

University of Bahrain Quality Assurance & Accreditation Center



Course Syllabus Form				
1. College	Science			
2. Department	Mathematics			
3. Program	B.Sc. in mathematics			
4. Course Code	MATHS 253			
5. Course Title	Set Theory			
6. Course Credits	3			
7. Pre–requisites	MATHS 121			
8. Course webpage	http://www.abdullaeid.net/teaching/Fall2018/MATHS253.html			
9. Course Coordinator	Dr. Abdulla Eid			
10. Academic Year	2018/2019			
11. Semester	First			

12. Course Description: Elementary logic. Methods of proofs. Concepts of sets. Relations and Functions. Denumerable sets and nondenomerable sets. Cardinal numbers and cardinal arithmetic. The axiom of choice and some of its equivalent forms.

13. Textbook:

• William Barnier and Norman Feldman, *Introduction to Advanced Mathematics*, 1999, 2nd Edition, Pearson, ISBN–13: 978–0130167507.

14. References:

- 1. Chartrand, Polimeni, and Zhang, *Mathematical Proofs: A Transition to Advanced Mathematics*, 2014, 3rd Edition, Pearson, ISBN-13: 9781292040646.
- 2. Kenneth Rosen, *Discrete Mathematics and Its Applications*, 2011, 7th Edition, McGraw-Hill Education, ISBN-13: 978–0073383095.
- 3. Robert J. Bond and William Keane, *An Introduction to Abstract Mathematics*, 2007, 1st Edition, Waveland Press Inc, ISBN-13: 978–1577665397.
- 4. Donaldson and Pantano, An Introduction to Abstract Mathematics. Online textbook, 2015.
- 5. Sundstorm, Mathematical Reasoning: Writing and Proof. Online textbook, 2014.

15. Other Resources:

The instructor's lecture notes that will be given in the class.

16. Course Intended Learning Outcomes (CILOs):											
Students who successfully complete this course should be able to:											
	Mapping to PILOs										
CILOs	a	b	c	d	e	f	g	h	i	j	k
1. Use the connectives of propositional logic to write the contrapositive, negation of statements	 ✓ 	~									
2. Prove if a statement is a tautology, a contradiction or neither	 ✓ 	~									
3. Conclude a statement from a given set of premises	\checkmark	\checkmark									
4. Demonstrate that a statement is not a tautology by finding counterexamples	 ✓ 	\checkmark									
5. Apply the proof techniques learned to prove known results about the numbers	√	~	~								
6. Write clear statements and their negation using quantifiers	✓	~									
7. Prove or disprove quantified statements	\checkmark	\checkmark									
8. Use the technique of induction proof to figure out whether a proposition is true for all natural numbers	 ✓ 	~	~								
9. Derive, using the pick-a-point method or the algebraic method, set theory identities	√	~	~								
10. Show that a function is one to one, onto or bijective	\checkmark	\checkmark	\checkmark								
11. Identify images and inverse images of sets under a function	~	\checkmark	\checkmark								
12. Determine if a relation is an equivalence relation	\checkmark	\checkmark	\checkmark								
13. Produce the equivalence classes of an equivalence relation	√	\checkmark	\checkmark								
14. Differentiate between finite, infinitely countable, and uncountable sets	\checkmark	\checkmark									
15. Recognize the ZF axioms and the axiom of choice	\checkmark	\checkmark									

17. Course Assessment:					
Assessment Type	Number	CILOs	Weight		
Tests	2	Test 1: CILOs 1,2,3,4,5 Test 2: CILOS 5,6,7,8	35%		
Homework	16	All CILOs	25%		
Final Exam	1	All CILOs	40%		

18. Assessments Details:							
No	Assessment	Weight	Time	Date	Place	Material	
1	Test 1	15%	9:00 AM – 9:50 AM	TBA	S41-1016	TBA	
2	Test 2	20%	9:00 AM – 9:50 AM	TBA	S41-1016	TBA	

18. A	18. Assessments Details:							
No	Assessment	Weight	Time	Date	Place	Material		
3	Homework	25%	See the homework rules	See the homework rules	See the home- work rules	All Sections		
4	Final Exam	40%	8:30 AM – 11:30 AM	9.1.2019	TBA	All sections		

19. Course Instructor:		
Section(s)	Instructor	Office
1	Dr. Abdulla Eid	S41–2098

20. Attendance Policy:

Extracts from the University Bulletin regarding withdrawal and enforced withdrawal (Article 31):

A students absence from lectures or classes in excess of 25% of the total assigned session will result in an automatics withdrawal of the student from the course, regardless of the causes for his/her absence.

- (a) A grade of (W) is given to a student who misses 25% or more of the total sessions assigned to the course if he/she presents a valid excuse for his/her absence.
- (b) A grade of (WF) is given to a student who misses 25% or more, but with no valid excuse.

The classroom environment should be conductive to learning by all. This means, among other things, coming to class on time and prepared. Please no chit-chat talks during the class. Cell phones, graphical calculators and all electronic devices should be turned off and put away during the class and in the exams.

