lengths; probability; economic interpretations
3. Elements of Differential Equations: slope fields, Euler's method, applications and modeling
4. Systems of first-order differential equations and second-order differential equations, including solutions involving complex numbers
5. Approximations and series: Taylor series, Fourier polynomials
6. Review and Tests

Learning Outcomes for AMS 161, Applied Calculus II

Syllabus

- 1.) Demonstrate a conceptual understanding of the Fundamental Theorem of Calculus and its technical application to evaluate definite and indefinite integrals.
 - * Solve problems graphically and analytically that illustrate how integration and differentiation are inverse operations;
 - * Use the Fundamental Theorem of Calculus to evaluate definite integrals whose limits are functions of x .
- 2.) Demonstrate skill in integrating basic mathematical functions, such as:
 - * polynomials,
 - * exponential functions
 - * sine and cosine functions.
- 3.) Develop facility with important integration tools such as:
 - * reverse chain rule;
 - * substitution methods;
 - * integration by parts;
 - * tables of integrals.
- 4.) Solve problems involving geometric applications of integration:
 - * area problems;
 - * volume problems;
 - * arc-length problems
- 5.) Develop basic skills with using numerical methods to evaluate integrals
 - * right-hand, left-hand, and trapezoidal rules;
 - * Simpson's rule.
- 6.) Solve problems involving applications of integration to in physics and economics.
 - * center of mass problems;
 - * force problems;
 - * work problems;
 - * present value of multi-year investments.
- 7.) Solve problems with sequences and series, including:
 - * find limits of sequences;
 - * test series for convergence;
 - * sum series.
- 8.) Demonstrate facility with constructing and using Taylor and Fourier series.
 - * Taylor series for simple functions
 - * Taylor series for composite functions and products of functions;
 - * Taylor series to integration problems;
 - * simple Fourier series.
- 9.) Model problems with simple types of differential equations and solve these problems:
 - * model problems with solve first-order linear differential equations and solve them;
 - * use separation of variables to solve rate problems such as Newton's law of cooling and logistic equations;
 - * solve second-order linear differential equations.

Prerequisite: AMS 151_or MAT 131 or MAT 126.

Textbook:

"Calculus Early Transcendentals" by James Stewart, 9th Edition

Supplementary Textbooks:

- "Calculus (Single Variable)", by Hughes-Hallett, Gleason, McCallum, et.al., 6th Edition
- "Calculus Volume 2" by Gilbert Strang and Edwin "Jed" Herman, Free download at <https://openstax.org/details/books/calculus-volume-2>

Syllabus

Course Structure

This course consists of two lectures each week lasting 75 min each.

Methods for Assessment of Learning Outcomes

The expected learning outcomes for the course will be assessed through grading activities that include homework, attendance, exams, quiz.

Homework policy:

1. Homework will be assigned once a week on Brightspace.
2. The lowest homework grades will be dropped before the final grading.
3. Submit one file of your homework in PDF format on Brightspace. If you are not able to submit it via Brightspace, you should submit it to me by email.
4. Organize your solutions in the same order as the problems listed.
5. You **must** write neatly and legibly so that the TA can recognize your writing.
6. Late homework will **NOT** be graded for credit!
7. Collaboration with other classmates is encouraged in this course. Also, you may ask homework questions during office hours with TAs, or with me. But write-ups must be done independently.
8. Show all your work by writing all the steps to arrive at the solutions. A correct answer without the steps will receive minimal credit. This is good practice for what will be expected on exams.

Homework Guidelines:

1. Do **not** expect that you can solve every single problem on your own; instead, you are encouraged to discuss questions with each other
2. Download or print homework problems on Brightspace.
3. Write your solutions on blank (or ruled) papers or use an electronic pen to write in a file
4. Write your name, the course number (AMS161), and the assignment number (HW#) on the top of the first page of each homework. For example, you can write 'AMS161 HW1'.
5. Scan your homework papers with your phone by using free scanner apps (Download '**Adobe Scan**' for both iOS and Android or 'CamScanner' for Android users or 'Scannable' for iOS users), and change it to a 'pdf' file. Scan the multiple pages of your homework and save them into one pdf file format.
6. Save the pdf file of your homework as '**Your-First-Last Name-AMS161-HW1.pdf**'.
7. Working through problems is crucial to understanding math. Online practice problems will be available after each week of lectures so you can get practice with the material.

Exams: There are two midterms and one comprehensive final exam. No make-up exams will be allowed.

