المناهج الدراسية ومفرداتها المقترحة

عدد الوحدات	اسم التدريسي/ مكان العمل	اسم المادة	ت
الفصل الدراسي الأول / (12) وحدة			
3	أ.د. عباس يونس الياس/ جامعة تلعفر	التحليل العددي المتقدم Advance Numerical Analysis	1.
3	أ.د. هدى اسماعيل خالد/ جامعة تلعفر	الاحتمالية والاحصاء النيوتروسوفيك Neutrosophic Probability and Statistics	2.
2	أ.د. باسم عباس حسن/ جامعة الموصل	معالجة الاشارة الرقمية Digital Signal Processing	3.
2	أ.د. خليل خضر عبو/ جامعة تلعفر	ذكاء إصطناعي متقدم Advance Artificial Intelligence	4.
2	أ.م.د. ادريس محمد نوري/ جامعة الموصل	برمجة الحاسوب Computer Software	5.
0	د. اوس عباس يونس/ جامعة الموصل	لغة انكليزية English Language	6.

عدد الوحدات	اسم التدريسي	اسم المادة	ت
الفصل الدراسي الثاني / (12) وحدة			
3	أ.د. باسم عباس حسن/ جامعة الموصل	نظرية السيطرة Control Theory	1.
3	أ.د. عباس يونس الياس/ جامعة تلعفر	طرائق الامثلية العددية Numerical Optimization Methods	2.
2	أ.م.د. وليد محمد فتحي/ جامعة الموصل	طرائق حل المعادلات التفاضلية الجزئية Methods of Solving PDE's	3.
2	أ.د. خليل خضر عبو/ جامعة تلعفر	خوارزميات علم التشفير المتقدم Advanced Cryptography Algorithms	4.
2	أ.د. هدى اسماعيل خالد/ جامعة تلعفر	النظرية النيوتروسوفكية في معالجة الصور و تحليل الصور الطبية Neutrosophic Theory in Image Processing and Medical Image Analysis	5.
0	أ.م.د. ادريس محمد نوري/ جامعة الموصل	طرق تدريس اصول البحث العلمي The Teaching Methods of Origins Scientific Research	6.

المناهج الدراسية ومفرداتها المقترحة

المفردات المقترحة للمناهج الدراسية اعلاه:

1- **التحليل العددي المتقدم (Advance Numerical Analysis)**

Advance Numerical Analysis / Course one/ Credits: 3

Chapter One: Solution of Non-linear Equations
1.1.Bisection Method.
1.2.False position Method.
1.3.Secunt Method.
1.4.Newton Raphson Method.
1.4.1. Convergence of Newton-Raphson Method.
1.4.2. Order of Convergence of the Methods.
1.5.Fixed Point method.
1.5.1. Local Convergence for fixed point Iterations.
1.6. Aitken accelerating convergence.
1.7. Stephenson's Method.
1.8.Muller's Method.
1.9. Ramanujan Method.
1.10. Giraffe's Root-Squaring Method.
1.11. Lin-Bairstow's Method.
1.12.Newton Method for solving nonlinear system of equations.
1.13. fixed point Iterations Method for solving nonlinear system of equations.

Chapter two: Interpolation and Polynomial Approximation
2.1.Interpolation and Lagrange Polynomial.
2.2.Horner's Method for Polynomial Evaluation.
2.3. Hermite's Interpolation Formula.

Chapter Three : Numerical. Differentiation
3.1.Approximating the Derivative.
3.2.Numerical Differentiation Formulas.
3.2.1. Forward Differences Formula.
3.2.2. Backward Differences Formula.
3.2.3. Central Differences Formula.

Chapter Four: Numerical Integration
4.1.Intoduction to Quadrature.
4.2. Closed Newton-Cotes Quadrature Formula
4.2.1. Composite Numerical Integration

References

1- Numerical Analysis by Richard L. Burden and J. Douglas Faires, Wadsworth Group Brooks Cole ,(2001).

