Applied Calculus II

1. Instructor Information

- Instructor: Tan Cao
  Assistant Professor, Department of Applied Mathematics & Statistics,
  SUNY Korea
- Website: https://sites.google.com/site/tancaowebsite/
- Office address: B524
- Phone: 82-32-626-1912
- Email: tan.cao@stonybrook.edu
- Office hours: Monday and Wednesday 2:00 pm – 3:00 pm or by appointment.

2. Teaching Assistant Information:

- Haoran Jiang and Joon Young Lee
- Email: haoran.jiang@stonybrook.edu and joonyoung.lee@stonybrook.edu.
- Office address: B517
- Office hours:
  - Haoran Jiang: Thursday 1:00 pm – 3:00 pm.
  - Joon Young Lee: Tuesday 1:00 pm – 3:00 pm.

3. Course Description

3.1. Course Information.
- Course Reference Number (CRN): AMS 161
- Meeting room: C105
- Meeting time: Monday and Wednesday 3:30 pm – 4:50 pm
- Prerequisites: AMS 151 or MAT 131 or MAT 126.
- Textbook Hard Copy (available from Amazon): "Calculus Single Variable", by D. Hughes-Hallett et al., 6th edition, John Wiley & Sons, ISBN# 978-0470-88864-3.
- Course Overview: 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.

3.2. Learning Outcomes. After completing this class, students will be able to:
(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 rules.

(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;
- work problems;
- 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 Newtons law of cooling and logistic equations;
- solve second-order linear differential equations.

3.3. **Attendance.**
(1) All students of SUNY Korea are required to attend every class.
(2) Unexcused absences will affect seriously the student's final grade in the course.
(3) If a student has over 20% unexcused absence (6 days), the student's final course grade will be an 'F'. Example:
  (a) If the class is a 150 minute class, and is held once a week, the 4th unexcused absence of a student will lead to an F grade of the course.
  (b) If the class is a 75 minute class, and is held twice a week, the 7th unexcused absence of a student will lead to an F grade of the course.

(c) If the class is a 50 minute class, and is held three times a week, the 10th unexcused absence of a student will lead to an F grade of the course.

(d) In Intensive English Course (IEC), if a student misses the class more than 40 hours in a semester, the student will receive an F grade on the course.

(4) Students should report the reason of 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.

(a) Extreme emergencies (e.g. death in the family)

(b) Severe medical reasons with doctor's note (Not a slight illness)

(c) Very important events (e.g. national conference, official school event)

(8) At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

3.4. **Tardiness.** Tardiness disturbs other students, disturbs me, and puts you at a disadvantage for doing well in the class. On the rare occasion that you are tardy, please come in quietly and take a seat in the back.

3.5. **Code of Conduct.** Since every student is entitled to full participation in class without interruption, all students are expected to be in class and prepared to begin on time. All cell phones or other devices that make noise must be turned off and out of sight when you enter the classroom. Disruption of class, whether by talking, noisy devices, eating in class or other inconsiderate behavior, will not be tolerated. Students who violate these rules will be asked to leave the classroom and will not be allowed to return until they have spoken privately with me.

4. Homework, Quizzes, Tests, and Final Exam

4.1. **Homework.** Homework will be assigned weekly and graded carefully. There will be 10 assignments and two lowest will be dropped. Each homework must be turned in on the due date at the beginning of the class. **Late homework will not be accepted.** You may discuss homework problems with other classmates, or with TAs, or with me. However, you should write the solutions by yourselves. Copying the solutions from other classmates will not be accepted and your HW assignment will be scored 0 if you do so. In order to be accepted you must:

- Download the assignment to your computer and print it out.
- Put your name and your ordinal number (found in the sign-in sheet) in the upper right hand corner.
- Staple the assignment together.
- Show all your supporting work. Please do not just write the final answer.
- Box the answer.
- Take pride in your work and make sure it is neat and legible.

I will be particularly interested in how you show your work, since developing good work habits is one of the primary goals of this class.

4.2. **Quizzes and Tests.** There will be a quiz or test every week except the first week. You will be expected to take two midterm exams and the final exam. Only in the event of an unavoidable emergency will a make-up exam be considered. You may drop the two lowest quiz grade. If you are absent for a quiz the missed quiz becomes your dropped grade.

