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| **Jerash University**  **Faculty of Science**  **Department of Science/Mathematics**  **First Semester 2019-2020** | **C:\Users\HP\Dropbox\Jarash University\Jarash Logo.jpg** |

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| **Course Information** | |
| **Course Title** | Methods of Applied Mathematics |
| **Course Number** | 303473 |
| **Prerequisites** | 303241+303303+303416 |
| **Instructor** | Jafar Al Al-Ahmad |
| **Office Location** | 502, Al-Khwarizmi |
| **Office Hours** | (9:30- 11:00) Everyday |
| **E-mail** |  |
| **Course Description** | |
| In format and content, the course is broadly organized around the theme of applications of Fourier analysis. The treatment covers both classical applications in partial differential equations and boundary value problems, and a substantial number of topics associated with Laplace, Fourier, and discrete transform theories. The topics covered are useful both in traditional continuum mechanics and mathematical physics areas and in various phases of “modern” applied mathematics such as control and communications.  The course covers the topics of Fourier series, boundary value problems, and Laplace, Fourier, and z-transforms. | |

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| **Text Book** | |
| **Title** | Methods of Applied Mathematics with a Software Overview |
| **Author(s)** | Jon H. Davis |
| **Publisher** | Birkhäuser |
| **Year** | 2016 |
| **Edition** | Second Edition |

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| **Assessment Policy** | | |
| **Assessment Type** | **Expected Due Date** | **Weight** |
| **First Exam** | To be announced by the department | 20% |
| **Second Exam** | To be announced by the department | 20% |
| **Final Exam** | To be announced by the department. | 40% |
| **Assignments** | Ten assignments will be considered | 20% |
| **Over all** |  | 100% |

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| **Course Objective** |
| The course provides the student with a firm grasp of the fundamental notions and techniques of the area and, at the same time, conveys a sense of the wide variety of problems in which the methods are useful. We emphasize not only the computational aspects of problem-solving but also the limitations and implicit assumptions inherent in using the formal methods. |

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| **Course Content** | | |
| **Week** | **Topics** | **Chapter in Text (handouts)** |
| 1-2 | **Fourier Series** | **Chapter 2** |
| 2.1 Introduction  2.2 Inner Products and Fourier Expansions  2.7 Fourier Series Properties  2.8 Periodic Solutions of Differential Equations |
| 3 - 4 | **Elementary Boundary Value Problems** | **Chapter 3** |
| 3.1 Introduction  3.2 The One-Dimensional Diffusion Equation  3.3 The Wave Equation |
| **First Exam** | | |
| 6-7 | 3.4 The Potential Equation  3.6 Separation of Variables  3.7 Half-Range Expansions and Symmetries | **Chapter 3** |
| 8-9 | **Laplace Transforms** | **Chapter 6** |
| 6.1 Introduction  6.2 Definitions of the Laplace Transform  6.3 Mechanical Properties of Laplace Transforms  6.4 Elementary Transforms and Fourier Series Calculations  6.5 Elementary Applications to Differential Equations  6.6 Convolutions, Impulse Responses, and Weighting Patterns  6.7 Vector Differential Equations  6.8 Impedance Methods |
| **Second Exam** | | |
| 10-12 | **Fourier Transforms** | **Chapter 7** |
| 7.1 Introduction  7.2 Basic Fourier Transforms  7.3 Formal Properties of Fourier Transforms  7.8 An Introduction to Generalized Functions  7.9 Fourier Transforms, Differential Equations, and Circuits |
| 12-14 | **Discrete Variable Transforms** | **Chapter 8** |
| 8.1 Some Discrete Variable Models  8.2 Z-Transforms |