Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	02/11/2024
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	07

1.	**Course Title**	**Complex Analysis**
2.	**Course Number**	0301713
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	None
5.	**Program Title**	M.Sc. in Mathematics
6.	**Program Code**	
7.	**School/ Center**	Science
8.	**Department**	Mathematics
9.	**Course Level**	Compulsory specialization requirement
10.	**Year of Study and Semester (s)**	1st year, 2nd semesters
11.	**Other Department(s) Involved in Teaching the Course**	None
12.	**Main Learning Language**	English
13.	**Learning Types**	☑Face to face learning ☐Blended ☐Fully online
14.	**Online Platforms(s)**	☐Moodle ☑Microsoft Teams
15.	**Issuing Date**	26/11/2024
16.	**Revision Date**	26/11/2024

17. Course Coordinator:

Name: Dr. Khalid Bdarneh Contact hours: TBA

Office number: 329 Math Bldg Phone number:

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18. Other Instructors:

Name: Prof. Abdallah Talafha	Contact hours:
Office number:	Phone number:
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Name: Dr. Saja Hyajneh	Contact hours:
Office number:	Phone number:
Email:	
Name: Dr. Eman Aldabbas	Contact hours:
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19. Course Description:

Review of complex numbers. Analytic function, Harmonic function. Maximum modulus principle, open mapping theorem. Cross ratio, Stereographic projections. Linear fractional transformation. Complex integrals. Zeros of holomorphic functions. Power series and Laurent series. Singularities. Residue and residue theorem. Application of residue theory. Picard's Theorem . Rouche' theorem. Reflection principle. Runge's theorem. Mittag-Leffler's theorem. Weierstrass infinite products. Conformal mapping. Schwartz Lemma. Automorphisms of the unit disc and upper half plane. Riemann mapping theorem. Analytic continuation of the Riemann Zeta function. Dirichlet problem, Mean value property.

20. Program Student Outcomes (SO's):

SO1. Read, analyze and write logical arguments to prove mathematical and statistical concepts and theorems.

SO3. Communicate with mathematical and statistical ideas clearly and consistently, in writing and verbally.

SO7. Work effectively within work teams and communicate scientific knowledge and results with peers and experts in the field.

SO8. Apply methodologies and ethics of scientific research in preparation of scientific research in mathematics field.

21. Course Intended Learning Outcomes (CLO's):

Upon completion of the course, the student will be able to achieve the following intended learning outcomes.

CLO1. To know the difference between analytic and differentiable function, and to understand the definition of harmonic functions
CLO2. To recognize that the maximum of a non-constant analytic function is obtained on the boundary of the region.
CLO3. To be able to decide if a function is conformal at a certain point.
CLO4. To understand the bilinear fractional transformation and be able to find a bilinear fractional transformation with certain conditions.
CLO5. To be able to calculate complex integrals.
CLO6. To Know the zeros and properties of holomorphic functions.
CLO7. To be able to calculate Laurent series of a given function on a given region.
CLO8. To know how to use residue to evaluate improper real integrals.
CLO9. To understand and apply Picard's Theorem, Rouche' theorem, Runge's theorem, and Mittag-Leffler's theorem.
CLO10. To understand the proof of Schwartz Lemma and the Riemann mapping theorem, and how to find the automorphisms of the unit disc and the upper half plane.
CLO11. To formulate the Dirichlet problem.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
CLO (1)	●	●				
CLO (2)		●	●			
CLO (3)	●	●		●		
CLO (4)		●	●	●	●	
CLO (5)		●	●		●	
CLO (6)		●	●		●	
CLO(7)	●	●	●		●	
CLO(8)			●		●	
CLO(9)		●		●		●
CLO(10)		●		●		●
CLO(11)		●		●	●	

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program SO's / Course CLO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)	SO (8)
CLO (1)	●		●				●	
CLO (2)	●		●					
CLO (3)	●		●					
CLO (4)							●	
CLO (5)	●							
CLO (6)	●		●				●	
CLO(7)	●		●				●	
CLO(8)	●		●				●	
CLO(9)	●						●	●
CLO(10)	●						●	●
CLO(11)	●						●	●