2- Numerical Methods Using MATLAB , by John. H. Mathews and Kurtis D. Fink, person Education , Inc. (2004)

المناهج الدراسية ومفرداتها المقترحة

2- الاحتمالية والاحصاء النيوتروسوفيك (Neutrosophic Probability and Statistics)

Neutrosophic Probability and Statistics / Course one/ Credits: 3

Chapter one: Introduction

Neutrosophic Probability and Statistics

Neutrosophic Quartiles

Neutrosophic Sample

Neutrosophic Numerical Measures

Chapter two : Neutrosophic Numbers

Classical Neutrosophic Numbers

Neutrosophic Random Numbers

Example with Neutrosophic Data

Indeterminacy related to the sample size

Chapter Three: Continuous Neutrosophic Distributions

Neutrosophic Binomial Distribution

Neutrosophic Multinomial Distribution

A Neutrosophic Normal Distribution

Neutrosophic Scatter Plot

Chapter Four : the Regression in the Neutrosophic Statistics

Neutrosophic Regression

Neutrosophic Least-Squares Lines

Neutrosophic Coefficient of Determination

Chapter Five : A Neutrosophic Hypothesis

The Neutrosophic Level of Significance

The Neutrosophic Confidence Interval

Large-Sample Neutrosophic Confidence Interval for the Population Proportion

Chapter Six : The Neutrosophic Central Limit Theorem

References

1. Florentin Smarandache, **Introduction to Neutrosophic Measure, Neutrosophic Integral, and Neutrosophic Probability**, Sitech-Education Publisher, Craiova – Columbus, 2013.

2. Florentin Smarandache**, Neutrosophy / Neutrosophic Probability, Set, and Logic**, Amer. Res. Press, Rehoboth, USA, 105 p., 1998;

3. David Nelson, **The Penguin Dictionary of Statistics**, Penguin Books, London, 2004.

4. Graham Upton & Ian Cook, **Oxford Dictionary of Statistics**, Oxford University Press Inc., New York, 2006.
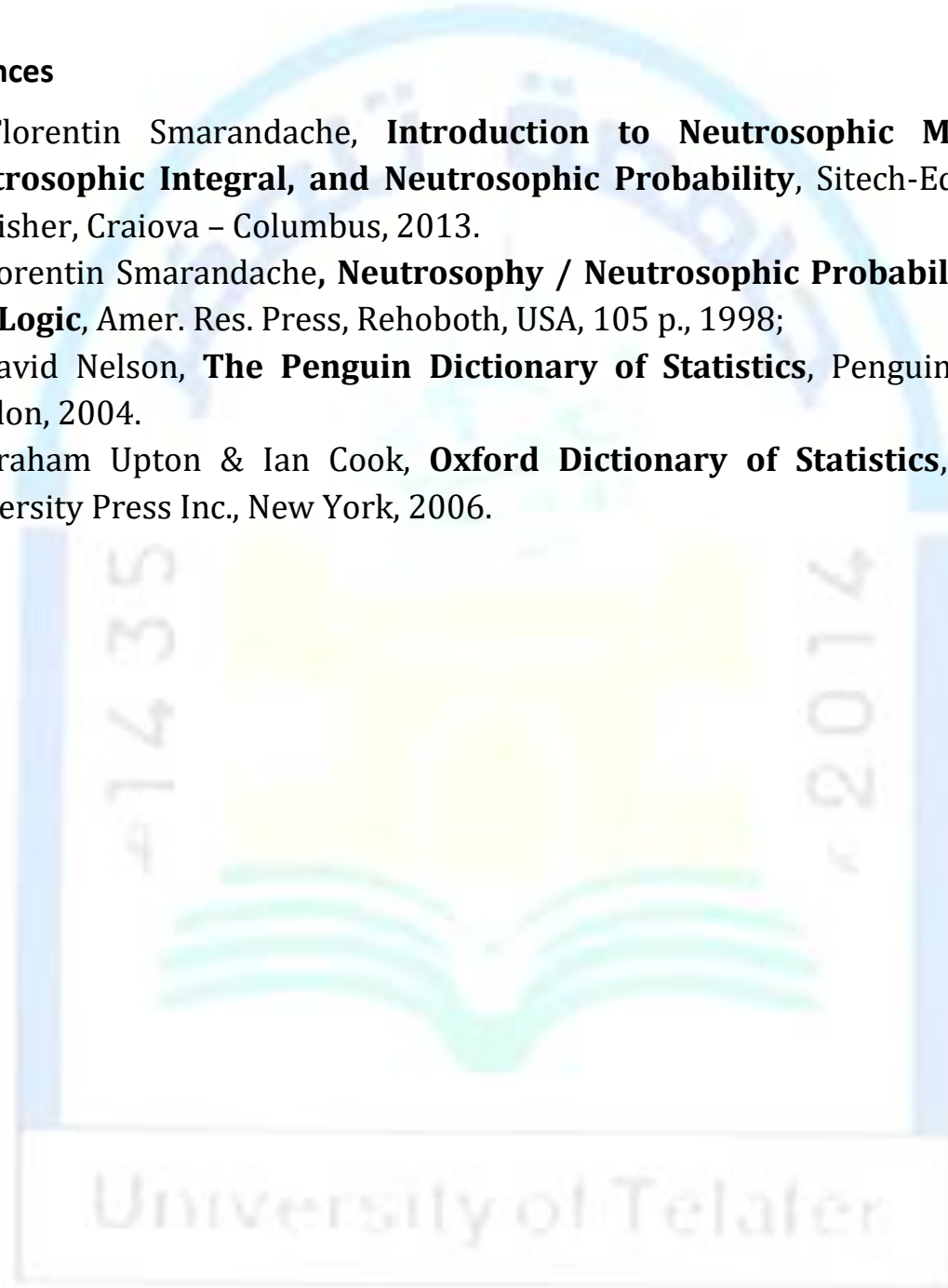
المناهج الدراسية ومفرداتها المقترحة

