Math 112   Fall 2018

Textbook: James Stewart, *Single Variable Calculus: Early transcendentals*, 7th *or* 8th *Edition*

Instructor: Fang Chen, Office: Pierce 130, Phone: 770-784-4639, e-mail: fchen2@emory.edu

Office hours: To be announced on Canvas

Course Content: Mathematics 112 is the second semester of calculus and is designed specifically for students who have completed a semester of college calculus (Math 111 or AP Calculus). Course content includes indeterminate forms, methods of integration, improper integrals, polar coordinates, infinite sequences and series, power series, and introduction to differential equations. A calendar of topics is attached.

Course Goals: At the completion of the course, students should have (1) a basic understanding of derivative, of antiderivative, and of limit; (2) a basic understanding of power series and be able to determine the domain of appropriate power series. Students should also be able to (1) use the rules of differentiation as they apply to algebraic and transcendental functions; (2) evaluate a variety of limits; (3) sketch graphs of transcendental functions by building on concepts from Calculus I; (4) demonstrate appropriately the methods of integration (substitution, integration by parts, trigonometric substitution, partial fractions) and use these methods with typical indefinite, definite, and improper integrals; (5) graph and find area using simple polar coordinate expressions; (6) determine convergence of appropriate infinite series by giving logical arguments; (7) derive a power series expression for certain transcendental expressions using a geometric series or Taylor's Theorem; (8) solve simple first-order differential equations.

Classes: Students are expected to attend all classes and are responsible for all material covered in class as well as any changes made in the schedule regarding homework and tests. *Furthermore students are expected to have done the reading before each class.* Topics for each class will be announced on Canvas.

Class attendance and consistent preparation for class will determine the success or failure the student realizes in this course.

Homework: Homework will be assigned almost every day of class. Most of these exercises will not be collected and are for the benefit of the students. *Selected homework problems will be collected as announced.*

It is important for the success of the student that homework be completed as soon as possible after covering the material. Use good style on your homework.

In general students should expect to spend at least $2-3$ productive hours of study for each class session, or about $6-9$ hours per week not counting the time spent reviewing for tests.

Reflection Problems: A large portion of high school mathematics courses are devoted to computation; being able to apply correct calculative procedures is important, but it is not "the point" of mathematics. Being able to develop a systematic approach to solving novel complex problems and then clearly and completely explaining their solutions are also important components of developing one's mathematical ability. Throughout the semester, three challenging problems will be assigned. These problems will vary in style and content, but will require using the skills and knowledge acquired from studying calculus–perhaps in a way different from problems seen in class or the homework. Each problem will have three components: an initial individual attempt at solving the problem, a final solution developed and revised within a team, and a brief written reflection on your thought process while working on the problem. More specific guidelines will be provided on Canvas.

Tests: Four major comprehensive tests will be given. Each student is expected to take tests at the scheduled times. Any conflicts should be brought to the instructor's attention as soon as possible. If a legitimate reason exists for missing a test(as determined by the instructor), then the test must be taken prior to the scheduled time. In the unusual circumstance where taking the test early is not possible, *students should be aware that any make-up test given will be designed to be more difficult to offset the additional time given for study.*

Calculators: Calculators will <u>**not**</u> be allowed on any work handed in for grades.

Final Exam: A cumulative final exam will be given according to the final exam schedule. Students must obtain permission from the Associate Dean of Academic Affairs to take a final exam earlier or later than scheduled.

Grading: Evaluation will be based on the following written work:

Homework (10 @ 10 pts)	100 points
Reflection Problems (3 @ 25 pts)	75 points
Tests (4 @ 100 pts)	400 points
Final	225 points
Total	800 points

In general, letter grades will be determined as follows:

A: 91% and above;   B: $81 - 90\%$;   C: $71 - 80\%$;   D: $61 - 70\%$;   F: less than 60%

Grades of $A-, B+, B-, C+, C-, D+$ may be assigned for percentages near the above cut-offs.

