

# Syllabus for Mathematics 552 Spring 2020

INSTRUCTOR: Ralph Howard    OFFICE: LC 304    PHONE: 777-7471

OFFICE HOURS: TTh 2:30-3:30 and by appointment

TEXT: *Schaum's Outline of Complex Variables, 2<sup>nd</sup> Edition* by Murray Spiegel, Seymour Lipschutz, John Schiller, and Dennis Spellman.

CLASS WEB PAGE:

<http://ralphhoward.github.io/Classes/Spring2020/552/>

Most of the homework and class notes will be posted on this page.

**Grading:** There will be three hour exams of 100 points each. Homework will be collected and will count for 100 points. The Final will count for 150 points. This makes a total of 550 points:

Three midterms @100 points each	300 points
Final	150 points
Homework (includes quizzes)	100 points
Total	550 points

The grade will be based on the total number of points out of the 550 points. Note that the homework counts as much as the final so it is important to spend time on the homework. Some homework may be “collected” in the form of in class quizzes. Letter grades will be assigned to all the tests. The last day to drop without a “WF” is Saturday March 28 and you should have a good idea of where you stand by then.

**There will be no make up exams.** If you miss a test, then your score on that exam is 80% of the average of your other test scores (including the final). If you miss a second exam then the score on it is zero. As an example suppose you get 96 on the first two tests and 144 on the final but missed the third exam. Your average is then

$$\frac{96 + 96 + 144}{3.5} = 96.$$

So the score on the third exam is 80% of 96 which is 76.8. Assume your homework average is 90%. Then the total for the class is

$$96 + 96 + 76.8 + 144 + 90 = 502.8 \quad \text{out of 550}$$

So the average is

$$502.8/5.5 = 91.4\%$$

so you still get an A. The bright side of this system is that assume you had 96 on the first two tests, a 65 on Test 3, and 144 on the Final. Then you would have been better off just not showing up for Test 3. If this happens I will replace the 65 with 76.8 (80% of the average on the other exams).

Likewise **no late homework will be accepted.**

The exams will be on the following days:

Test 1 Friday, February 14  
Test 2 Friday, March 20  
Test 3 Friday, April 17  
Final Friday, May 1, 9:00am.

**Course content:** The goal of the class is to learn the basics of the calculus of a complex valued function of a complex variable that is differentiable. The theory is very different from that of functions of a real variable, for example if a function is once differentiable, then it has derivatives of all orders. Such maps have surprising geometric properties, such as preserving angles between curves. The condition of differentiability will be shown to be equivalent to a system of partial differential equations, the Cauchy-Riemannian equations. The Cauchy integral theorem and Cauchy integral formula will be proven and used to show that differentiable functions of a complex variable have convergent power series. The residue theorem will be proven and used to evaluate definite integrals. If there is time, the basics of conformal mapping will be covered.

**Learning Outcomes:** Students will learn about the calculus of complex valued functions of a complex variable and how this differs from that corresponding theory for real valued functions. The differential and integral calculus of these functions will be used to solve a wide variety of problems in mathematics and, time permitting, in engineering.