3- معالجة الاشارة الرقمية (Digital Signal Processing)

Digital Signal Processing / Course one/ Credits: 2

Chapter 1. Introduction

Chapter 2. Sinusoids

Chapter 3. Spectrum Representation

Chapter 4. Sampling and Aliasing
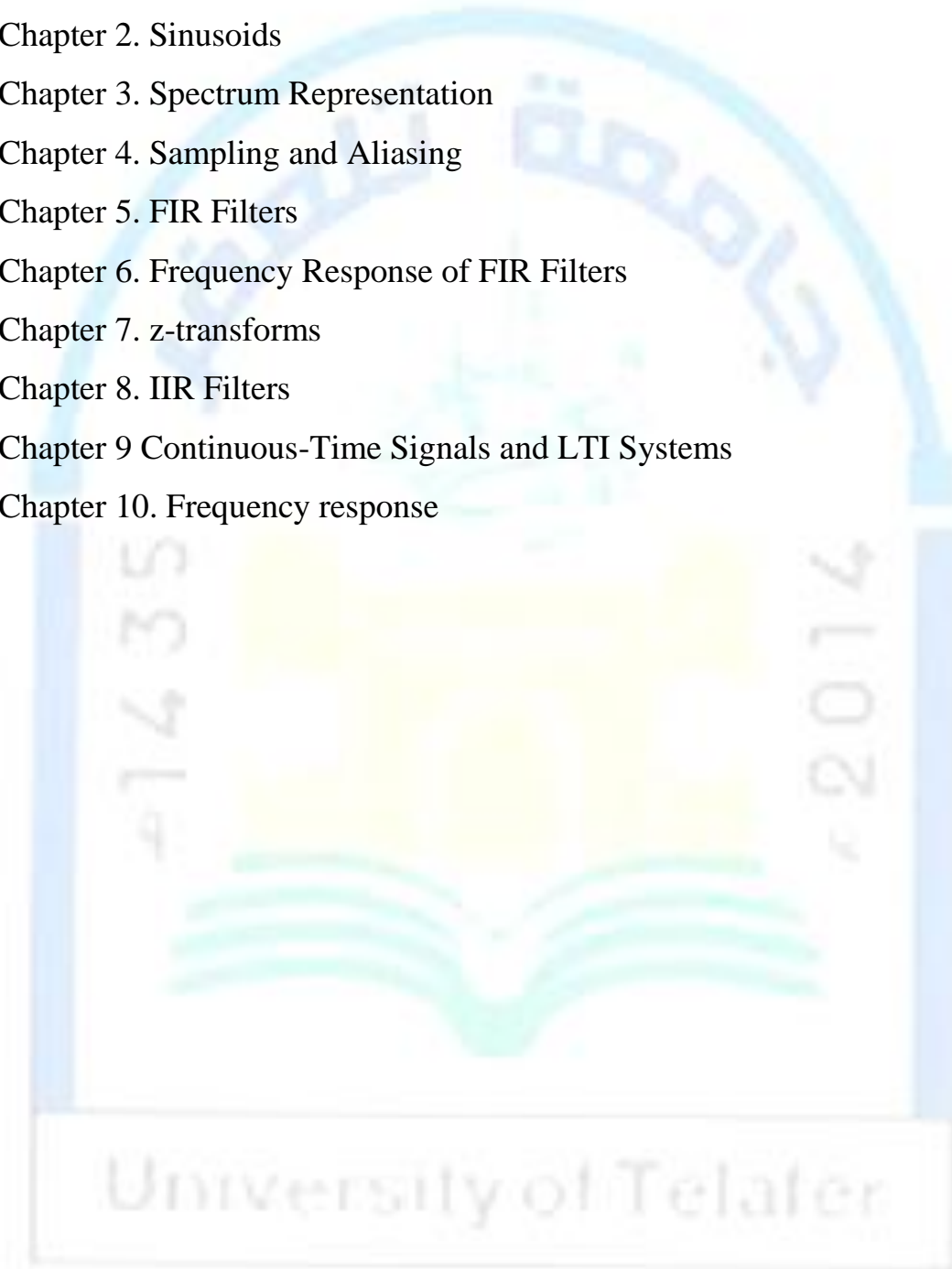
Chapter 5. FIR Filters

