Syrian Arab Republic

Higher Institute for Applied Sciences and Technology

Course Specification Document

Title	General Mathematics

Credits	6 ECTS

Aims	This course aims to introduce the student to the basic concepts in mathematics, such as sets and logical predicates, and teaching him logical reasoning and formulating an accurate proof.

Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand the basic concepts in mathematics (logical predicates, sets, functions)
- Handle numbers (natural numbers, integers, rational numbers and real numbers) and understand their properties.
- Use some basic techniques, such as sums and the absolute value and others.

Syllabus

- **Logic and sets:** Predicates, logical operators, quantifiers, sets, subsets, operations on subsets of a set, Cartesian product of non-empty sets, functions (direct image, inverse image, injective functions, surjective functions, bijections and inverse function),
- **Number sets**: Natural numbers and proofs by induction, integers, rational numbers and real numbers, absolute value of a real number, the floor function, handling sums and products and some useful identities and inequalities (the sum of an arithmetic progression, the sum of a geometric progression).
- **Elementary combinatorics**: Permutations, combinations, Pascal's rule and Binomial theorem.
- **Introduction to number theory**: Divisibility, Euclidean division, congruence, the greatest common divisor, the Piezo relationship, Euclid’s procedure, the least common multiple, Gauss’s theorem and prime factorization.