



مركز الاعتماد
و ضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

**Course Name: Foundations of
Mathematics**

1	Course title	Foundations of Mathematics
2	Course number	(0301451)
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	(0301211)
5	Program title	B.Sc.
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Science
9	Department	Mathematics
10	Level of course	College requirement
11	Year of study and semester (s)	all Semesters
12	Final Qualification	B.Sc. in Mathematics
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	2.11.2016

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Abdalla Tallafha

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

As stated in the approved study plan.

Introduction and paradoxes; axioms of set theory; equivalence relations and functions; partially ordered classes; lattices; well-ordered classes; the axiom of choice and related principles; Dedekind cuts; cardinals and ordinals.

19. Course aims and outcomes:**A- Aims:**

1. Set theory can be regarded as a foundation for all, or most mathematical concepts. So the student should be reminded the basic concepts of set theory, as sets and relations on sets, axiomatic set methods and generalized union and intersection.
2. To acquaint students with fundamental concepts an functions, properties of composite functions and inverse functions.
3. To understand the concepts of equivalence relations and partitions, equivalence classes and quotient of equivalence relations.
4. To understand partially ordered, linearly ordered and well ordered relations and isomorphism's between well-ordered classes.
5. To understand the ordinal numbers and the arithmetic of ordinal numbers.
6. To explore cardinal numbers and arithmetic of cardinal numbers.
7. To acquaint students with axiom of choice and a related principles.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

A. Knowledge and Understanding Skills: Student is expected to

- A1. Learn and apply the elementary theorems and proof techniques of set theory.
- A2. Define, interpret and analyze fundamental concepts.
- A3. Understand the arithmetic of cardinals and ordinals.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

- B1. Demonstrate a working knowledge of set notation and set theory, recognize the connection between functions and other concepts.
- B2. Demonstrate the ability to do direct proofs, proofs by contradiction proofs by contra positive and proofs (finite and transfinite) induction.

C. Subject- Specific Skills: Student is expected to

- C1. Order a set of ordinals or cardinals.
- C2. Be able to befit abjection between equipotent sets or similar posits.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

- D1. Real write and criticize proofs.
- D2. Perform logical thinking.
- D3. Using mathematical reassuring.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Historical Introduction The background of set theory The paradoxes The axiomatic set method Axiomatic set theory	1				
Classes and Sets Building sentences Building classes The algebra of classes Ordered pairs Cartesian products Graphs Generalized union and intersection Sets	2-3				
Functions Fundamental concepts and definitions Properties of composite functions and inverse functions Direct images and inverse images under functions Product of a family of classes The axiom of replacement	4-5				
Relations Fundamental concepts and definitions Equivalence relations and partitions Pre-image restriction and quotient of equivalence relations	6				
Partially Ordered Classes Fundamental concepts and definitions Order preserving functions and isomorphism Distinguished elements: Duality Fully ordered classes. Well-ordered classes Isomorphism between well-ordered classes	7-9				
The Axiom of Choice and Related Principles Introduction The axiom of choice An application of the axiom of choice Maximal principles The well-ordering theorem	10				
Finite and Infinite Sets Introduction Equipotence of sets Properties of infinite sets Properties of denumerable sets	11				

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Arithmetic of Cardinal Numbers Introduction Operations on cardinal numbers Ordering of the cardinal numbers Special properties of infinite cardinal numbers	12-13				
Arithmetic of the Ordinal Numbers Introduction Operations on ordinal members Ordering of ordinal numbers	14-15				

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.

- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in this class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems before class. (Problems will be assigned each class period, then to be discussed the following period).
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work together with other students and to ask questions and seek help from your professor, both in and out of class.
- Students are also encouraged to visit the library and see related topics as an applications.

22. Evaluation Methods and Course Requirements:

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

ILO/s	Learning Methods	Evaluation Methods	Related ILO/s to the program
	Lectures	Exam	

23. Course Policies:

1. 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.
2. 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.
3. 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.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on homeworks.

24. Required equipment:

Data Shows

25. References:

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

Set Theory By Pinter.

B- Recommended books, materials, and media:

1. Set Theory (Schaum Series). By Seymour Lipschutz.
2. Set Theory with applications. By Shwu-Yeng T. Lin and Yoou-Feng Lin.

26. Additional information:

Name of Course Coordinator: Dr. Abdalla Tallafha Signature: ----- Date: 2/11/2016

Head of curriculum committee/Department: Dr. Hisham M. Hilow Signature: -----

Head of Department: Dr. Baha Alzalg Signature: -----

Head of curriculum committee/Faculty: Dr. Amal Al-Aboudi Signature: -----

Dean: Dr. Sami Mahmood Signature: -----

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File