

الإطار التفصيلي لتنفيذ المقرر مادة ٤٠٦
Course Schedule for Math 406

١. معادلات تفاضلية جزئية من الدرجة الأولى

1. Partial Differential Equations of First Order

Title of Book: Partial Differential Equations of First Order and Their Applications to Physics.

Authors: Gustavo Lopez

Publisher: World Scientific, 1999.

ISBN: 981-02-3746-4

٢. معادلات تفاضلية جزئية من الدرجة الثانية

2. Partial Differential Equations of Second Order

Title of Book: Fundamentals of Differential Equations and Boundary Value Problems (Fourth Edition)

Authors: R. Nagle - E. Saff - A. Snider

Publisher: Addison-Wesley, 2004.

ISBN: 0-321-14571-2

| الأسبوع Week | رقم المحاضرة Lecture no. | الموضوع Topic | التمارين Exercises | ملاحظات ومواعيد هامة What is Due? |
|-----------------|-----------------------------|--|--|--------------------------------------|
| 1 | 1 | <ul style="list-style-type: none"> Introduction to PDE and its solutions Classification. (Not in Book) | | اشترى الكتاب Buy the Book |
| | 2 | Chapter 10 (book 2) <ul style="list-style-type: none"> A model for Wave Equation. (Not in Book) | | |
| | 3 | <ul style="list-style-type: none"> Continue previous | | |
| 2 | 4 | <ul style="list-style-type: none"> A model for Heat flow Equation. | | |
| | 5 | <ul style="list-style-type: none"> Continue previous | | |
| | 6 | 10.2 Method of Separation of Variables: <ul style="list-style-type: none"> Solutions of the Heat Equation. (Exm.1) | | |
| 3 | 7 | <ul style="list-style-type: none"> Solutions of the Wave Equation(Exm.2) | Ex.10.2: Odd (15 - 23), 24,25,26, Odd (27 - 33). | |
| | 8 | 10.5 The Heat Equation: <ul style="list-style-type: none"> Heat Equation with insulated ends (Exm. 1) | | |
| | 9 | <ul style="list-style-type: none"> Heat Equation with Non-Homogeneous B.C. (Exm. 2) | | |
| 4 | 10 | مناقشة التمارين السابقة Discussion on Previous Exercises | | |
| | 11 | <ul style="list-style-type: none"> Non-Homogeneous Heat Equation with Non-Homogeneous B.C. (Exm. 3) | Ex. 10.5: Odd (1-11) | |
| | 12 | <ul style="list-style-type: none"> Existence and Uniqueness of Solutions. (Th. 6 -without proof-, Th. 7 -with proof-) | | |

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|----|----|---|--|--|
| 5 | 13 | موعد عرض ومناقشة مشروع "تعليمي وعلمي" | | |
| | 14 | موعد عرض ومناقشة مشروع "تعليمي وعلمي" | | |
| | 15 | موعد عرض ومناقشة مشروع "تعليمي وعلمي" | | |
| 6 | 16 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | |
| | 17 | 10.6 The Wave Equation: • Non-Homogeneous Wave Equation with a time-dependent forcing term. (Exm. 1) | | |
| | 18 | • D'Alembert's Solution to the Wave Equation of an infinite string. (Exm. 2) | | |
| 7 | 19 | • D'Alembert's Solution to the Wave Equation of an infinite string. (Exm.3-4) • Existence and Uniqueness of Solutions. (Th. 8 -without proof-) | Ex. 10.6: Odd (1 - 10), Odd (13 - 17). | |
| | 20 | 10.7 Laplace's Equation: • Laplacian for polar coordinates. (Not in Book) • Laplacian for cylindrical coordinates. (Not in Book) | | |
| | 21 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | |
| 8 | 22 | • Types of Boundary Conditions. • Mixed Problem for a rectangle. (Exm.1) | | |
| | 23 | • Dirichlet Problem for a circular disk. (Exm. 2) • Existence and Uniqueness of Solutions. (Th. 9,10 -without proof-) | Ex. 10.7: 1,3,7 | |
| | 24 | Chapter 2 (book 1) 1. Classification: • Linear PDE (Def.) • Quasi-Linear PDE (Def.) • Non-Linear PDE (Def.) | Ex.1 (p. 24) & additional exercises (Sheet 1). | |
| 9 | 25 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | |
| | 26 | 2. Linear PDEFO: • Method of Solution (Exm. 1). | | |
| | 27 | • Characteristic Method. (Not in Book) | Ex.2 (p. 27) & additional exercises (Sheet 2). | |
| 10 | 28 | 3. Quasi-linear PDEFO: • Method of Solution (Exms. 2,3). | | |
| | 29 | • Continue previous | | |
| | 30 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | |

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|-------------------|----|--|--|---------------------------|
| 11 | 31 | <ul style="list-style-type: none"> Method of Solution of $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ (Sec.2, Ch.1 p. 7-9) | Ex.3 (p. 29) & additional exercises (Sheet 3). | |
| | 32 | <ul style="list-style-type: none"> Continue previous | | |
| | 33 | <p>Chapter 4 (book 1)</p> <p>1. Nonlinear PDEFO:</p> <ul style="list-style-type: none"> Method of Solution (Case a,b,c,d), (Exms. 2-5) | | موعد تسليم مشروع "بحثي" |
| 12 | 34 | موعد مناقشة مشروع "بحثي" | | |
| | 35 | موعد مناقشة مشروع "بحثي" | | |
| | 36 | موعد مناقشة مشروع "بحثي" | | |
| 13 | 37 | <ul style="list-style-type: none"> Continue previous | Exs. 2-6 (p. 70 - 75) | |
| | 38 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | |
| | 39 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | |
| 14 | 40 | <ul style="list-style-type: none"> Lagrange-Charpit Method (Exm. 6) | additional exercises (Sheet 4). | موعد تسليم مشروع "إضافتي" |
| | 41 | <ul style="list-style-type: none"> Continue previous | | موعد تسليم مشروع "إضافتي" |
| | 42 | مناقشة التمارين السابقة <i>Discussion on Previous Exercises</i> | | موعد تسليم مشروع "إضافتي" |
| FINAL EXAM | | | | |