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**Department of Mechanical and Mechatronics Engineering**

**College of Engineering**

**University of Salahaddin**

**Subject: Mathematics III**

**Course Book- 2nd year students – Semester 1**

**Lecturer's name: MS. Khatoon Y. IbrahimMSC**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | Mathematics II |
| **2. Lecturer in charge** | Ms. Khatoon Yaseen Ibrahim |
| **3. Department/ College** | Mechanical –Mechatronics Eng. Dept. / College of Engineering |
| **4. Contact** | e-mail: Khatoon.Ibrahim@su.edu.krdTel: (optional) |
| **5. Time (in hours) per week**  |  Theory: 3 Tutorial: 1  |
| **6. Office hours** |  |
| **7. Course code** | 109 |
| **8. Teacher's academic profile**  | MSc in Composite Materials  |
| **9. Keywords** | Vectors, polar coordinates, differential equations, partial derivatives. |
| **10. Course overview:**In this section the lecturer shall write an overview about the subject he/she is giving. The course overview must cover:* Definition of vectors, properties of vectors, operation of vectors.
* Polar system (Definition, Relation between polar & Cartesian coordinates, polar equation).
* Graph of polar equation, Intersection between polar curves.
* Differential Equations(basic concepts, Definitions, Direction fields)
* Partial derivatives of a function of one, two and three variables.
* Chain Rule of several variables.
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| **11. Course objective:*** An engineering student needs to have some basic mathematical tools and techniques which emphasize the development of rigorous logical thinking and analytical skills. Topics include Definition of vectors, properties of vectors, operation of vectors. Understand Polar system and know Relation between polar &Cartesian coordinates and solve polar equations. Recognize to the kinds of differential equations. Solve the partial derivatives of functions with one, two and three variables. Learn to use the Chain Rule of several variables.
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| **12. Student's obligation** The attendance of students at all lectures is required since being absent from class will inhibit student’s ability to fully participate in class discussions and problem solving sessions and will therefore affect his/her grade. The student is required to continuously submits homework and assignments and expect quizzes any time. |
| **13. Forms of teaching*** Power point presentations for the head titles, definitions and graphs.
* Elaborations and explanations of the subjects, analysis and derivation for necessary equations, solution of examples and problems on white board.
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| **14. Assessment scheme**‌ The final grade in this course will be determined as follows:‌ Midterm Examination 20 % Course work and assignments 20 % Final Examination 60 %\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Total Marks 100% |
| **15. Student learning outcome:**At the end of the course, students will be expected to :* Understand the Vectors, and know the Properties of vectors, operations of vectors.
* Students will be able to recognize to Polar system and solve polar equations.
* Solve types of differential equations.
* Solve problems include Functions of more than one variable.
* Find Partial derivatives of a function of two variables, three variables.
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| **16. Course Reading List and References‌:**1. Calculus, International Edition, By Thomas’, 2005.
2. Thomas’ Calculus 12th edition, Thomas, Weir and Hass, Pearson Addison Wiley, 2010.
3. Calculus, 2nd edition, Steven G. Krantz McGraw Hill, 2011.
4. Essential Calculus, 2nd Edition, James Stewart, 2012.
5. Calculus, 11th Edition, By Thomas’, 2013.
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| **17. The Topics:** | **Lecturer's name** |
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| **Week** | **Hours** | **Topics** |
| 1 | 4 | Vectors(Definitions, Properties of vectors operations, unit vectors) |
| 2 | 4 | Vectors(Dot products, properties of dot products, vector projections ) |
| 3-4 | 8 | Polar system(Definition, Relation between polar &Cartesian coordinates, polar equation) |
| 5 | 4 | Graph of polar equation, Intersection between polar curves |
| 6 | 4 | Area enclosed by polar curves |
| 7-8 | 8 | Differential Equations(basic concepts, Definitions, Direction fields) |
| 9 | 4 | First order differential equations(Linear DE’s, Separable DE’S) |
| 10 | 4 | Exact DE’s, Bernoulli DE’S |
| 11 | 4 | Functions of more than one variable(Definitions) |
| 12 | 4 | Partial derivatives of a function of one variable |
| 13 | 4 | Partial derivatives of a function of two variable, three variables |
| 14 | 4 | Tangent planes |
| 15 | 4 | Chain Rule of several variables |
|  | Final Exam |

  | Ms. Khatoon Yaseen Ibrahim |
| **18. Practical Topics (If there is any)** |  |
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| **19. Examinations:*****1. Compositional:*** ***2.******True or false type of exams:******3. Multiple choices:***. |
| **20. Extra notes:** |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** .‌‌  |