21. Academic Plagiarism:

All students are expected to follow the specific rules of academic honesty and plagiarism as per the regulation of professional conduct violations for University of Bahrain students, decision number 4/2006. Please refer the UoB website-Deanship of Students Affairs-Guidance Office.

Cheating is strictly prohibited and will result in serious consequences. In particular, cheating may result in an "F" for the course and be reported to deanship of students affairs. Using of any outside materials, looking at another student's exam or using cell phones might be consider as a cheating (whether or not you get benefit from it). For more information, refer to the student handbook (Article 75).

22. Important Dates:

- Sept 16, 2018: First day of the semester (Instruction begins).
- Sept 27, 2018: Last day to drop courses without a 'W' grade.
- Nov 4 Nov 8, 2018: Mid semester break.
- Dec 6, 2018: Last day to withdraw with a 'W' grade.
- Jan 3, 2019: Last day of instruction.
- Jan 9, 2019: Final exam.

23. We	23. Weekly Breakdown:						
Week	Date	Topics Covered	CILOs	Teaching Method	Assessment		
1	16.09.2018	Introduction to propositional logic. Logical Equivalence and Tautologies.	1,2	Lecture and problem- solving	HW 1, Test 1, Final Exam		
2	23.09.2018	Rules of Inference. Proof techniques.	1,2	Lecture and problem- solving	HW 2, Test 1, Final Exam		
3	30.09.2018	More proof techniques.	3	Lecture and problem- solving	HW 2, Test 1, Final Exam		
4	07.10.2018	Introduction to mathematical induction.	1,2	Lecture and problem- solving	HW 3, Test 1, Final Exam		
5	14.10.2018	Predicates and quantifiers.	4,6 5,6	Lecture and problem- solving	HW 4, Test 1, Final Exam		
6	21.10.2018	Counter-examples, Proofs and conjectures.	5,6	Lecture and problem- solving	HW 4, HW5, Test 1, Final Exam		
7	28.10.2018	Introduction to sets. Venn diagrams and conjectures.	5,6	Lecture and problem- solving	HW 6, Test 2, Final Exam		
	04.11.2018	Mid semester break.					
8	11.11.2018	The algebra of sets.	1,5,6	Lecture and problem- solving	HW 6, HW 7, Test 2, Final Exam		
9	18.11.2018	Arbitrary unions and intersections.	12	Lecture and problem- solving	HW 8, Test 2, Final Exam		
10	25.11.2018	Product sets.	7	Lecture and problem- solving	HW 9, Test 2, Final Exam		

23. We	23. Weekly Breakdown:								
Week	Date	Topics Covered	CILOs	Teaching Method	Assessment				
11	02.12.2018	Functions.	8	Lecture and problem- solving	HW 10, Test 2, Final Exam				
12	09.12.2018	Composition, bijections and inverse functions.	9	Lecture and problem- solving	HW 11, Final Exam				
13	16.12.2018	Images and inverse images of sets	8,9,10	Lecture and problem- solving	HW 10, Test 2, Final Exam				
14	23.12.2018	Relations. Equivalence relation.	10,11	Lecture and problem- solving	Final Exam				
15	30.12.2018	Countable and uncountable sets. Axiom of choice and its equivalent forms. First order logic Gödel Incompleteness theorem.	12	Lecture and problem- solving	Final Exam				

24. Co	24. Course Weekly Examples and Problems:				
Week	Date	Section	Topics Covered	Problems	
1	16.09.2018	1.1 1.2	Introduction to propositional logic Logical Equivalence and Tautologies	1-22 1-22	
2	23.09.2018	1.3 2.1	Rules of Inference Proof techniques	1-15 1-20	
3	30.09.2018	2.2	More proof techniques	1-22	
4	07.10.2018	2.3	Introduction to mathematical induction	1-24	
5	14.10.2018	2.4	Predicates and quantifiers	1-16	
6	21.10.2018	2.5	Counter-examples, Proofs and conjectures	1-22	
7	28.10.2018	3.1 3.2	Introduction to sets Venn diagrams and conjectures	1-22 1-20	
8	04.11.2018	3.3	The algebra of sets	1-20	
	11.11.2018		Mid semester break.		
9	18.11.2018	3.4	Arbitrary unions and intersections	1-23	
10	25.11.2018	4.1	Product sets	1-19	
11	02.12.2018	4.2	Functions	1-10 , 13-20	
12	09.12.2018	4.3	Composition, bijections and inverse functions	1-14 , 19-25	
13	16.12.2018	4.4	Images and inverse images of sets	1-14	
14	23.12.2018	5.1 5.2	Relations Equivalence relation	1-23 , 29-31 1-15	

25. Grades					
Letter Grade	Percentage Equivalent	Grade Point Value			
А	90 - 100	4.00			
A-	87 – 89	3.67			
B+	84 - 86	3.33			
В	80 - 83	3.00			
В-	77 – 79	2.67			
C+	74 – 76	2.33			
С	70 – 73	2.00			
C-	67 – 69	1.67			
D+	64 - 66	1.33			
D	60 - 63	1.00			
F	Below 60	0.00			