Syllabus for Math 141, Fall 2016

Meetings time and place:
Lecture: MW 5:30pm–6:50pm in Soc. Behav. Sci. S218
Recitation: TTh 4:00pm–4:50pm in Light Eng. Lab. 152.

Course webpage:
`math.stonybrook.edu/~rdhough/mat141-fall16/`

Professor:
Robert Hough
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Math Tower 4-118
Office Hours: F 4-6pm

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Course Description: This is a rigorous, proof based introduction to single variable calculus. Topics include properties of the integers, rational numbers and real numbers, mathematical induction; definitions and methods in taking limits, derivatives and integrals; the intermediate and mean value theorems; Newton's method; infinite sequences and series and power series.

Prerequisite: A working knowledge of calculus at the high school level is necessary to keep pace in this course.

Required text: Tom Apostol. *Calculus, vol 1*, 2nd ed. John Wiley and Sons, 1967.
Supplementary text: Walter Rudin. *Principles of mathematical analysis*, 3rd ed. New York: McGraw Hill, 1964.
Note: Although Rudin's book is worth owning, it will not be necessary to obtain this book in order to successfully complete the course.

Homework policy: With the exception of the first recitation session, a short homework assignment will be due in each recitation session throughout the course. You may work together on the homework problems and may discuss them in office hours, but should write up your solutions independently. Homework solutions should be written in complete sentences, with full justification, citing theorems proved in lecture. Homeworks will be posted on the course homepage a minimum of two lectures prior to when they are due.

Exam policy: There will be two in class midterm exams, held Sept. 28 and Nov. 2. The final exam will be Thursday Dec. 15 from 8:30 pm to 11:30 pm. All exams are closed book, closed notes with no calculators or other electronic aids permitted.

Grade Distribution:

Homework	20%
Midterm 1	20%
Midterm 2	20%
Final Exam	40%

Students with disabilities: If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services at (631) 632-6748 or `http://studentaffairs.stonybrook.edu/dss/`. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Math Learning Center (MLC): The location of the MLC is S-240 in the math tower. The MLC is open every day and most evenings. A schedule is posted on the door.

Administrative deadlines:
Semester cancellation: Sunday, Aug. 28
Drop deadline: Tuesday Sept. 13, 4pm (no W)
Grade basis deadline: Friday Oct. 28, 4pm (drop with W)
For more details, see the SBU registrar: `http://www.stonybrook.edu/registrar/index.shtml`

Tentative Course Schedule: Sections labeled A refer to Apostol, sections labeled R refer to Rudin.

Date	Topics	Reading
M Aug 29.	Sets, the integers, induction, summation notation.	A.I.2.1–5, A.I.4.1–6
W Aug 31.	The rationals, $\sqrt{2}$ is irrational, field and order axioms, consequences of the l.u.b. property.	R.1.1, A.I.3.2, A.I.3.5, A.I.3.7–13
M Sept 5.	No class – Labor day.	
W Sept 7.	Dedekind cuts, countability.	R.1.A, R.2.1
M Sept 12.	The complex numbers. Triangle and Cauchy-Schwarz inequalities. Functions.	A.9.1–5, A.I.4.8, A.1.2–4
W Sept 14.	Area axioms, area calculation, definition of the integral.	A.1.6–18
M Sept 19.	Integrable functions, computing integrals, basic properties.	A.1.19–27
W Sept 21.	Applications of integrals, indefinite integrals.	A.2.1–2.11, A.2.16–19
M Sept 26.	Definition of limits and continuity, properties, composite fns, Intermediate Value Theorem.	A.3.1-11
W Sept 28.	Midterm 1.	
M Oct 3.	Inverse functions, compactness properties and integrability of cts fns.	A.3.12–20
W Oct 5.	Further examples. Sperner's Lemma and the Brouwer Fixed Point Theorem.	
M Oct 10.	Definition of derivative and interpretations, taking derivatives.	A.4.1–9

W Oct 12.	The chain rule and implicit differentiation.	A.4.10–12
M Oct 17.	The mean value theorem and extrema, Jensen's inequality.	A.4.13–21
W Oct 19.	The Fundamental Theorem of Calculus.	A.5.1–5
M Oct 24.	Logs and exponentials and trig functions.	A.6.1–22
W Oct 26.	Integration by substitution and by parts.	A.5.7–11, A.6.23–25
M Oct 31.	Complex exponentials and trig identities, the Fund. Thm. of Algebra.	A.9.7, R.8.4
W Nov 2.	Midterm 2.	
M Nov 7.	Taylor's formula, big O and little o, indeterminant forms.	A.7.1–10
W Nov 9.	l'Hopital's rule and indeterminant forms.	A.7.11–15
M Nov 14.	Asymptotics of some standard functions, Newton's method.	A.7.16–17, R p118
W Nov 16.	First and second order constant coefficient ODE's.	A.8.1–14
M Nov 21.	Nonhomogeneous equations, geometric and physical problems.	A.8.15–28
W Nov 23.	No class – Thanksgiving.	
M Nov 28.	Infinite sequences and series, limits and properties.	A.10.1–9
W Nov 30.	Convergence tests.	A.10.12–22
M Dec 5.	Sequences of functions, integration and differentiation, power series.	A.11.1–7
W Dec 7.	Taylor series, exponential and trig functions, differential equations.	A.11.8–16