جامعة الزيتونة الأردنية

Al-Zaytoonah University of Jordan

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Number Theory

Course Number: 0101212

General Course Information:

Course Title	Number Theory
Course Number	0101212
Credit Hours	3 credit hours
Education Type	Blended learning
Prerequisites/Co-requisites	Foundations of Mathematics (0101211)
Academic Program	Bachelor of Mathematics
Program Code	101
Faculty	Faculty of Science and Information Technology
Department	Mathematics
Level of Course	3
Academic Year /Semester	2023/2024
Awarded Qualification	BS'c
Other Department(s) Involved in Teaching the Course	-
Language of Instruction	English
Date of Production	2021-2022
Date of Revision	

Course Coordinator:

Coordinator's Name	
Office No.	
Office Phone Extension Number	
Office Hours	
E-mail	

Other Instructors:

Instructor Name	
Office No.	
Office Phone Extension Number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	In this course students learn the basic concepts of numbers, namely they learn: Properties of Integer Numbers, Division Algorithm, Greatest Common Divisor, Least Common Multiple, Prime Numbers, Fundamental Theorem Of Arithmetic, Diophantine Equations, Congruence, Linear Congruence, Chinese Remainder Theorem, Fermat's Theorem, Euler's Theorem and Wilson's Theorem
Arabic	في هذا المساق يدرس الطلاب المفاهيم الاساسية للتفاضل حيث يدرس الطالب: خواص الأعداد الصحيحة، خوارزمية القسمة، القاسم المشترك الأكبر، المضاعف المشترك الأصغر، الأعداد الأولية، النظرية الحسابية الأساسية، معادلات ديوفانتين، التطابق، التطابق الخطي، نظرية الباقي الصيني، نظرية فيرما، نظرية أويلر، نظرية ويلسون

Textbook: *Author(s), Title, Publisher, Edition, Year, Book website.*

Elementary Number Theory, Strayer, Waveland Press, 2001

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

1) K. Ferland, ‘’Discrete Mathematics and Applications, ‘’ Chapman and Hall/CRC, 2nd Edition, 2017
2) G. H. Hardy and E. M. Wright, "An Introduction to the Theory of Numbers," Oxford University Press, 6th Edition, 2008.
3) David M. Burton, "Elementary Number Theory," McGraw-Hill Education, 7th Edition, 2010.

Course Educational Objectives (CEOs):

CEO1	Master fundamental concepts in number theory, including prime numbers and congruencies.
CEO2	Apply advanced number theory techniques in real-world problem-solving.
CEO3	Develop proficiency in analysing and presenting rigorous mathematical proofs.

Intended Learning Outcomes (ILO’s):

Intended learning outcomes (ILOs)		Relationship to CEOs	Contribution to PLOs	Bloom Taxonomy Levels*	JNQF Descriptors**
K	Knowledge and Understanding				
ILO1-k	Knowledge of how to communicate mathematics clearly.	**CEO1**	PLO1-k	Understanding	K
ILO2-k	Knowledge of the main concepts in number theory.	**CEO1**	PLO1-k	Understanding	K
S	Intellectual skills				
ILO3-s	Making use of mathematical logic in number theory.	**CEO3**	PLO5-s	Creating	S
ILO4-s	Engaging scientific methodology as a way of thinking and as a tool in facing problems.	**CEO2**	PLO6-s	Applying	S
C	Subject specific skills				
ILO5-c	Demonstrated proficiency in prime factorization, modular arithmetic, congruence relations, Diophantine equations, and fundamental theorems in number theory, facilitating a comprehensive understanding of the subject.	**CEO1**	PLO12-c	Understanding	C

*Bloom Taxonomy Levels:

Level #	1	2	3	4	5	6
Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

** Descriptor (National Qualification Framework Descriptors): K: Knowledge, S: Skill, C: Competency.

Program Learning Outcome (PLOs):

