MAT 131 CALCULUS I
SPRING 2016
GENERAL INFORMATION

Instructor. Henri Guenancia
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Office: Math Tower 3-121
Office Hours: Monday 2-4pm, or by appointment.
MLC Hours: Wednesday 10-11.

Blackboard. Grades and some course administration will take place on Blackboard. Please login using your NetID at http://blackboard.stonybrook.edu.

Course Description. MAT 131 is the first course in the 2-semester single variable calculus sequence. It covers limits, continuous functions, derivatives and their applications, antiderivatives and the fundamental theorem of calculus. The course moves rather quickly. Students who would like to learn the same material at a somewhat slower pace should take MAT 125. The three-semester sequence MAT 125-126-127 covers the same material as the two-semester sequence MAT 131-132.

Textbook. We will try to follow the following textbook:

Single Variable Calculus: Concepts and Contexts, 4th ed, by James Stewart.

See http://www.cengagebrain.com/course/site.html?id=1-201CHVD for example

Tentative of Schedule.

- Week of 1/25: 2.2,2.3 Limits
- Week of 2/1: 2.5, 2.4 Limits at infinity, Continuity
- Week of 2/8: 2.6, 3.1 Derivatives
- Week of 2/15: 3.2, 3.3 Derivatives
- Week of 2/22: Review, **Exam Tu**, 3.4 Chain Rule
- Week of 2/29: 3.6, 3.7 Derivatives of inverse trig functions and logarithms
- Week of 3/7: 4.5 L'Hospital Rule, 4.1 Related Rates
- Week of 3/14: Spring Break
- Week of 3/21: 2.8, 4.3 Derivatives and function behavior
- Week of 3/28: 4.2, 4.6 Optimization
- Week of 4/4: Review, 4.8 **Exam W**
- Week of 4/11: 5.1, 5.2
- Week of 4/18: 5.3, 5.4 The fundamental Theorem
- Week of 4/25: 5.5
- Week of 5/2: Review Sessions
- May 11: **Final exam**

Exams. There will be two midterms and a final exam, scheduled as follows:

- Midterms –2/23 and 4/6, 8:45pm-10:15pm.
- Final Exam – Wednesday, May 11, 11:15am-1:45pm.

There will be no make-up exams.

Grading policy. Grades will be computed using the following scheme:

Midterm I = 25%

Midterm II = 25%
Final Exam = 30%
Homework and Recitation Participation= 20%

Students are expected to attend class regularly and to keep up with the material presented in the lecture and the assigned reading. There will be (roughly) weekly homework assignments and/or web assignments.

WebAssign will beginning February 1st, students will be assigned web-based exercises using an online system. Your access code can be purchased as webassign for MAT 131 in our bookstore. Information on how to access this system will be brought to you via your Blackboard account by 2/1. Please pay careful attention to due dates as there are no extensions!

Extra Help. You are welcome to attend the office hours and ask questions about the lectures and about the homework assignments. In addition, math tutors are available at the MLC: http://www.math.sunysb.edu/MLC.

Special Needs. If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, Room 128, (631) 632-6748, or at the following website http://studentaffairs.stonybrook.edu/dss/index.shtml. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is 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 is 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 University Community Standards 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. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

PRACTICE MIDTERM I

Exercise 1. For each of these limits, say whether they exist, and if need be, precise the limit.

a. $\lim_{x\to 0} \frac{\sin^2 x}{x}$

b. $\lim_{x\to 0^+} \frac{\tan x - 1}{x}$

c. $\lim_{x\to 0} \frac{x}{\sin x}$

d. $\lim_{x\to 0} x^6 \sin(\frac{1}{x})$

Exercise 2. Show that each of the following equations admit a solution x and give an interval of the form $[a, a+1]$ to which the solution belongs:

a. $3x^4 - x^3 + 8x + 2 = 0$

b. $\cos(3x) = \frac{1}{3}$

Exercise 3. For each of these limits, say whether they exist, and if need be, precise the limit.

a. $\lim_{x\to 5^+} \frac{x^4+2x+1}{5-x}$

b. $\lim_{x\to+\infty} \frac{2x^3+x+1}{x^3-3}$

c. $\lim_{x\to+\infty} \frac{2x^4+x^2-3x+1}{5x^3-3x+1}$

d. $\lim_{x\to+\infty} \frac{6x^7+2x^3-x+2}{7x^7-x+13}$

e. $\lim_{x\to+\infty} \sqrt{x} - 7\sin^2 x$

f. $\lim_{x\to 3} \frac{\sqrt{x}-3}{x-3}$ (for this one, give two *different* methods).

g. $\lim_{x\to 7} \frac{x-7}{\sqrt{x}-\sqrt{7}}$

Exercise 4. For each of the following functions, precise the domain and compute the derivative:

a. $\frac{x^3+3x^2-x}{x^2-4}$

b. $x^7 e^x + \tan x$

c. $\sin x \cos x$

d. $\cos^2 x$

e. e^{3x}

f. e^{-2x}

Exercise 5. Let f be the function defined on $\mathbb{R}$ by

$$f(x) = \begin{cases} x+1 & \text{if } x < 0 \\ e^x & \text{if } x \geq 0 \end{cases}$$

Show that f is continuous on its whole domain of definition. What about differentiability?

Exercise 6. Give the equation of the tangent to the graph of $y = e^{3x} + x$ at $x = 0$. Same question with $y = x^3 + 2x + 3$ at $x = 1$. Sketch a graph.