

MAT122 – Overview of Calculus with applications.

Spring 2014

LEC 01	49035	MWF	9:00am-9:53am	Mathematics	P131	Mohammad Farajzadeh Tehrani
R01	49036	Tu	10:00am-10:53am	Frey Hall	224	Robert Abramovic
R02	49037	Th	11:00am-11:53am	Life Science	054	Robert Abramovic

The aim of this course is to introduce you to the basic ideas of calculus without going into the technical details. We will learn how to solve some simple but useful problems, and the course will be mostly about computation.

Instructor: Mohammad F Tehrani *mtehrani@scgp.stonybrook.edu*

TA: Robert Abramovic *rabramo2@math.sunysb.edu*

Textbook Applied Calculus by Hughes-Hallett, Gleason et al.(4th edition)

Office Hours My office is located in Simons Center (Glass building) 508, and my office hours are Monday 11-12 and Wednesday\Friday 10-11. Alternatively, you can email me and I can meet you some other time. Your TA will also have office hours. You can also visit the Math Learning Center, open weekdays 10-6pm.

Homepage: <http://mysbfiles.stonybrook.edu/~mfarajzadeht/>

Grading There will be two midterm exams, each counting for 20% of your grade, and one final exam worth 40%. The remaining 20% of your grade will be from homeworks, which will be set on **Monday** and collected next week **Monday**.

The lowest two homework grades will be dropped. That means you can get away with doing no homework at all on two separate weeks before it starts to affect your grade. Hopefully this will cover any missed buses, dying pets, terrible hangovers, and other small problems. If you are worried that you might be falling behind, or if something comes up that might affect your grade, then please come and see me - we can certainly work something out.

If you haven't spoken to me personally, however, then there will be **no late homeworks accepted**. And telling me about your problems *after* the final is no good: once I've submitted the grades to the department, they cannot be changed. So please talk to me in advance.

Caution: Following information will be updated through the time ----- Last updated 2/18

Syllabus

Jan 27-31: Functions, graphs, and slope

Monday: What is a function? Input: Independent variable; Output: Dependent variable; Discrete variable, Continuous variable; Tables, Graphs, Formulas, Descriptions.

Mathematical model, Function notation, Horizontal and Vertical intercepts.

Recommended HWs: Sec 1.1, # 1, 5,7,10, 14, 26.

Wednesday: Domain; Range; Increasing; Decreasing; Linear functions; Example of Resistor\Voltage\Current; Slope; Formula for function and slope, Table 1.2; Speed and Acceleration; Location and Speed; Finding intercepts for linear functions; Slope; Example 2.

Recommended HWs: Sec 1.2 #1, 3, 5, 11, 17, 21, 31

(No homework this week)

Friday: Example 3 & 4 of Section 1.2; Average rate of change; Example of falling object; Section 1.3 Examples 1 & 2; Secant line; Concavity; Example 6; Example 9;

Recommended HWs: Sec1.3 # 11, 13, 15, 18b, 41,

Feb 3-7: Important functions and their properties

Monday: Snow

HW1 Questions, total of 15 questions (Final answer is not enough, some explanation is needed):

Sec 1.1: 2, 12, 23

Sec 1.2: 2, 4, 8, 9, 14

Sec 1.3: 10, 12, 18, 22, 42 (in question 42, also calculate the relative change as a percentage)

Sec 1.5: 2, 4,

Due: Next Monday in class

Wednesday: Snow

Friday: Relative change; Percentage form; Section 1.3 Example 12;

Exponential function, Table 1.30;

Exponential change vs linear change or arithmetic sequence vs geometric sequence; Example 3.

Recommended exercises: Sec 1.5: 8, 12, 15

Feb 10-14: More on functions

Monday: Power functions, Sec 1.9 → Area of disk; Functions proportional to x^k (monomials); Example.2 of pendulum; Gravity; Negative powers, Power functions with non-integral exponent;

Graph of power functions; Polynomials; Degree; leading coefficient; Example 6; roots.

HW2 Questions, total of 15 questions (Final answer is not enough, some explanation is needed):

Section 1.5: # 3, 5, 7, 21

Section 1.9: # 6, 11, 17, 18, 31,

Section 1.10: # 2, 9, 10, 14, 18, 22.

Due: Monday 2/17

Wednesday: Periodic functions Sec 1.10 → Example of pendulum; Amplitude and period; Electro-magnetic waves- Cell phone; AC power vs Battery; Example 2; Sine and Cosine functions; Example 4; $A \sin(Bt+c)$;

Friday: Snow

Feb 17-21: Manipulating functions

Monday: New functions from old Sec 1.8 → Addition; multiplication; composition (numerical and closed formula examples); Example 1,2,3; Stretch; Shift;

No HW for this week, prepare yourself for midterm.