	(PLOs)	JNQF Descriptors**		
		K	S	C
1.	Knowledge of the main concepts in pure mathematics.	√		
2.	Knowledge of the main concepts in applied mathematics.	√		
3.	Explain concepts, principles and theories in the fields of probability and statistics.	√		
4.	Possession of technological culture related to the fields of mathematics and its applications.	√		
5.	Making use of mathematical logic in practical life.		√	
6.	Engaging scientific methodology as a way of thinking and as a tool in facing problems.		√	
7.	Applying mathematical software packages in problem solving.		√	
8.	Being capable of data analysis.		√	
9.	Capability of teaching according to modern educational techniques.		√	
10.	Develop creative and innovative methods of teaching mathematics.		√	
11.	Showing the ability to work under ethical and professional standards within teams.			√
12.	Gaining critical thinking and scientific research skills.			√

**** Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

Weekly Schedule *(please choose the type of teaching)*

- ☐ **Face to Face (F2F)**
- ☒ **Hybrid** *(One – To - One)*
- ☐ **Online**

Schedule of Simultaneous and their Topics:

Week	First Lecture (F2F)	Second Lecture	ILOs	PLOs	JNQF Descriptors*
1	Integers	Activity: (Assignments) Properties of Integer Numbers	ILO1-k	PLO1-k	K
2	Divisibility	Activity: (Assignments) Properties of divisibility	ILO2-k	PLO1-k	K
3	The division algorithm theorem (state and proof)	Activity: (Work sheet) Applications of division algorithm	ILO2-k	PLO1-k	K

		theorem			
4	Prime and composite numbers.	Activity: (Assignments) Mersenne prime and Fermat prime.	ILO3-s	PLO5-s	**S**
5	The greatest common divisor	Activity: (Assignments) The G.C.D by using Euclidean algorithm.	ILO4-s	PLO6-s	**S**
6	The fundamental theorem of arithmetic.	Activity: (Assignments) Prove the fundamental theorem of arithmetic.	ILO2-k	PLO1-k	K
7	Diophantine Equations	Quiz	ILO1-k	PLO1-k	K
Midterm Exam (30%)					
9	Congruence's.	Activity: (Video) Application of congruences.	ILO3-s	PLO5-s	**S**
10	Linear Congruence	Activity: (Assignments) the multiplicative inverse of a modulo m system modulo m.	ILO3-s	PLO5-s	**S**
11	Solving system modulo m.	Application of system modulo m.	ILO4-s	PLO6-s	**S**
12	The Chinese remainder theorem	Activity: (Work sheet) Application of The Chinese remainder theorem	ILO1-k	PLO1-k	K
13	Fermat's little theorem	Activity: (Assignments) Wilson's theorem	ILO5-c	PLO12-c	C
14	Euler phi- function and Euler's theorem.	Activity: (Assignments) Application of Euler's theorem.	ILO5-c	PLO12-c	C
15	**Review**				
16	**Final Exam**				

* **K: Knowledge, S: Skills, C: Competency**

Teaching Methods and Assignments:

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

- Lecture.
- Learning through projects.
- Learning through problem solving.

Course Policies:

A- Attendance policies:
The maximum allowed absences is 15% of the lectures.
B- Absences from exams and handing in assignments on time:
Midterm exam can be retaken based on approval of excuse by the instructor's discretion.
Not handing assignment on time will incur penalties.
C- Academic Health and safety procedures
D- Honesty policy regarding cheating, plagiarism, and misbehaviour:
Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.
E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities **20%**
- Midterm 30**%**
- Final Exam 50**%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required Equipment:

- Internet Connection
- Access to the ZUJ E-Learning Platform at https://exams.zuj.edu.jo/
- E-learning plan
- Classroom

Assessment Tools Implemented in the Course:

- Final Exam
- Midterm Exam
- Quizzes
- Homework

Responsible Persons and their Signatures:

Course Coordinator	Dr. Hamza Alzaareer	**Completed Date**	**10 / 2023**
		Signature	

Received by (Department Head)		**Received Date**	/ /
		Signature	