Important Dates:
- Quiz 1: Wednesday 03/07/2018
- Quiz 2: Wednesday 03/14/2018
- Quiz 3: Wednesday 03/21/2018
- Quiz 4: Wednesday 03/28/2018
- **Midterm Exam 1: Wednesday 04/04/2018**
- Quiz 5: Wednesday 04/11/2018
- Quiz 6: Wednesday 04/18/2018
- Quiz 7: Wednesday 04/25/2018
- Quiz 8: Wednesday 05/02/2018
- **Midterm Exam 2: Wednesday 05/09/2018**
- Quiz 9: Wednesday 05/16/2018
- Quiz 10: Wednesday 05/30/2018

4.3. **Calculators.** You are **not allowed** to use any calculator during the quizzes and exams.

4.4. **Grade Weighting.**
- Attendance: 5%
- Homework (best 8 of 10): 15%
- Midterm Exam: 30%.
- Quizzes (best 8 of 10): 20%.
- Final: 30%.

4.5. **Grade Scale (as intervals of percentages).**

Percentage	Latin Grade
[93,100]	A
[90,93)	A-
[87,90)	B+
[83,87)	B
[80,83)	B-
[77,80)	C+
[73,77)	C
[70,73)	C-
[67,70)	D+
[63,67)	D
[60,63)	D-
[0,60)	F

4.6. **Final Exam.** Final Exam will be given on **Monday 06/18/2018** from 12:30 – 3:00 pm. The exam room will be announced during the semester.

4.7. **Textbook Coverage.** In the textbook we will cover most of the following sections (with some omissions and additions) from chapter 6 to chapter 10:

(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.
(3) Elements of Differential Equations: slope fields, Euler's method, applications and modeling.
(4) Approximations and series: Taylor series, Fourier polynomials.
(5) Review and Tests.

5. Tentative Course Schedule

Week	Date	Section	Material Covered
1	02/26	6.1	Antiderivatives graphically & numerically
	02/28	6.2	Constructing antiderivatives analytically
		6.4	Second fundamental theorem of calculus
2	03/05	7.1	Integration by substitution
	03/07	7.2	Integration by parts
3	03/12	7.4	Algebraic identities and trigonometric identities
	03/14	7.4	Algebraic identities and trigonometric identities
		7.5	Numerical methods for definite integrals
4	03/21	7.5	Numerical methods for definite integrals
	03/26	7.6	Improper integrals
5	03/28	7.7	Comparison of improper integrals
	04/02		Review
6	04/04		Exam 1
	04/09	8.1	Areas and volumes
7	04/11	8.2	Applications to geometry
	04/16	9.2	Geometric series
8	04/18	9.3	Convergence of series
	04/23	9.3	Convergence of series
		9.4	Test for convergence
9	04/25	9.4	Test for convergence
	04/30	9.5	Power series and interval of convergence
10	05/02		Review
11	05/09		Exam 2
	05/14	10.1	Taylor polynomials
12	05/16	10.2	Taylor Series
	05/23	10.3	Finding and using Taylor series
13	05/28	10.3	Finding and using Taylor series
		10.5	Fourier Series
	05/30	10.5	Fourier series
		6.3	Differential equations & motion
14	06/04	6.3	Differential equations & motion
		11.1	What is a differential equation?
	06/11	11.2	Slope fields
	06/14		Review

6. Other Resources and Miscellaneous

6.1. **Tips for Success.** Commit yourself to the class on day one. If you devote ample time to working on homework, reading the textbook and your notes, and thinking about the concepts we are learning, you will learn this material and you will learn it well. You will build a strong foundation for future math and science classes, as well as good study and organizational habits, which will be essential throughout your university studies. You have the ability to reach success if you commit yourself to excellence. Moreover, you do

not have to reach success alone. Get to know your classmates, and learn with and from each other. Come to see me whenever you have questions.

6.2. **Religious Holidays.** (from the online Academic Calendar): Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

6.3. **Academic Dishonesty.** Plagiarism and Cheating: Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at SUNY Korea. Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions.

Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student's test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

Fabrication: Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

Plagiarism: To take and use another's words or ideas as one's own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student's access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

6.4. **Disability Support Services (DSS) Statement.** 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 information and documentation is confidential.
In addition, this statement on emergency evacuation is often included, but not required: Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and One-Stop Service Center.

6.5. **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 the following link to access the course evaluation system: `http://stonybrook.campuslabs.com/courseeval/`

Department of Applied Mathematics and Statistics

E-mail address: `tan.cao@stonybrook.edu`