Inclusivity: We are committed to fostering an environment where people of diverse backgrounds, identities, abilities, and ideologies are affirmed, respected, and seen as a source of strength; where we strive to learn together, and ultimately thrive communally.

Accessibility: Students with a documented disability who anticipate barriers related to the format or requirements of this course, or presume to have a disability (e.g. mental health, attention, learning, vision, hearing, physical or systemic) and are in need of accommodations this semester should contact the Office of Accessibility Services (OAS) as soon as possible to learn more about the registration process and steps for requesting accommodations.

Students who are currently registered with OAS who do not receive an accommodation notification letter within the first week of class must notify OAS immediately. Students who have accommodations in place are encouraged to coordinate a face-to-face meeting with the instructor to communicate specific needs for the course as it relates to approved accommodations. All discussions with OAS and faculty members concerning the nature of a student's disability remain confidential. For additional information regarding OAS and how to register, please visit the website: equityandinclusion.emory.edu/access.

Support Services: Students should utilize the following resources:

- **Office Hours:** Office hours will be posted on Canvas. These times vary due to meetings and other obligations, but most afternoons should have some availability.

- **Canvas:** Announcements and important documents will be posted on the course's Canvas site. The student is responsible for regularly checking the site for new announcements and resources, including homework assignments and handouts.

- **Supplemental Instruction:** Supplemental instructors are sophomores who have previously taken the course before and know how to be a successful student in it. Each SI will offer a weekly session to review course content and provide advice on how to prepare for the course. Attendance is optional, but students often find these sessions very helpful.

- **Math Center:** Student tutors are generally available in the Math Center Monday through Thursday afternoons. Additional online resources are available at http://www.oxfordmathcenter.com.

- **Study Groups:** When used appropriately, study groups can be a useful tool in learning mathematics. Study groups should complement and enrich individual study of course material; with particular regard to homework assignments, it is suggested that study groups discuss completed (or attempted) assignments rather than work through homework problems for the first time.

Written Style: Expressing complete thoughts and arguments require complete sentences. In mathematics, where clarity of thought is paramount, this is no less true. Granted, with mathematical symbols one can write these sentences very efficiently – but they are sentences nonetheless. Consider "$1+1 = 2$". This is a complete sentence (it has a subject "$1+1$", verb "$=$" and predicate "2").

To this end, your written work in this class should be in complete sentences. Use mathematical symbols wherever appropriate. Your work also needs to be neat and orderly to be intelligible.

Tips for Success: Calculus is hard, but it can be made easier by intelligent and efficient study habits. Gauss said the purpose of calculation is insight. Insight is an understanding into why things work the way they do. This should be the goal of working out problems. Know *why* each step is correct and *why* each step was the right step to take. This is more than knowing *that* each step is correct.

Although most of the homework exercises are not graded, it is important for the success of the student that they be completed as soon after covering the material as possible. While collaboration is encouraged, each student should be sure that he or she ultimately can *solve problems unaided by notes, the textbook, a calculator, or other people*.

Practice good style on homework. A clean style helps to clean up messy thinking.

In general the student will need **about 9 good hours per week** to study for this course exclusive of the time spent on review for tests.

Tests are performances, similar to those by athletes, musicians, and dancers. Prepare for them in similar ways.

The topics we will cover are very useful and fundamental in the sciences, business and engineering, among other fields, and we want you all to succeed. However, success in the course will require your diligence and hard work. Be sure to keep up with the assignments and to attend class. Talk to your instructors as soon as you are having problems - don't wait until the week of a test. *In addition to learning quantitative skills, it is important that you develop learning skills and study habits that will help you in calculus, in other courses, and in life beyond Oxford College.*

A Word on Technology: Please leave all iPods, MP3 players, computers, etc. stowed and off for the duration of the class. Cell phones should be silenced or off.

Good luck and we hope this will be an enjoyable experience for all of you!

