Mathematics

1. **Course number and name:** 020MATES1 Mathematics

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Instructor's or course coordinator's name:** Fares Maalouf

4. **Text book:**
   a. **Other supplemental materials:**
      Course handouts

5. **Specific course information**
   a. **Catalog description:**
      Complex analysis: holomorphic functions, Cauchy-Riemann equations, complex logarithm, Cauchy integral formula, the residue theorem and its application – Fourier analysis: Fourier series, Fourier transforms – Distributions – Z transforms – Some classical partial differential equations.

   b. **Prerequisites:** 020AN2NI4 Analysis 2 or 020AN3CI4 Analysis 3

   c. **Required:** Required for CCE and EE students

6. **Specific goals for the course**
   a. **Specific outcomes of instruction:**
      - Recognize a holomorphic function with the Cauchy Riemann equations.
      - Identify the poles and zeroes of a function.
      - Compute the residue of a holomorphic function at a pole.
      - Evaluate integrals along paths in the complex plane.
      - Evaluate integrals along closed paths by applying the residue theorem.
      - Compute the Fourier coefficients of a periodic function.
      - Compute Fourier transforms.
      - Compute Z transforms.
      - Solve linear difference equations with Z Transforms.
      - Solve some classical partial differential equations

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

KPI	a1
Covered	x
Assessed	x
Give Feedback	x

7. Topics and approximate lecture hours:

- Holomorphic functions, Cauchy Riemann equations, complex logarithm (3 lectures)
- Contour integrals, Cauchy formula (3 lectures)
- Laurent series, analycity of holomorphic functions (3 lectures)
- The residue theorem (2 lectures)
- Applications of the residue theorem to the computation of real integrals (2 lectures)
- Periodic functions and Fourier series (2 lectures)
- Fourier transforms (3 lectures)
- Convolution (2 lectures)
- Distributions (2 lectures)
- Z transforms (2 lectures)
- Linear difference equations (1 lecture)
- Some classical partial differential equations : method of characteristics, separation of variables (3 lectures)