23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types Face to Face (FF) Blended (BL) Fully Online (FO)	Platform Used	Synchronous (S) Asynchronous (A)	Evaluation Methods	Learning Resources
1	1.1	Introduction and syllabus discussion	1	FF	Boards	S		Textbook
	1.2	Analytic function, Harmonic function	1	FF	Boards	S		Textbook
2	2.1	Maximum modulus principle, open mapping theorem	2	FF	Boards	S		Textbook

	2.2	Conformal mapping. Cross ratio, Stereographic projections	3	FF	Boards	S		Textbook
3	3.1	Linear fractional transformation,	4	FF	Boards	S		Textbook
	3.2	Complex integrals	5	FF	Boards	S		Textbook
4	4.1	Zeros of holomorphic functions	6	FF	Boards	S		Textbook
	4.2	Power series and Laurent series. Singularities.	7	FF	Boards	S		Textbook
5	5.1	Residue and residue theorem.	7	FF	Boards	S		Textbook
	5.2	Application of residue theory.	8	FF	Boards	S		Textbook
6	6.1	Picard's Theorems .	9	FF	Boards	S		Textbook
	6.2	Rouche' theorem.	9	FF	Boards	S		Textbook
7	7.1	Reflection principle	9	FF	Boards	S		Textbook
	7.2	Runge's theorem.	9	FF	Boards	S		Textbook
8	8.1	**Midterm Exam**		FF		S		
	8.2	Runge's theorem.	9	FF	Boards	S		Textbook
9	9.1	Mittag-Leffler's theorem.	9	FF	Boards	S		Textbook
	9.2	Weierstrass infinite products	9	FF	Boards	S		Textbook
10	10.1	Conformal mapping.	10	FF	Boards	S		Textbook
	10.2	Schwartz Lemma	10	FF	Boards	S		Textbook
11	11.1	Automorphisms of the unit disc and upper half plane	10	FF	Boards	S		Textbook
	11.2	Riemann mapping theorem.	10	FF	Boards	S		Textbook
12	12.1	Riemann mapping theorem.	10	FF	Boards	S		Textbook
	12.2	Analytic continuation of the Riemann Zeta function.	10	FF	Boards	S		Textbook
13	13.1	**Second exam**		FF	Boards	S		
	13.2	Subharmonic functions	11	FF	Boards	S		Textbook
14	14.1	Subharmonic functions	11	FF	Boards	S		Textbook
	14.2	Dirichlet problem,	11	FF	Boards	S		Textbook
15	15.1	Dirichlet problem,	11	FF	Boards	S		Textbook
	15.2	Mean value property	11	FF	Boards	S		Textbook
16		**Final Exam**						

24. Evaluation Methods:

Opportunities to demonstrate achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Midterm exam	% 30	TBA	1-9	TBA	On Campus
Second exam	% 30	TBA	10	TBA	On Campus
Final exam	% 40	All topics	1-11	TBA	On Campus

25. Course Requirements:

Each student must have:

- Account on Microsoft Teams.

26. Course Policies:

A. Attendance policies: Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.

B. Absences from exams and submitting assignments on time: If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.

C. Health and safety procedures: Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.

D. Honesty policy regarding cheating, plagiarism, misbehavior: Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.

E. Grading policy: Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.

F. Available university services that support achievement in the course: Math library, Computer lab.

27. References:

A- Required book(s), assigned reading and audio-visuals:

- Raghavan Narasimhan, Yves Nievergelt. Complex Analysis in One Variable. Second Edition.

B- Recommended books, materials, and media:

- Stein, E.M. and Shakarchi, R. (2003) Complex Analysis. Princeton University Press, Princeton.
- Conway, John B. *Functions of one complex variable II*.
- Alfors, L.V. Complex analysis. McGraw-Hill, N. Y, 1979

28. Additional information:

Name of the Instructor or the Course Coordinator: **Dr. Khalid Bdarneh**	Signature: ……	Date: 26/11/2024
Name of the Head of Quality Assurance Committee/ Department: **Prof. Manal Ghanem**	Signature: ……	Date: ……
Name of the Head of Department: **Prof. Baha Alzalg**	Signature: ……	Date: ……
Name of the Head of Quality Assurance Committee/ School of Science: **Prof. Emad A. Abuosba**	Signature: ……	Date: ……
Name of the Dean or the Director: **Prof. Mahmoud I. Jaghoub**	Signature: ……	Date: ……