BIRZEIT UNIVERSITY

Mathematics Department
Math243
Foundations of higher mathematics

Course Outline **Second Semester 2018/2019**

Instructor: Khaled Altakhman, Room SCI202

Text Book: Peter Fletcher and C. Wayne Patty, Foundations of higher mathematics, 3rd edition.

The main purpose of this course is to teach the student how to write, read, and recognize correct mathematical proofs. The student will also be given an opportunity to learn how to present proofs verbally. Along the way, the student will be introduced to some elementary concepts of advanced mathematics including elementary propositional logic, set theory, relations, functions, and cardinality.

Grading policy for this course is as follows:

Two hour exams **45%**
Homework & Quizzes **10%**
Final Exam **45%**

Homework

Homework will be assigned weekly, it is extremely important that you do the homework yourself, there will be a deadline for each homework and no late homework will be accepted.

Exams: The university policy regarding excuses for not attending an exam will be applied in this course

Cheating Policy: The cheating policy of the university will be strictly applied in this course.

Topics Outline:

Section	Title	Problems
1.1	Propositions	2, 4, 6, 7(b), 13, 14.
1.2	Expressions and tautologies	17, 20,21,23,24,25,27,35, 36,37,38,39.
1.3	Quantifiers	41,42,44,47,48,54
1.4	Methods of Proof	57,58,61,66,71.
1.5	The contradiction Method of Proof	75,76,78,79,82,87
1.6	More Proofs	92,93,94,101
2.1	Introduction	3,5,9,10,11,14,15 ,18,20
2.2	Operations on Sets	21(d,h),40,46,49,50,51,52.
2.3	Indexed Families	53,54,55,56,57,61,62
2.4	An Axiomatic Approach of Sets	
3.1	Proofs by Induction	1(d,f,g,h,j,l,q),2,5,6,15,16.
3.2	Other Principles of Induction	17,18,19,20,22,24
3.3	Induction and Recursion	
4.1	Functions and Relations	4,5,6,7,8,9,11,12,13,16.
4.3	Equivalence Relations	28,30,31,32,34,35,36,37,38,39, 43.
4.4	Partitions and Identifications	50,51,54,57,58.
4.5	Congruence	69,70.
4.6	Composition of Relations	90,91,92,93.
4.7	Types of Orders	
5.1	Functions as Relations	1,2,4,6,7,11,12,14.
5.2	Functions Viewed Globally	17,18,21,23,24.
5.3	Permutations	
5.4	Functions and Partitions	40,42,44,45.
5.5	Real-Valued Functions	48,49,50,51,53,57,58.
5.6	Images and Inverse Images of Sets	67,69,72,73,75,77.
5.7	Functions and Indexed Families	85,86.
7.1	Finite and Infinite Sets	4,5,6,8.
7.4	Countable Sets	28,29
7.5	Uncountable Sets	38,40