SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Teaching Language*
MAT	**626**	**Number Theory**	**4**	**3**	**0**	**1**	**9**		**2[1]-2[2]**	**English**

[1]*Level 2 for the B.Sc. in Applied Mathematics and Chemistry, and Level 3 for Physics*
[2]*Level 2 for the B.Sc. in Applied Mathematics and Chemistry, and Level 3 for Physics*

A. Course Description

This course describes the most important ideas, theoretical results, and basic methods of the theory of modular arithmetic. The course includes the canonical problems with their solution algorithms. It covers classical topics in elementary theory of multiplicative functions, and some miscellaneous questions demonstrating variety of directions in this subject.

B. Course Outcomes

At the end of this course the student will be able to:

1. Give basic methods of the theory of modular arithmetic,
2. Provide canonical problems with their solution algorithms,
3. Introduce elementary theory of multiplicative functions and some miscellaneous questions.

C. References:

Required Textbook

1. **I. Niven, H. Zuckerman, and H. Montgomery**, *An Introduction to the Theory of Numbers*; Wiley 5th Ed., 1991. (Main Reference)

Other references:

2. **A. Baker**, *A Comprehensive Course in Number Theory*; Cambridge Univ. Press. 2012.
3. **G. Andrews**, *Number Theory*; Dover Publications, 1st ed. 1994.
4. **J. Tattersall**, *Elementary Number Theory in Nine Chapters*; Cambridge University Press, 2nd ed. 2005.

Course Website: Google Classroom Webpage:http://www.imamm.org/

D. Topics Outline

1. **Basics:** Divisibility and ideals, congruencies and their properties, Chinese remainder theorem, Hensel's lemma, Quadratic residues, Gauss' Lemma, Quadratic reciprocity law, arithmetic functions.

2. **Quadratic forms:** Definitions and basic properties, Equivalence of quadratic forms, Reduced quadratic forms, Quadratic representation, two squares sum representation, Sums of four squares sum representation and Lagrange's Theorem.

3. **Elliptic curves:** Pythagorean triples, The method of descent, Rational points on curves, the projective line, the projective plane, Elliptic curves.

4. **Continued Fractions:** Definitions and basic properties, Characterizing rationales by finite continued fractions, Finding a particular solution of the linear congruence equation, Continued fractions approximation of a real number, Purely periodic continued fraction, Pell's Equations.

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm :** 8^{th} or 9^{th} week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam:** 16^{th} week.

Your course grade will be based on your semester work as follows:

Midterm : 30 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 30 %	

The grading distribution:

A^+	A	B^+	B	C^+	C	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[0, 70)

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Examsgoo.gl/ykm7t3

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