



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

1	Course title	Pattern Recognition
2	Course number	1901452
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	Computer Graphics (1901359)
5	Program title	B.Sc. in Computer Science
6	Program code	01
7	Awarding institution	The University of Jordan
8	Faculty	King Abdullah II School for Information Technology
9	Department	Computer Science
10	Level of course	4 th year
11	Year of study and semester (s)	Second Semester (Spring) 2014/2015
12	Final Qualification	
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	1/2015
16	Required/ Elective	Elective

16. Course Coordinator:

Computer Science Department, Office no. 113, 1st floor
 Phone: +9625355000. Extension: 22578
 Email: hazemh@ju.edu.jo
 Office hours: 12-1 (Sun, Tue, Thu), 8-9:30 (Mon)

17. Other instructors:

None

18. Course Description:

This course covers pattern recognition essentials with topics that are suitable for undergraduate levels in computer science and most engineering specialties. It covers wide understanding of different related topics, i.e., pattern recognition systems, preprocessing and feature extraction, theories of supervised and unsupervised learning, object classification and recognition, artificial neural networks, and other topics as well.

19. Course aims and outcomes:**A- Aims:**

The main goal of this course is to teach students the foundations of pattern recognition, i.e. how patterns are recognized on the computer. The course aims to provide you with sufficient background in the theoretical concepts behind stages of pattern recognition systems, and to implement these systems using computer applications.

Objectives include enabling students to:

1. Learn about pattern recognition and its broad applications in various aspects of our day to day life.
2. Understand the algorithms used in various phases of pattern recognition systems, including data acquisition, pre-processing, segmentation, feature extraction and classification.
3. Understand the techniques used recognize patterns, such as statistical approaches, data clustering, neural networks, etc.
4. Knowledge of various applications of pattern recognition in real life, this includes reading research papers and preparing presentations by the students.
5. Writing pattern recognition programs and implement the various techniques discussed throughout the course.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

A- Knowledge and Understanding: Students should ...

- A1) Learn the concepts of pattern recognition, including its definition, design cycle, applications, algorithms.
- A2) Know the important principles of neural networks.
- A3) Understand the basic concepts involved in structural and statistical pattern recognition

B- Intellectual skills: with the ability to ...

- B1) Compare and analyze algorithms used in pattern recognition.
- B2) Apply mathematical tools to algorithm design.
- B3) Analytically recognize pattern recognition systems

C- Subject specific skills – with ability to ...

- C1) Understand various techniques used in object detection and classification.
- C2) Understand various techniques used in pattern recognition systems, including supervised and unsupervised learning.
- C3) Translate abstract ideas into practice.

D- Transferable skills – with ability to

- D1) Possess good programming style.
- D2) Possess the ability to read research papers.
- D3) Possess the ability for oral presentations.

20. Topic Outline and Schedule (T: Teaching, L: Learning, A: Assessment):

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods
Introduction: definition, systems, and applications	1+2	Dr Hazem Hiary	A1, A3	T: Lecture and presentation L: Reading lecture notes A: in class questions
Neural networks: history, definition, structure, supervised learning	3	Dr Hazem Hiary	A1, A2, A3	T: Lecture and presentation L: Reading lecture notes A: in class questions
Neural networks: structure: weights and activation functions, examples, matrix operations	4	Dr Hazem Hiary	A2, B1, B3, C2	T: Lecture and presentation L: Reading lecture notes, examples A: in class questions
Neural networks: Hopfield network: structure, example, code. Neural networks training	4+5	Dr Hazem Hiary	A2, B1, B2, C2, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Neural networks: feedforward backpropagation: structure, example, code. Neural networks pruning: definition and algorithms	6	Dr Hazem Hiary	A2, B2, C2, C3, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Midterm exam	7	Dr Hazem Hiary		A: Written exam - Weeks 1- 6
Hough transform: definition, algorithms, code	8	Dr Hazem Hiary	A1, B1, C1, C2, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Object recognition: detection of objects, with examples and code	9	Dr Hazem Hiary	A2, B1, B3, C1, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Data clustering: definition, unsupervised learning, algorithms, examples and code	10	Dr Hazem Hiary	A1, B1, C2, C3, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Classification: definition and algorithms, k-nearest neighbor algorithm with examples and code	11	Dr Hazem Hiary	A1, B2, B3, C2, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Template matching: definition, algorithms, with examples and code	12	Dr Hazem Hiary	A1, B2, C2, C3, D1	T: Lecture and presentation L: Reading lecture notes, examples, code A: in class questions
Presentations	13-14	Dr Hazem Hiary	A1, D1, D2, D3	T: Presentations by students L: Presentation A: in class oral presentations
Review	15	Dr Hazem Hiary		T: Summary and Review L: Demo A: Sample of exams
Final Exam	16	Dr Hazem Hiary		Written exam - Weeks 1 - 15

21. Teaching Methods and Assignments:

Teaching (T) Strategies: The class contact is 3 hours per week. The course will be delivered using different means like lectures, presentations, demonstration examples, and discussions.

Learning (L) Methods: Students attend classes, ask questions and participate in discussions, do the homework, present and demo their work. Students will use the lab to implement the practical parts. Students will access the e-learning platform for more instructions and supported learning materials.

Assessment (A) Methods: There will be several assessment methods of evaluating the performance of the students such as attending and class participation, grading the quizzes; conducting the Midterm and the Final Exams.

22. Evaluation Methods and Course Requirements:

Mid-Term Exam	30%
Presentation	20%
Final Exam	50%

23. Course Policies:

Please follow The University of Jordan regulations regarding the following policies, more information is at www.ju.edu.jo

A- Attendance policies

B- Absences from exams and handing in assignments on time

C- Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, misbehavior

E- Grading policy

F- Available university services that support achievement in the course

24. Required equipment:

A computer so that students can practice theoretical material and programming using MATLAB, C#, C++

25. References:

- Pattern Classification, Duda, Hart, and Strok, Wiley, latest edition.
- Pattern recognition, Theodoridis, Sergios, Koutroumbas, Konstantinos, Elsevier, latest edition.
- Pattern Recognition and Machine Learning, Bishop, Springer, 2006.
- Introduction to Neural Networks for C#, , Heaton, Jeff, Heaton research, 2nd edition, 2008.

Recommended materials, and media:

- Pattern recognition video lectures:
 - <http://videlectures.net/Top/Computer Science/Machine Learning/Pattern Recognition/>
 - https://www.youtube.com/results?search_query=pattern+recognition

26. Additional information:

None

Name of Course Coordinator: -----Signature: ----- Date: -----

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- -Signature: -----

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File