Chapter 6. Frequency Response of FIR Filters

Chapter 7. z-transforms

Chapter 8. IIR Filters

Chapter 9 Continuous-Time Signals and LTI Systems

Chapter 10. Frequency response

4- ذكاء اصطناعي متقدم (Advanced Artificial Intelligence)

Advanced Artificial Intelligence / Course one/ Credits: 2

1) **Intelligence Optimization.**
   Definitions, learning and reasoning, some principle of graph and trees, A.I application, search space, search space.
2) **Search strategies methods.**
   Blind search
   Hybrid Search Techniques.
   Heuristic Search Techniques.
   Knowledge Representation.
3) **Artificial Neural Network.**
4) **Clustering.**
5) **RBF Neural Network**
6) **Genetic Algorithms.**

References:

1. George F.L. , (2005) ,"Artificial Intelligence :Structures and Strategies for Complex Problem Solving", 5rd edition.
2. Michael N., (2002),"Artificial Intelligence : A Guide to Intelligent Systems", Second Edition.
3. S. sumathi & surekha p., (2010), "Computational Intelligence Paradigms : Theory and Applications using MATLAB", by Taylor and Francis Group, LLC.
4. Wolfgang Ertel ,(2011),"Introduction to Artificial Intelligence" ,Translated by Nathanael Black With illustrations by Florian Mast
5. Amit K. ,(2000),"Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain", CRC Press LLC.

المناهج الدراسية ومفرداتها المقترحة

5- برمجة الحاسوب (Computer Software)

Computer Software / Course one/ Credits: 2

1. **Introduction to Maple.**

2. **Basic Operations on Numbers, Expressions and Mathematical Functions.**

3. **Graphics.**

4. **Calculus.**

5. **Linear Algebra.**

6. **Differential Equations.**

7. **Complex Functions.**

8. **Special Functions and Orthogonal Polynomials.**

9. **Numerical Analysis and Scientific Computing.**

References:

1- Maple by Example, 3rd Ed., Martha L. Abell and James P. Braselton.
2- Differential equations with maple: an interactive approach, Jon H. Davis.
3- Many references from Internet.

المناهج الدراسية ومفرداتها المقترحة

6- اللغة الانكليزية (English Language)

English Language/ Course one/ Credits:0

1-Parts of speech

2-A Simple sentence structure

3-Present simple active

4-Past simple active

5-Present perfect-present continuous

6-Past perfect-past continuous

7-Translating different scientific texts

8-Reading different passages

9-Different tenses in English

The main book:

