Philadelphia University
Faculty of Science – Department of Basic Sciences and Mathematics
Summer Semester 2009–2010

Course Syllabus

Course Title	Complex Analysis	**Course Code**	250312
Course Level	"3"	**Course Prerequisite**	250311
Lecture Time	SMTWT 11:30–12:30	**Credit Hours**	"3"

Academic Staff Specific

Name	Feras Awad Mahmoud		
Rank	Lecturer "M.Sc"		
Room Number	"819", Office Ext. No. (2341)	**Office Hours**	09:00 – 10:00 SMTWT; other times by appointment.
Location	Faculty of Science		
E – mail	fawad@philadelphia.edu.jo		

Course Description:

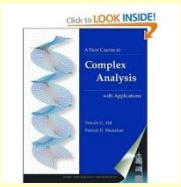
This course is intended to familiarize the students with the basic concepts, principles, and methods of complex analysis and its applications. The course covers the following subjects: the complex numbers system, polar representation and complex root analytic functions, power series, Mobius transformation, conformal mapping, complex integration, power series representation of analytic functions, residues, Cauchy's theorem, application to integration simple closed curves, Cauchy's integral formula, Morera's theorem, singularities, classification and remainder.

Course Objectives:

The course objective is to understand, derive, prove, and apply the theory and properties of complex numbers.

Course Components (Text Book):

Title	:	A First Course in Complex Analysis With Applications
Author	:	Dennis G. Zill and Patrick D. Shanahan
Publisher	:	Jones & Bartlett Pub.
Edition	:	1st Edition.
Year	:	2006
ISBN	:	0763746584



Teaching Methods:

1. To learn it is imperative for the student to take an active interest in their own education. To learn mathematics the student must read, think, and write in an analytical manner and this takes practice. Such practice is by working exercises. When troubles arise, and they will, the student must ask questions. Questions may be posed to the instructor or to other students in a variety of ways; online office hours, or in class.
2. There are many different styles of learning. Some people gain better understanding from listening to something being explained orally. Some get better understanding from written material. Some like a combination of both. I do my best to accommodate various styles of learning. However, feel free to let me know what your learning style is so that I can take that into account when determining the future direction of the course.
3. There will be required readings associated with each lecture. Most readings will be from the course text, but students are encouraged to seek supplementary material. Links to supplementary reading material can be accessed from the course page.
4. Homework will be assigned each week; not to be collected or graded by the instructor. In addition, at the end of a chapter, challenge problems will be assigned for "work–hard "students. Furthermore, mathematical projects on real–life problems will be assigned to the students throughout the semester.
5. I encourage the use of research materials as a way to supplement your understanding of the course material, as long you heed the following common-sense ground rules. First, you may not consult my solutions or the problems sets of other students from previous offerings of this course. Second, external sources may be used only to improve your own understanding. You may not quote directly from any source and you should not write down anything that you do not understand. When you write your solutions, you should do it on your own without the direct help of any external sources. If you do use external references in improving your understanding, please cite them! Failure to cite references will be treated as cheating and will not be tolerated. If you are diligent about citing

references, you will come out ahead in the end. Please ensure that you understand the spirit and the letter of these rules before beginning any class work.

6. You are encouraged to work together on problem sets, especially those designated as group work. However, unless the problem set is specifically designated as group work, you must ultimately demonstrate your understanding of the material by writing up your own solutions without the help of other students or their written work. If you consult with other students (or faculty) on a problem set, this should be considered equivalent to consulting any other reference and should be cited appropriately. This policy will be strictly enforced.
7. All assignments should be submitted electronically by e–mailing a file to the instructor by the beginning of the class period in which the assignment is due. The official turn–in time of the assignment will be the time stamp on the e–mail.
8. Higher learning involves not just acquiring knowledge, but developing the ability to know what you don't know. Among other things, this involves the ability to know when you do and do not have a rigorous proof or an accurate answer. One of the goals of this course is to cultivate your ability to perform an accurate self-assessment of your work. Hence, you are encouraged to think about and state accurately not only the parts that you do understand from each homework, but also the parts that you do not. Please do not muddle your way through proofs and other exercises in the hope that I will not read them carefully. You will get additional credit for an accurate self-assessment of your answer or approach. If you have gotten most of the way through a proof and just cannot complete the last step or even if you are missing a step in the middle but know how to do the rest, just try to write down what you have done so far and what it is that you don't know how to do. This will help me to better gauge where your understanding is incomplete so that we can review these areas in class. It will also demonstrate your understanding of your own work.
9. Effective learning also involves knowing where to go to get help when you realize that your knowledge or understanding of a topic is incomplete. This could mean consulting external references or coming to office hours. It can also mean asking a question in class when you don't understand part of the lecture.
10. I very much appreciate and enjoy getting as much feedback from my students as possible, even if it is not all positive. Please don't be afraid to tell me what you think. If you want to just stop by to chat, feel free. My door is usually open, but if you could utilize office hours as much as possible, I would appreciate it. If you would like to make an appointment outside office hours, just call or send an e-mail.