Work on HWs from section 1.8, 1.6, and 1.7 by yourself.

Wednesday: Inverse function; Logarithm Sec 1.6, Square root,

Friday: Leftovers from Sec 1.7, Doubling time and half time, Compound interest, Present and future value; also drawing quadratic functions.

Feb 24-28: Derivative

Monday: Section 2.1, limit of average rate of change; instant rate of change, tangent line, definition of derivative at a point; examples.

Review class: Monday 6:30-7:45 PM Location: same as class.

Midterm 1: Tuesday Feb 25, 8:45pm-10:15 PM Location: same as class.

Includes Section 1.1 1.2 1.3 1.5 1.8 1.9 1.10 + simple questions from 1.6 1.7

HW3, Due March 3.

Sec 1.6: # 6, 22, 28

Sec 1.7: # 2, 9

Sec 2.1: # 3, 5, 8, 13

Sec 2.2: # 1, 8, 19.

Wednesday: Sec 2.2, Derivative of a function; graphs and derivative Example 1,2,3; estimating derivatives from graphs, from right and from left, What does derivative tell us, increasing, decreasing; HW 11, 15, 17.

Friday: Sec 2.3, dy/dx notation, example of Quadratic; estimate $\Delta y = f'(x)\Delta x$; Example 2; Example 6; $f(x) \sim f(a) + f'(a)\Delta x$, also equation of tangent line; HW 17, 25; Error in estimates.

March 3-7: Differentiation rules

Monday: Sec 2.3: Relative rate of change, Example 9, 8, HW 44;
Sec 2.4 : second derivative, what does it tell us; HW 36 of page 123; Read page 127-131 by yourself;
Sec 3.1: Derivative formulas for famous functions: constant function, linear function, constant multiple, sum and difference, power function,

HW4, Due March 10

Sec 2.3: 1, 7, 13, 25

Sec 2.4: 1, 12, 15, 19

Sec 3.1: 12, 25, 28, 32, 40, 49, 61

Wednesday: Sec 3.1 continued, polynomial, examples 4,5,6,7;
Sec 3.2: Derivative of exponential functions, importance of e, derivative of logarithm, Example 4,5; estimate examples. HW 41, 25.
Sec 3.5: Derivative of periodic functions.

Friday: Sec 3.4: Product and quotient rule; Examples 1,2,3,4.
Sec 3.3 Chain rule Example 1,2,3,4,5.

March 10-14: Optimization problems

Monday: More examples of chain rule,

HW 5, Due Monday March 24

Sec 3.2: 4, 22, 41

Sec 3.3: 4, 10, 18, 24, 44

Sec 3.4: 2, 6, 14, 28, 36

Sec 3.5: 22

Sec 4.1: 7, 16, 19,

Sec 4.2: 6, 13, 22, 24

Sec 4.3: 9, 13, 31

Wednesday: Sec 4.1, local maxima and minima, graphing functions with detail, Example 1, Critical point, Critical value, End points, First and Second derivative test, Examples 2,3,4,5.

Friday: Sec 4.2: Concavity and inflection, Examples.
Sec 4.3 Global maxima and minima Example 1,2.

March 17-21: Spring Break

March 24-28: Optimization

Monday: Section 4.4, 4.5

HW6, Due March 31st

Sec 4.4: # 1, 2, 3, 4

Sec 4.5: # 1, 2, 3, 4, 7, 16

Wednesday: Section 4.6

Friday: Review of Chapter 3, 4

March 31- April 4: Introduction to integration; Sections 5.1-5.3 (not in exact order)

HW7, Due April 7

Sec 5.1: 1, 3, 6, 14, 15

Sec 5.2: 1, 3, 7, 8, 19

April 7-11: Fundamental Theorem of Calculus Sec 5.4-5.5

Midterm 2: Tuesday April 8, 8:30pm-10:00 PM

No HW Due April 14

April 14-18: More on Fundamental Theorem of Calculus, Anti derivatives

HW 8, Due April 21

Sec 5.3: 10, 12, 18, 22,

Sec 5.4: 4, 9 (use Calculator), 14, 25, 30,

Sec 5.5: 4, 7, 13,

Chapter summary: 15, 16.

April 21-25: Applications

April 28-May 2: Review of the course from A to Z.

May 5-9: Review of the course from A to Z

Final Exam: Wednesday, May 14, 8:30pm-11:00pm

DSS advisory: If you have a physical, psychiatric, medical, or learning disability that could adversely affect your ability to carry out assigned course work, we urge you to contact the Disabled Student Services office (DSS), Educational Communications Center (ECC) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students requiring emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services.

For procedures and information, go to the following web site:

<http://www.stonybrook.edu/ehs/fire/disabilities.shtml>

Disruptive Behavior: 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, and/or inhibits students' ability to learn.