

## Supplemental Mathematics

1. **Course number and name:** 020CMTNI1/020SMTNI1 Supplemental Mathematics
2. **Credits and contact hours:** 2 ECTS credits, 1x1:15 course hours
3. **Name of coordinator:** Wafa Saoud
4. **Instructional materials:** PowerPoint slides and worksheets.

### References:

- Mathematics, General and Life Sciences, K. Attieh and al., 2013.
- SSS Mathematics, Volume 2, K. Attieh and al., 2007.
- Mathematics FSG, K. Attieh and al., 2015.
- Thomas' Calculus, G. Thomas and al., 2010.

### 5. Specific course information

#### a. Catalog description:

This course equips students with the necessary skills to solve elementary mathematical problems. They learn key concepts such as composite and inverse functions, the numerical sequences, the circular functions, as well as definite and indefinite integrals. By studying composite and inverse functions, students comprehend the relationships between different functions and learn to decompose and reconstruct more complex functions. Additionally, this course introduces numerical sequences, particularly arithmetic and geometric sequences. Another essential component of this course is the study of basic trigonometric functions: sine, cosine and tangent. Finally, this course covers definite and indefinite integrals by exploring their properties, the technique of integration by parts, the substitution method, and a fundamental application: area calculation.

#### b. Prerequisites: None

#### c. Required/Selected Elective/Open Elective: Required

### 6. Educational objectives for the course

#### a. Specific outcomes of instruction:

- Determine the domains of definition of composite and inverse functions.
- Find the expressions of composite and inverse functions.
- Differentiate composite and inverse functions.
- Understand the concept of a numerical sequence.
- Use the principal of mathematical induction to prove equations and inequalities related to sequences.
- Calculate the terms of a sequence.
- Study the monotonicity of a sequence.
- Identify arithmetic and geometric sequences.

- Calculate the sum of the first  $n$  terms of arithmetic and geometric sequences.
- Determine the period of trigonometric functions.
- Find the derivatives of trigonometric functions.
- Sketch the graphs of trigonometric functions.
- Solve trigonometric equations.
- Understand the concepts of definite and indefinite integrals.
- Evaluate integrals using integration by parts method.
- Calculate integrals using the change of variable method.
- Find areas using definite integrals.

**b. PI addressed by the course:**

<b>PI</b>	1.3
<b>Covered</b>	x
<b>Assessed</b>	x

**7. Brief list of topics to be covered**

- Chapter 1: Composite functions, inverse functions + Worksheet 1 (2 lectures)
- Chapter 2: Proof by induction, numerical sequences + Worksheet 2: exercises 1 → 6 (2 lectures)
- Chapter 2: Arithmetic sequences, geometric sequences + Worksheet 2: exercises 6 → 10 (1 lecture)
- Chapter 3: Radian, trigonometric circle, trigonometric ratios in a right triangle, trigonometric lines (2 lectures)
- Chapter 3: Continuity of trigonometric functions, derivatives of trigonometric functions, graphical presentations of trigonometric functions + Worksheet 3 (1 lecture)
- Chapter 4: Rules of differentiation, antiderivatives, indefinite integrals, definite integrals (2 lectures)
- Chapter 4: Integration by parts, the change of variable method, calculation of area + Worksheet 4 (1 lecture)
- Supplementary exercises (1 lecture)