A Course in Basic Scientific English

J.R. Ewer and G. Latorre
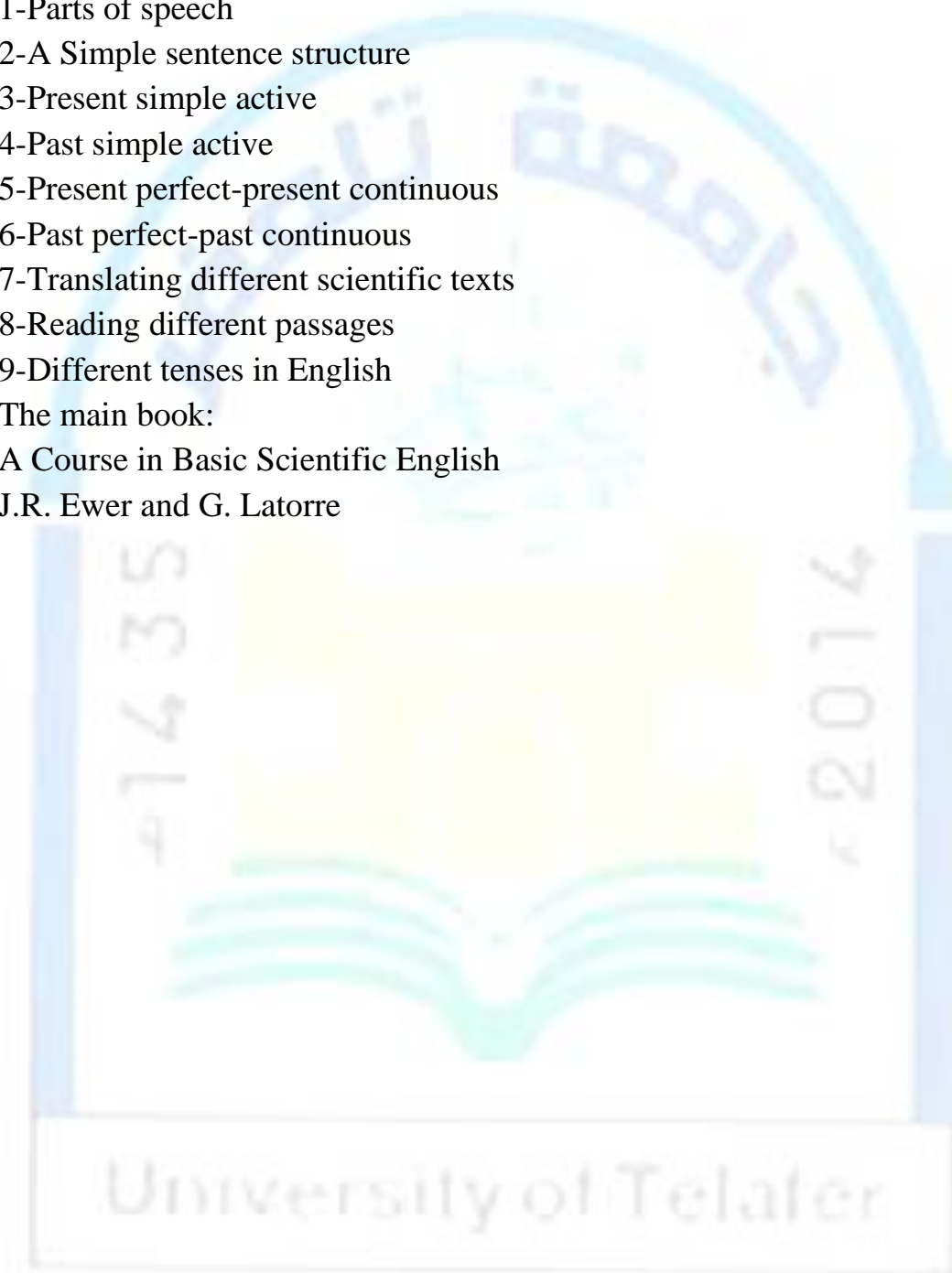
1- نظرية السيطرة (Control Theory)

Control Theory / Course Two / Credits: 3

Course content

Modeling and analysis of dynamic systems. Laplace transform. Transfer functions. Poles, zeros, gain. Time response, frequency response, Bode plot and bandwidth. Stability analysis. Feedback principle, closed systems. Controllability and observability. State space feedback design. Design in the frequency domain, Nyquist diagrams, phase and amplitude margin. PID controllers. Antiwindup. Digital control systems, zeta transform, stability analysis. Modeling and simulation of control systems in Matlab.

المناهج الدراسية ومفرداتها المقترحة

2- طرائق الامثلية العددية (Numerical Optimization Methods)