HONOR CODE: THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. TO RECEIVE CREDIT FOR WORK SUBMITTED YOU MUST PLACE YOUR NAME ON IT. BY PLACING YOUR NAME ON SUCH WORK, YOU PLEDGE THAT THE WORK HAS BEEN DONE IN ACCORDANCE WITH THE GIVEN INSTRUCTIONS AND THAT YOU HAVE WITNESSED NO HONOR CODE VIOLATIONS IN THE CONDUCT OF THE ASSIGNMENT.

Tentative Calendar:

Monday	Tuesday	Wednesday	Thursday	Friday
Aug 27th	Aug 28th	Aug 29th **1** Review functions, limits, differentiation	Aug 30th	Aug 31st **2** L'Hopital's rule
Sep 3rd *No class Labor day holiday*	Sep 4th	Sep 5th **3** L'Hopital's rule	Sep 6th	Sep 7th **4** L'Hopital's rule Graphing exponential and logarithmic functions
Sep 10th **5** Graphing exponential and logarithmic functions	Sep 11th	Sep 12th **6** Review of integration	Sep 13th	Sep 14th **7** Integration by parts
Sep 17th **8** Trigonometric integrals	Sep 18th	Sep 19th **9** Trigonometric substitution	Sep 20th	Sep 21st **10** Partial fractions
Sep 24th **11** Partial fractions	Sep 25th	Sep 26th **12** Test 1 wrap-up	Sep 27th Test 1 7:45–9:30 am	Sep 28th **13** Improper integrals
Oct 1st **14** Improper integrals	Oct 2nd	Oct 3rd **15** Arc length and surface area	Oct 4th	Oct 5th **16** Polar coordinates
Oct 8th *Fall Break*	Oct 9th *Fall Break*	Oct 10th **17** Polar coordinates	Oct 11th	Oct 12th **18** Polar coordinates
Oct 15th **19** Infinite sequences	Oct 16th	Oct 17th **20** Infinite series	Oct 18th	Oct 19th **21** Last day to withdraw. Infinite series
Oct 22nd **22** Test 2 wrap-up	Oct 23rd Test 2 7:45–9:30 am	Oct 24th **23** nth term test and p-series	Oct 25th	Oct 26th **24** Integral test

Monday	Tuesday	Wednesday	Thursday	Friday
Oct 29th <u>25</u> Integral test	**Oct 30th**	**Oct 31st** <u>26</u> Comparison tests	Nov 1st	**Nov 2nd** <u>27</u> Comparison tests
Nov 5th <u>28</u> Alternating series	**Nov 6th**	**Nov 7th** <u>29</u> Ratio and root tests	**Nov 8th**	**Nov 9th** <u>30</u> Review of infinite series
Nov 12th <u>31</u> Test 3 wrap-up	**Nov 13th** Test 3 7:45–9:30 am	**Nov 14th** <u>32</u> Power series	**Nov 15th**	**Nov 16th** <u>33</u> Freshman withdrawal. Power series
Nov 19th <u>34</u> More power series	**Nov 20th**	**Nov 21st** *Thanksgiving recess*	**Nov 22nd** *Thanksgiving recess*	**Nov 23rd** *Thanksgiving recess*
Nov 26th <u>35</u> More power series	**Nov 27th**	**Nov 28th** <u>36</u> Taylor and Maclaurin series	**Nov 29th**	**Nov 30th** <u>37</u> Taylor and Maclaurin series
Dec 3rd <u>38</u> Review of power series	**Dec 4th**	**Dec 5th** <u>39</u> Test 4 wrap-up	**Dec 6th** Test 4 7:45–9:30 am	**Dec 7th** <u>40</u> Differential equations
Dec 10th <u>41</u> Differential equations	**Dec 11th**	**Dec 12th** *Reading Day*	**Dec 13th**	**Dec 14th**
Dec 17th	**Dec 18th** 11–11:50 class Final Exam 2 − 5 PM	**Dec 19th** 10–10:50 class Final Exam 2 − 5 PM	**Dec 20th**	**Dec 21st** <u>42</u>