Philadelphia University
Faculty of Science
Department of Mathematics
Second Semester, 2023 – 2024

Course Syllabus	
Course Title: Set Theory	**Course code:** 0250251
Course Level: 2nd year	**Course prerequisite:** Calculus II
Lecture Time: sec1: Sun. Mon. 8:15–9:30	**Credit Hours:** 3
Location: S/21003	**Contact Hours:** 3

Academic Staff Specifics				
Name	**Rank**	**Office no. & location**	**Office hours**	**E-mail address**
Ahmad Hamdan	**Lecturer**	**819 / Faculty of Science**	**Sat. - Tue. 9:45 – 11:00**	ahamdan@philadelphia.edu.jo

Course description (According to the University Catalogue)

This course is an introduction to the foundation of mathematics, emphasizing teaching the students how to write a soundproof. Topics include a discussion of what is mathematics. Propositional logic and quantification, simple methods of proof, set operations and identities, relations, functions, cardinal numbers, and countable sets (if time permitting).

Course

• **Textbook**
  A step toward Advanced Mathematics by Marouf Samhan (Notes).

Teaching methods

(Lectures, discussion groups, tutorials, problem-solving, debates, etc.)
• **Duration**: 16 weeks, 48 hours in total.
• **Lectures**: 48 hours, 3 per week + two exams (two hours).
• **Assignments**: 5 quizzes.

Learning outcomes:

- **Knowledge and understanding**

  Students will have knowledge and understanding of:
  - Propositional logic and Quantifiers.
  - Techniques of mathematical proofs.
  - Sets and relations.
  - Basic properties of functions.
  - Cardinality of sets.

- **Cognitive skills (thinking and analysis).**
  - Understanding mathematical definitions and demonstrating them by writing them in their own words.
  - Translating application word problems into mathematical arguments and algorithms.
  - Reading and writing mathematical proofs.
  - Finding examples and counter-examples to given propositional theorems.

- **Communication skills (personal and academic).**
  - Be able to work effectively alone or as a small group member working on some tasks.
  - Expressing mathematical ideas in a logically correct manner.
  - Good logical writing.
  - Identifying ambiguities in mathematical statements and how to overcome them.
  - Encourage the students to be self-starters (creativity, decisiveness, initiative) and to finish the mathematical problems properly (flexibility, adaptability). Also, to improve the general performance of students through interaction with each other in solving different mathematical problems.

- **Transferable Skills.**
  - Gaining knowledge and experience in working with many pure mathematical problems.
  - Working independently and managing time wisely.
  - Using a word processor to write their reports legibly

Assessment instruments
- Exams (Midterm and Final Exams)
- Quizzes.
- Short reports and/ or presentations, and/ or short research projects.
- Homework assignments

Allocation of Marks		
Assessment Instruments	**Expected Time**	**Mark**
Midterm examination	16/04/2023 – 30/04/2023	**30 %**
Final examination	18/06/2023 – 26/06/2023	**40 %**
Quizzes, Home works	5 at least	**30 %**
Total		**100 %**

Documentation and academic honesty

Any form of dishonest conduct will be strictly punished. A student who is caught cheating, or attempting to do so in an exam will be given a zero for the exam and a report will be written to the Dean for further action. A student who helps another student or is seen communicating with another student in an exam will be given the same penalty stated in the previous point. Students with different exam forms are not exempt from the above rules. Repeat offenders will be expelled permanently and banned from future courses.

Course/ academic calendar

Week	Basic and support material to be covered	Homework/reports and their due dates
1	Propositional Logic	
2	Quantifiers	**Quiz**
3	Sets	**Quiz**
4	Direct proof	
5	Contrapositive proof	
6	Proof by contradiction	
7	Proving non-conditional Statements	
8	Proof involving sets	
9	Disproof	**Quiz**
10	Mathematical induction	**Quiz**
11	Relations, equivalence relations	
12	Partial order relations.	**Quiz**
13	Functions	**Quiz**
14	Cardinality of sets	
15	Countable and uncountable sets	
(16)	**Final Examination**.	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials 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.

Other Education Resources

References:
- **Foundation of Mathematics** (in Arabic) By Marouf A. Samhan and Fadwa Abu Morifa.
- **Introductory Mathematics: Algebra and Analysis**, by Geoff Smith, Springer, 1998.
- **Elements of Logic Via Numbers and Sets**, By D. L. Johnson, Springer, 1998.
- **Notes in Logic and Set Theory,** By Amin Witno, Philadelphia University.