Numerical Optimization Methods / Course Two/ Credits: 3

Classical Optimization Techniques
1.1 Introduction
1.2 Single-Variable Optimization
1.3 Multivariable Optimization with No Constraints
1.3.1 Semidefinite Case
1.3.2 Saddle Point
Nonlinear Programming I:One-Dimensional Minimization Methods
2.1 Introduction
2.2 Unimodal Function
ELIMINATION METHODS
2.3 Fibonacci Method
2.4 Golden Section Method
2.5 Comparison of Elimination Methods
INTERPOLATION METHODS
2.6 Quadratic Interpolation Method
2.7 Cubic Interpolation Method
Nonlinear Programming II: Unconstrained Optimization Techniques
3.1 Introduction
3.1.1 Classification of Unconstrained Minimization Methods
3.1.2 General Approach
3.1.3 Rate of Convergence
INDIRECT SEARCH (DESCENT) METHODS
3.2 Gradient of a Function
3.2.1 Evaluation of the Gradient
3.3 Steepest Descent (Cauchy) Method
3.4 Conjugate Gradient Method
3.4.1 Development of the Fletcher–Reeves Method
3.4.2 Fletcher–Reeves Method
3.5 Newton's Method
3.6 Marquardt Method
3.7 Quasi-Newton Methods
3.7.1 Rank 1 Updates
3.7.2 Rank 2 Updates
3.8 Davidon–Fletcher–Powell Method
3.9 Broyden–Fletcher–Goldfarb–Shanno Method

المناهج الدراسية ومفرداتها المقترحة

3- طرائق حل المعادلات التفاضلية الجزئية (Methods of Solving PDE's)

Methods of Solving PDE's / Course Two/ Credits: 2

10.   Partial Differential Equations
1.1 Basic Concepts and Definitions.
1.2 First Order Equations.
1.3 Higher Order Equations.
1.4 Classifications of Second Order PDE.
1.5 Method of Solution (Direct Integration, Separation of Variables).

11.   Fourier Series and Fourier Integrals
2.1 Fourier Coefficients.
2.2 Sine, Cosine and Comples Series.
2.3 Fourier Integrals and Transforms.
2.4 Solving PDE by using Fourier Transforms.
2.5 Applications.

12.   Boundary-Value Problems in Rectangular Coordinates
3.1 Laplace Equation.
3.2 The Wave Equation.
3.3 The Diffusion Equation.
3.4 Transforms Methods.

References:
4- Partial Differential Equations for Engineers and Scientists, Problem Book 1, T. Hillen and I.E. Leonard and H. van Roessel, 2010.
5- Partial Differential Equations Ma 3132 Lecture Notes, Beny Neta, California, 2002.
6- Advanced Engineering Mathematics, Ladis D. Kovack, Addison-Wesley publishing C., 1982.
7- Applied Differential Equations, Murry R. Spiegel Prentie Hall Inc., 1981.
8- Mathematics for engineers and scientists, Vol. 2, John Willy & sons, 1979.
9- Differential Equations, Frank Ayres, JR, 1952.

المناهج الدراسية ومفرداتها المقترحة

4- خوارزميات علم التشفير المتقدم (Advanced Cryptography Algorithms)

Advanced Cryptography Algorithms / Course Two/ Credits:2

Chapter One: Classical Cryptography and Overview
- Classical cryptosystems and their cryptanalysis
- Model of secure communication
- Security services
- Overview of attacks
- X.800 Security Architecture for Open System Interconnection (OSI)
- Societal and ethical issues

Chapter Two: Private Key Cryptography
- Data Encryption Standard (DES)
- Advanced Encryption Standard (AES):
- Variations on DES
- RC4, RC5

Chapter Three: Public Key Cryptography
- Introduction to Number Theory: GCD, Euclidean Algorithm, Extended Euclidean Algorithm, Chinese Remainder Theorem, Fermat's and Euler's Theorem
- RSA (Rivest-Shamir-Adelman)
- ECC (Elliptic Curve Cryptography)
- Key management: Diffie-Hellman Key Exchange protocol
- Pseudo-random number generation
- Hash functions
- Message Authentication
- Digital Signatures and authentication protocols

Chapter Four: Network Security
- Authentication: Kerberos, X.509 Authentication Service
- Email: PGP, S/MIME
- IP Security (IPSec)
- Web Security

Chapter Five: System Security
- Intrusion detection
- Password management
- Viruses
- Firewalls
- Secure software development

المناهج الدراسية ومفرداتها المقترحة

5- النظرية النيوتروسوفكية في معالجة الصور وتحليل الصور الطبية

Neutrosophic Theory in Image processing and medical Image Analysis/ Course Two/ Credits:2
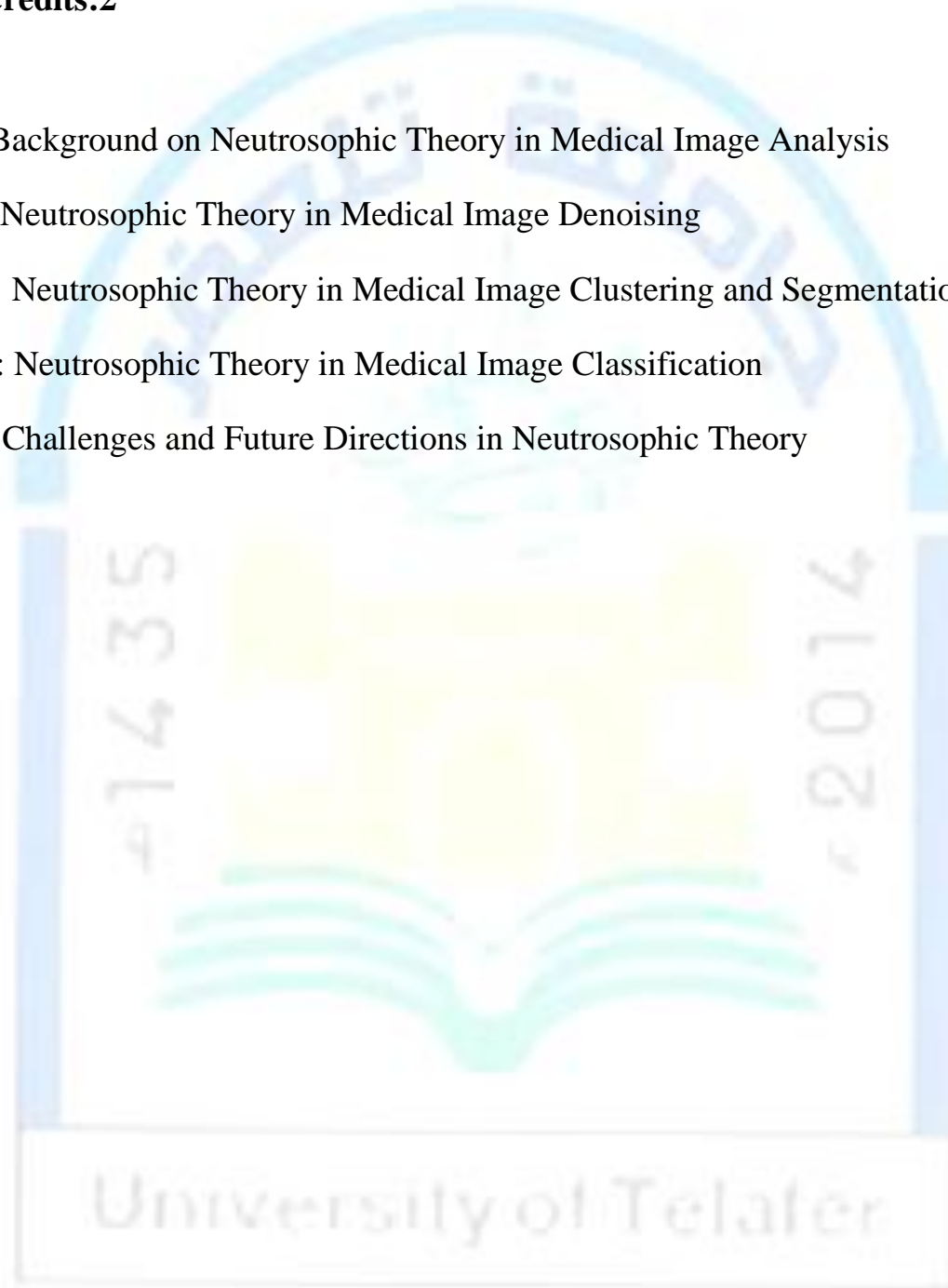
Part I: Background on Neutrosophic Theory in Medical Image Analysis

Part II: Neutrosophic Theory in Medical Image Denoising

Part III: Neutrosophic Theory in Medical Image Clustering and Segmentation

Part IV: Neutrosophic Theory in Medical Image Classification

Part V: Challenges and Future Directions in Neutrosophic Theory

المناهج الدراسية ومفرداتها المقترحة

6- طرائق تدريس اصول البحث (**Methods of Teaching and Scientific Research**)

Methods of Teaching and Scientific Research

- Master Journal List - Clarivate Analytics
- SJR : Scientific Journal Rankings
- Scopus
- ResearchGate

References:

[1] https://www.scopus.com/

[2] mjl.clarivate.com/

[3] https://www.researchgate.net/