(PATTERN RECOGNITION)

Programme(s) on which the course is given　　Information Technology

Major or Minor element of programs　Major

Department offering the program　Information Technology

Department offering the course　Information Technology

Academic year / Level　　3rd year / 2nd Semester

A- Basic Information

Title	Pattern Recognition		Code	IT311	
Credit Hours	**Lecture** 3	**Tutorial** 1		**Practical**	2
	Total			**6**	

B- Professional Information

1 – Overall aims of course

- Understand the fundamentals of pattern recognition
- Understand the neural network algorithms
- Understand the classification and discriminate functions

2 – Intended learning outcomes of course (ILOs)

2-a- Knowledge and understanding:

a1-	Students will demonstrate knowledge and understanding of the essential core content of the discipline of Information technology, and demonstrate the ability to apply content-knowledge in the specification, analysis, design, implementation and testing of a software solution.
a2-	Students will demonstrate the ability to effectively communicate Information technology concepts both orally and in writing or as members of a project team, Students will demonstrate an acceptance of the ethical standards.
a8-	Understanding the principles of multimedia, signal and image processing and applications.

2-b- Intellectual skills

b1-	Analyze the methods of parameters estimation, the method of hypothesis testing, the methods used for data analysis to any statistical data, Solve the problem of analyzing and interpreting random variables.
b2-	Analyze different information technology problems and be able to

	implement algorithms to solve the problems.
b6-	will demonstrate creative thinking in preprocessing the data, analysis, generalize and summarize the data, analyze and contrast different mining association rules, able to mine complex types of data, data and information retrieval.
b9-	Students will exhibit the ability to learn and understand new technologies as they are developed.

2-c- Professional and practical skills

c1-	Students will demonstrate the ability to effectively manage Information technology problems and solutions and apply content-knowledge in the specification, analysis, design, implementation and testing of a software solution.
c3-	Analyze and interpret statistical data, Apply methods of parameter estimation and implement method o hypothesis testing, design and implement practical programs to estimate statistical parameters and apply different analysis techniques.
c4-	Provide effective technology support for audio/visual, computer, multimedia, voice, video, graphics, animation and web based applications and services to all areas.
c7-	Grasp key technical issues of current digital and wireless communications systems, Specify and design key parts of a communication system operating within an existing standard.
c8-	Programming Intelligence Searching techniques, Design and building Intelligent Agent applications, Analysis Neural, fuzzy and Genetic systems as a new intelligent paradigms.

2-d- General and transferable skills

d1-	Explain the IT problems and their solutions, and effective skills in management of IT projects. Demonstrate a range of basic skills required to work effectively in communications and IT industry, understand the need for continuing professional development and lifelong learning in order to cope with rapidly changing communications technology
d2-	Provide effective technology explanations for audio/visual, computer, multimedia, voice, video, and web based applications and services to all areas of the college,
d3-	Explain the use of mathematical modeling to predict the behavior of a physical system, develop an analytical approach to understanding complex systems
d4-	Describe how computer vision is implemented, Explain the characteristics of signal and image processing algorithms, computer animation, the ability to apply algorithms and approaches of pattern recognition for real application
d8-	Describe and explain how parameters of statistical data are calculated and tested, the methods of statistical data analysis, solving problems associated with statistical data.
d9-	Group working to apply data mining techniques to simple and complex problems, Use of technological tool to preprocess and prepare data for knowledge discovery, Use of technological tool to clean, integrate, transform,

	and reduce data, Use of technological tool to design graphical user interfaces based on a data mining query language
d10	Demonstrate and explain concepts of Artificial Intelligence, analysis of searching techniques, basic knowledge of genetic algorithms and neural networks basic idea.

3- Content

Topic	No of hours	Lecture	Tutorial/ Practical
1 Introduction to Pattern Recognition • Introduction. • Components of a Pattern Recognition Systems. • Features and Patterns. • Classifiers. • A realistic Pattern Recognition System. • Pattern Recognition Approaches.	12	6	6
2 Recognition and Learning by a Computer • Recognition by a Computer. • Representation and Transformation in Recognition. • Learning by a Computer. • Representation and Transformation in Learning. • Example of Recognition and Learning.	12	6	6
3 Probability and Statistics • Introduction. • Conditional Probability. • Random Variables. • Probability Densities. • Bayesian Decision Theory.	12	6	6
4 Parameters Estimation and Dimensionality Computation • Introduction. • Supervised Learning. • Maximum Likelihood Estimation. • Log Likelihood Estimation. • Hidden Markov Model. • Density Estimation.	12	6	6

Topic	No of hours	Lecture	Tutorial/ Practical
5 Classification and Discriminate Functions • Introduction. • Nearest Neighbor Rule. • K- Nearest Neighbor Rule. • Linear Discriminate Functions.	12	6	6
6 Unsupervised Learning and Clustering • Introduction. • Unsupervised Classification. • Data Description and Clustering. • K-means Algorithm.	12	6	6
7 Neural Networks • Introduction. • Algorithms • Example	12	6	6
Total sum	**84**	**42**	**42**

4– Teaching and learning methods

4.1   Information collection
4.2   Research assignment
4.3   Lecture

4.4		Class activities
4.5		Practical training / lab
4.6		Case study

5- Student assessment methods

5-a- Methods

5.a.1	Class test (1) ……. *to assess* …Understanding...
5.a.2	Class test (2) ……. *to assess* …Understanding...
5.a.3	Reports ……… …. *to assess* Problem Solving
5.a.4	Mid term exam … *to assess* gains of completed topics….

5-b- Assessment schedule

Assessment 1	5th week.	
Assessment 2	8th week.	Mid term Exams
Assessment 3	10th weeks	
Assessment 4	16th weeks (Oral and Practical Exams).	
Assessment 5	17th-18th weeks (final written exam).	

5-c- Weighting of assessments

Semester work	10%
Mid-term examination	10%
Oral and Practical examination.	20%
Final-term examination	60%
Total	100%

6- List of references

6-a- Course notes

There are lectures notes prepared in the form of a book authorized by the department

6-b- Essential books (text books)

[1] Theodoridis Sergios , Pattern Recognition

6-c- Recommended books

[1] Tzanakou Evangella, Supervised and Unsupervised Pattern Recognition, 1999

6-d- Periodicals, Web sites, … etc

It is recommended for students to search for similar courses in other universities.

7- Facilities required for teaching and learning

- Multimedia laboratory.
- Datashow, screen, and laptop computer.

Course coordinator:

Prof. Moawad El Deswkey

Head of Department:

Prof. Mohiy M. Hadhoud

Date: