

**Republic of Iraq**  
**Ministry of Higher**  
**Education and Scientific**  
**Research**  
**Supervision and Scientific**  
**Evaluation Apparatus**



**College: Shatt Al-Arab University**  
**Department: Civil Engineering**  
**Stage: 1<sup>st</sup> stage**  
**Lecturer name: Shaheed Muhammed Ali**  
**Academic title: Ass. Lecturer**

### Course Weekly Outline

|                           |  |                |               |                |                      |                   |
|---------------------------|--|----------------|---------------|----------------|----------------------|-------------------|
| <b>Name</b>               | Shaheed Muhammed Ali   |                |               |                |                      |                   |
| <b>E-mail address</b>     | Shaheed.mohammedali@sa-uc.edu.iq   |                |               |                |                      |                   |
| <b>Course name</b>        | Mathematics-1  |                |               |                |                      |                   |
| <b>Course objective</b>   | <ol style="list-style-type: none"> <li>1. Good understanding of General Mathematics.</li> <li>2. To give information about Integrations and derivations and how they are used in the engineering field.</li> <li>3. Helping students to connect mathematics with civil engineering.</li> <li>4. better understanding of integration and derivations and their importance of role in civil engineering</li> </ol> |                |               |                |                      |                   |
| <b>Course description</b> | Full course of teaching differentiations and integrations and their engineering applications.  |                |               |                |                      |                   |
| <b>References</b>         | Calculus, International Edition, By Thomas, 2005.  |                |               |                |                      |                   |
| <b>External sources</b>   | Calculus with Analytical Geometry, Fourth Edition, By Robert Ellis and Denny Gulick, 1990  |                |               |                |                      |                   |
| <b>Course assessment</b>  | <b>Home work</b>   | <b>Quizzes</b> | <b>Report</b> | <b>Project</b> | <b>Mid-term exam</b> | <b>Final exam</b> |
|                           | <b>10</b>  | <b>10</b>      | <b>10</b>     | <b>10</b>      | <b>10</b>            | <b>50</b>         |
| <b>General notes</b>      |  |                |               |                |                      |                   |



### Course Weekly Outline

| Week No. | Theoretical  | Aims  |
|----------|--|---|
| 1        | Algebraic Preliminaries: Numbers, Sets   | Highlighting the importance of differentiation and integration for the branches of science and engineering, and the student's awareness of the relationship between them.<br>Presentation of the basic rules of differentiation and integration and their applications.<br>Accustoming the student to sound logical thinking and acquiring the skills necessary to solve problems |
| 2        | Algebraic Preliminaries: Inequalities & Absolute value.  |   |
| 3        | Functions: Domain, Range, graphs,  |   |
| 4        | Functions: Symmetry, Asymptotes  |   |
| 5        | Limits: Definition of Limit, Theorems,   |   |
| 6        | Continuity, One-Sided Limits,  |   |
| 7        | Limits at Infinity, L Hopital's rule.  |   |
| 8        | Derivatives: Definition, Power and Sum Rules, Product and Quotient Rules,  |   |
| 9        | Derivatives: Chain rule, High-Order derivatives, Implicit differentiation.   |   |
| 10       | Applications of Derivative: Maximum and minimum, mean value theorem,   |   |
| 11       | Applications of Derivative: Increasing and Decreasing Functions, Concavity and Points of inflection, Second Derivative Test.               |   |
| 12       | Definite Integration: Definition, Integral Theorems, Length of a Curve, Areas  |   |
| 13       | Definite Integration: Volume of Solids, Surface Area, Indefinite Integrals.  |   |
| 14       | Transcendental Functions: Trigonometric Functions, Graphs, Derivatives of trigonometric functions, Inverse trigonometric functions, Graphs |   |
| 15       | Derivatives of Inverse trigonometric functions, Natural Logarithm Functions, Exponential Functions, Functions $a^u$ and $\log_a u$ .       |   |