Assessment Instruments

Allocation of Marks

Assessment Instruments	Mark	Expected Appointment		
		Date	Day	Time
First Examination	15	13.07.10	Tuesday	11:30 – 12:30
Second Examination	15	02.08.10	Monday	11:30 – 12:30
Quizzes	20	4 quizzes (see course calendar below)		
Final Examination	50	15.08.10 – 18.08.10		
Total	100			

Course Academic Calendar

Class	Date	Topic
01	20/06/2010	**Chapter One: Complex Numbers and the Complex Plane** 1. Complex Numbers and Their Properties.
02	21/06/2010	2. Complex Plane.
03	22/06/2010	3. Polar Form of Complex Numbers.
04	23/06/2010	4. Powers and Roots.
05	24/06/2010	5. Sets of Points in the Complex Plane.
06	27/06/2010	6. Chapter 1 Review and Quiz 1.
07	28/06/2010	**Chapter Two: Complex Functions and Mappings** 1. Complex Functions.
08	29/06/2010	2. Complex Functions as Mappings.
09	30/06/2010	3. Linear Mappings.
10	01/07/2010	4. Special Power Functions. a. The Power Function z^n. b. The Power Function $z^{1/n}$.
11	04/07/2010	5. Reciprocal Function.
12	05/07/2010	6. Limits and Continuity. a. Limits. b. Continuity.

13	06/07/2010	7. Chapter 2 Review and Quiz 2.
14	07/07/2010	**Chapter Three: Analytic Functions** 1. Differentiability and Analyticity.
15	08/07/2010	2. Cauchy-Riemann Equations.
16	11/07/2010	3. Harmonic Functions.
17	12/07/2010	4. Chapter 3 Review.
18	13/07/2010	• *First Examination.*
19	14/07/2010	**Chapter Four: Elementary Functions** 1. Exponential and Logarithmic Functions. a. Complex Exponential Function. b. Complex Logarithmic Function.
20	15/07/2010	2. Complex Powers.
21	18/07/2010	3. Trigonometric and Hyperbolic Functions. a. Complex Trigonometric Functions. b. Complex Hyperbolic Functions.
22	19/07/2010	4. Inverse Trigonometric and Hyperbolic Functions.
23	20/07/2010	5. Chapter 4 Review and Quiz 3.
24	21/07/2010	**Chapter Five: Integration in the Complex Plane** 1. Real Integrals.
25	22/07/2010	2. Complex Integrals.
26	25/07/2010	3. Cauchy-Goursat Theorem.
27	26/07/2010	
28	27/07/2010	4. Independence of Path.
29	28/07/2010	5. Cauchy's Integral Formulas and Their Consequences. a. Cauchy's Two Integral Formulas.
30	29/07/2010	b. Some Consequences of the Integral Formulas.
31	01/08/2010	6. Chapter 5 Review.
32	02/08/2010	• *Second Examination.*
33	03/08/2010	**Chapter Six: Series and Residues** 1. Sequences and Series.
34	04/08/2010	2. Taylor Series.
35	05/08/2010	3. Laurent Series.
36	08/08/2010	4. Zeros and Poles.
37	09/08/2010	5. Residues and Residue Theorem.
38	10/08/2010	6. Some Consequences of the Residue Theorem. a. Evaluation of Real Trigonometric Integrals. b. Evaluation of Real Improper Integrals.
39	11/08/2010	c. Integration along a Branch Cut. d. The Argument Principle and Rouche's Theorem.
40	12/08/2010	e. Summing Infinite Series. 7. Chapter 6 Review and Quiz 4.
41	15-18/08/10	• Final Examination.

EXPECTED WORKLOAD:

On average students need to spend, at least, 9 hours of study and preparation per week for this course.

ATTENDANCE POLICY:

Absence from lectures shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course .If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.