



Department of Statistics and Informatics

College of administration and Economics

University of Salahaddin-Hawler

Subject: General Mathematics

Course Book – 1st Year (2nd semester)

Lecturer's name: Marwan Tariq Hassan-(MSc)

Academic Year: 2023/2024

Course Book

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| 1. Course name | General Mathematics |
| 2. Lecturer in charge | Marwan T. Hassan |
| 3. Department/ College | Statistics and informatics/Administration and Economics |
| 4. Contact | e-mail: marwan.hasan@su.edu.krd |
| 5. Time (in hours) per week | Theory: 4 Practical: N/A |
| 6. Office hours | Tuesday: 12:30-2:30 & Thursday: 8:30-12:30 |
| 7. Course code | SAE106 |
| 8. Teacher's academic profile | I was worked as assistant researcher in 2007 till 2009 in Department of Statistics at College of Administration and Economics at University of Salahaddin. I gained a master's degree in the same college and university in 2011. During my teaching experience, I have taught a lot of classes such as, Mathematics, Differential Equation, Computer, Mathematical Statistics, and SPSS. |
| 9. Keywords | Trigonometric function, Derivative, Integration. |
| <p>10. Course overview:</p> <p>The study of mathematics can lead to a variety of exciting professional careers. Basic research, engineering, finance, business, and government service are among the opportunities open to those with mathematical training. Moreover, with the increasing importance of basic science and information technology, prospects for careers in the mathematical sciences are very good. Mathematical analysis and computational modelling are important for solving some of the most pressing problems of our time - new energy resources, climate change, risk management, epidemiology, to name a few. We must strive to maintain our technological edge; mathematical skills will be crucial to this effort.</p> | |
| <p>11. Course objective:</p> <p>There are some important things that students have to learn in this course before they would go to the other stages. For example they need these experiences for other classes such as, Numerical Analysis, Mathematical Statistics, Inference, and Differential Equation.</p> <ul style="list-style-type: none"> • Students should be able to analyse functions, graphically, numerically and analytically. • Students should be able to understand the meaning of the derivative in terms of a rate of change or slope. • Students will be able to apply and implement derivatives to solve problems. | |

- **Students should be able to understand the meaning of the indefinite and definite integral both as a limit of Riemann sums as applied to area or volume.**
- **Students will be able to apply and implement integrals to solve problems.**

12. Student's obligation

Students should be follow these requirement sin the class:

They have to come to the class on time.

They have to bring their lectures to the class every day.

If any student misses the quiz, he or she will get zero.

They have to bring their homework on time.

13. Forms of teaching

This lessons use several methods of teaching such as PowerPoint presentation to show the underline headings and using white board as well. Sometimes, student will be asking to discuss and share their ideas on this filed during the lecture with participating his/her classmates. From the beginning of the course, a hand out of the lecture will be given to the students to see what they are studying during this course.

14. Assessment scheme

Midterm exam: 20 % marks.

Class assignments & quizzes: there will be weekly class assignments and quizzes;20 % marks.

There will be extra assignments, which give the students extra marks.

Final exam: 60 % marks.

The examination schedule will be announced by the exam board of the department of statistics.

15. Student learning outcome:

Students will understand the basic rules of logic, including the role of axioms or assumptions and appreciate the role of mathematical proof in formal deductive reasoning.

Students will also be able to formulate and solve abstract mathematical problems and recognize real-world problems that are amenable to mathematical analysis, and formulate mathematical models of such problems. They can apply mathematical methodologies to open-ended real-world problems. They will also be able to recognize the connections between different branches of mathematics like between theory and applications.

16. Course Reading List and References:

❖ Howard Anton, Calculus with Analytic Geometry (Fifth Edition), 1995.

❖ **Thomas, Calculus (Eleventh Edition).**

❖ **William V. Smith., The Calculus, 2001 available free at**

❖ <http://math.byu.edu/~smithw/Calculus/>

❖ <http://www.wolframalpha.com/>

| Week | 17. The Topics: | No. of hours |
|------|--|--------------|
| 1 | The derivative by definitions. Techniques of differentiation. | 3 |
| 2 | The Chain Rule. Higher-Order Derivatives. The Implicit Differentiation | 3 |
| 3 | Derivatives exponential functions and logarithm functions. Derivatives of algebraic Trigonometric and their inverses. | 3 |
| 4 | Hyperbolic functions and their derivative. Applications of derivative. L'Hopital Rule. Maxima and Minima. | 3 |
| 5 | Integration. Ant derivatives and Indefinite Integration | 3 |
| 6 | Integrals of trigonometric functions | 3 |
| 7 | Integrals of inverse trigonometric functions | 3 |
| 8 | Integrals of hyperbolic functions | 3 |
| 9 | Method of Integration Integration by parts | 3 |
| 10 | Integral involving: $\underline{ax^2 + bx + c}$ | 3 |
| 11 | Integration by Partial Fractions. | 3 |
| 12 | Integration by trigonometric substitution. | 3 |

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| 13 | Application of integrals Definite integrals. | 3 |
| 14 | Area between two curves. | 3 |
| 15 | Double integrals | 3 |

18. Practical Topics (if there is any)

We don't have any practical lessons at all.

19. Examinations:

1. Compositional: The following some examples related to compositional questions:

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$\frac{dy}{dx}$

Find $\frac{dy}{dx}$ for the functions: $y = e^{(x+e^{5x})}$

solution:

$$y = e^{(x+e^{5x})} \Rightarrow \frac{dy}{dx} = e^{(x+e^{5x})} (1+5e^{5x})$$

2. True or false type of exams:

Check the following questions to see whether they are TRUE or FALSE?

a) The slope of a vertical line is undefined because $\Delta x = 0$.

b) $\ln\left(\frac{x}{y}\right) = \ln x + \ln y$

c) $\sinh x = \frac{e^{-x} - e^x}{2}$

d) $\int \frac{du}{\sqrt{a^2 - u^2}} = \sin^{-1} \frac{u}{a} + c$

3. Multiple choices:

For the following questions choose the right answer:

1) Determine $\lim_{x \rightarrow \infty} \frac{3x^3 + 5x^2 - 7}{10x^3 - 11x + 5}$

a) ∞ b) $\frac{3}{10}$ c) 0 d) $\frac{-7}{5}$

2) Compute $\int_0^{\frac{1}{2}} \frac{4}{1+4x^2} dx$

a) 0 b) $-\pi$ c) π d) $\frac{1}{2}\pi$

3) Give the value of x where the function $f(x) = x^3 - 9x^2 + 24x + 4$ has a local maximum: a)4 b)-2 c)-4 d) 2

20. Extra notes:

Final exam will be determined by the exam board of the college.

Notice that, this syllabus may be subject to changes; we may take either longer or shorter time to finish them.

21. Peer review

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