**TEMPLATE FOR COURSE SPECIFICATION**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

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**COURSE SPECIFICATION**

**Better understanding the relationship between theory and applied math as calculus in the first stage and taking the mathematical problems concerning the soil, water, and air pollution into consideration .**

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| 1. Teaching Institution | University of Baghdad/ College of Engineering |
| 2. University Department/Centre | Environmental Engineering Department |
| 3. Course title/code | Calculus I |
| 4. Modes of Attendance offered | Electronic lectures are delivered twice a week |
| 5. Semester/Year | Annual |
| 6. Number of hours tuition (total) | 75 hours (3 hours a week) |
| 7. Date of production/revision of this  specification | 2021-2022 |
| 8. Aims of the Course | |
| 1. Learning the dependent/independent variables and how they relate to. | |
| 1. Tracing curves and studying the behavior of functions as well as their extrema. | |
| 3- Expecting the initial and final values through limits. | |
| 4- Determining the domain and range of certain functions via different methods. | |
| 1. Getting the knowledge of how to sketch and/or graph functions using short cut methods. | |
| 1. Making use of rules of differentiation in solving many extreme problems. | |
| 1. Learning methods of definite integrals using simpler numerical approaches. | |
| 1. Evaluation of arc length, area under the curve, volume and/or surface of rotation. | |

9· Learning Outcomes, Teaching ,Learning and Assessment Method

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| A- Cognitive goals .   |  | | --- | | A1. Making the student to be fully aware of how math is being incorporated in Environmental applications. | | A2. Making use of up-to-date criteria dealing with manipulating functions and equations. |   A3. Using of most advanced electronic devices in graphing complex functions. |
| B. The skills goals special to the course.   |  | | --- | | B1- Understanding the nature and behavior of functions in terms of easier mathematical tools. | | B2. Making proofs of transcendental, rational, irrational polynomial, etc.,  B3- Writing out scientific reports concerning the applications of math in Environmental Engineering. | |
| Teaching and Learning Methods |
| Extensive description of case studies and applications regarding the Environmental Engineering studies, Lectures, homework and assignments tests, and exams, class oral conservations, questions and discussions, comparison between theory and applications. |
| Assessment methods |
| Homework related to problem solving, student participation through class session, preparation of reports, quizzes, monthly exams, student attendance, and lucrative encouragement. |
| C. Affective and value goals   |  | | --- | | C1. Getting optimum values through the applications of extreme functions. | | C2. Facilitate the algebraic and solving problems that might be encountered in biochemistry, organic, etc,.  C3. Getting students to trouble shoot and overcome cumbersome solutions in math. |   . |
| Teaching and Learning Methods |
| |  | | --- | | Teaching and Learning Methods  Intensive studies of regulations | |
| Assessment Methods |
| Case studies |

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

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| D1. Become more effective, independent and confident self-directed learners |
| D2. Improve their general skills for study and career management  D3. Articulate personal goals and evaluate progress towards their achievement  D4.An ability to identify, formulate, and solve engineering problems |

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|  | 10. Course Structure | | | | | |
| Week | Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours |  |
| 1 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Review of fundamental concepts | 1&2 | 3 (Theory) |  |
| 2 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Figuring out functions and equations | 1 &2 | 3 (Theory) |  |
| 3 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Graphing functions and getting acquainted on function behavior | 1 &2 | 3 (Theory) |  |
| 4 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Solving problems using inequalities | 1 &2 | 3 (Theory) |  |
| 5 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Finding out domain and range of certain functions | 1 &2 | 3 (Theory) |  |
| 6 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Determination of function limits | 1 &2 | 3 (Theory) |  |
| 7 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Knowing the continuity and differentiability | 1 &2 | 3 (Theory) |  |
| 8 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Learning the differentiation, definition and rules | 1 &2 | 3 (Theory) |  |
| 9 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Solving extreme problems using techniques of differentiation | 1 &2 | 3 (Theory) |  |
| 10 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Solving definite integrals and methods of integration | 1 &2 | 3 (Theory) |  |
| 11 | Making questions during the lectures ,quizzes, exams, and attendance in the class. | Electronic | Evaluation of curve's length, area, volume, and surface area through integration applications | 1 &2 | 3 (Theory) |  |
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| 11. Infrastructure | |
| 1. Books Required reading: | 1-Calculus, Howard Anton, Drexel University, 5th ed, 2019  2-Calculus, Muray Spiegel, Shaum's Outline Series, 2011  3-Engineering Mathematics, Ken Stroud, 2nd ed. 1987. |
| 2. Main references (sources) | Calculus, Thomas and Finney, 7th ed., 2012 |
| A- Recommended books and references (scientific journals, reports…). | American Journal of Mathematics and any textbooks on calculus |
| B-Electronic references, Internet  sites… | <https://www.pdfdrive.com/calculus-and-analytic-geometry-2nd-edition-e31002683.html>.  https://www.google.com/search?q=calculus+by+howard+anton+11th+edition+pdf+free+download&rlz=1C1SQJL\_enIQ924IQ924&oq=calculus+by+Howard++edition+pdf+free+download&aqs=chrome.1.69i57j0i7i30j0i5i7i30j0i8i30l4.32525j1j4&sourceid=chrome&ie=UTF-8 |

12. The development of the curriculum plan

The development must take imposing further math courses in 3rd and 4th stages into consideration as concrete tools for more applications on mathematics.