Calculators are **NOT** allowed in the exams. Every exam is a closed book.

- Exam 1: TBA
- Exam 2: TBA
- Final Exam: TBA

Quizzes: There will be a 10-15-minute Quiz once a week. **No** make-up quizzes will be allowed.

Grading: Your course grade will be determined by the following items:

Attendance = 5%, where attendance includes attending classes and class participation

Homework = 10%, **Quiz** = 15%, **Exam 1** = 20%, **Exam 2** = 20%, **Final Exam** = 30%

The final letter grade will be determined by the following scale (%):

A: [93, 100], **A-:** [90, 93), **B+:** [87, 90), **B:** [83, 87), **B-:** [80, 83), **C+:** [77, 80),

C: [73, 77), **C-:** [70, 73), **D+:** [67, 70), **D:** [60, 67), **F:** [0, 60)

Syllabus

Attendance: You are required to attend every class regularly. The percentage of participation in each class should be more than 50% to be considered attending each class.

Attendance Policy

- (1) All students of SUNY Korea are required to attend every class.
- (2) Unexcused absences will affect seriously the students' final grades in the course.
- (3) If a student has over 20% unexcused absence, the student's final course grade will be an F.
- (4) Students should report the reason for absence to the instructor in advance, or immediately after the absence.
- (5) When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
- (6) The instructor of the course reserves the right to excuse absences.
- (7) The course instructor may excuse the absence if the submitted documentation fulfills the conditions below.
 - i) Extreme emergencies (e.g. death in the family)
 - ii) Severe medical reasons with a doctor's note (Not a slight illness)
 - iii) Very important events (e.g. national conference, official school event)
- (8) At the end of the semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

Absence due to officially approved trips: The person responsible for a student missing class due to a trip should notify the instructor of the departure and return schedule in advance of the trip. The student may not be penalized and is responsible for the material missed.

Concerns: If you have ANY problem related to the course, please feel free to discuss it with us. We truly want you to succeed in this course and will do whatever we can to help resolve the problem. You can talk to me before or after class, during office hours, or via email.

Students with Disabilities:

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations if any, are necessary and appropriate. All documentation regarding your personal information will be kept in confidential.

Academic Integrity:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

Critical Incident Management:

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

Conduct:

Stony Brook University expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to observe national, state, and local laws and University regulations; and to respect the rights, privileges, and property of other people. Faculty are **required** to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits

Syllabus

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Course Evaluations

Stony Brook University values student feedback in maintaining the high-quality education it provides and is committed to the course evaluation process, which includes a mid-semester assessment as well as an end-of-the-semester assessment, giving students a chance to provide information and feedback to an instructor which allows for development and improvement of courses. Please click the following link to access the course evaluation system: <http://stonybrook.campuslabs.com/courseeval/>

Tentative Class Schedule:

AMS161-90 Applied Calculus II

Fall 2024

Week	Date	Topics	Stewart
1	8-26, 8-28	Areas and Distances, Definite and indefinite integrals,	5.1, 5.2
2	9-2, 9-4	The Fundamental Theorem of Calculus, Indefinite Integrals, and the Net Change Theorem	5.3, 5.4
3	9-9, 9-11	The Substitution Rule, Areas Between Curves, Volumes	5.5, 6.1, 6.2
4	9-16, 9-18	Chuseok (Korean Thanksgiving): No classes in session	
5	9-23, 9-25	Volumes by Cylindrical Shells, Work	6.3, 6.4
6	9-30, 10-2	Average Value of a Function, <i>Exam 1 Review</i>	6.5
7	10-7, 10-11	Integration by parts, Trigonometric Integrals,	7.1, 7.2,
8	10-14, 10-16	Trigonometric Substitution, Integration of Rational Functions by Partial Fractions	7.3, 7.4
9	10-21, 10-23	Improper Integrals, Arc Length	7.8, 8.1
10	10-28, 10-30	Area of a Surface of Revolution, <i>Exam 2 Review</i>	8.2
11	11-4, 11-6	Sequences, Geometric Series, The Integral and Comparison Tests; Estimating Sum	11.1, 11.2, 11.3
12	11-11, 11-13	The Comparison Tests, Alternating Series, Absolute Convergence, and the Ratio and Root Tests	11.4, 11.5, 11.6
13	11-18, 11-20	Power Series, Representations of Functions as Power Series	11.8, 11.9
14	11-25, 11-27	Taylor and Maclaurin Series	11.10
15	12-2, 12-4	<i>Final Exam Review</i>	