



Course Specification

Course Name: Machine Learning

Course Code: CS467

I. Basic Course Information

Major or minor element of program: Major

Department offering the course: Computer Science Department

Academic level: 400 Level

Semester in which course is offered: First (fall) Semester

Course pre-requisite(s): MA214 Mathematics - 3

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	0.0	0.0	4.0

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: September 2014

II. Overall Aims of Course

Introducing the field of Machine learning, its models and applications and how to design and develop algorithms for real life applications.

III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
K1,K2,K16	I12,I16,I18	P5,P17	G1,G2,G6



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IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Define essential facts, concepts, principles, and theories for Machine Learning, computing and software applications.
- K.2 Recognize and explain essential facts, concepts, principals, and theories related to Machine Learning and software applications
- K.3 Recognize different algorithms that are suitable for real life applications.

b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Distinguish Machine Learning concepts and Decision Support approaches to solve problems in scientific and systematically way.
- I.2 Apply appropriate approach to achieve partial or approximate solution.
- I.3 Design and develop algorithms that are suitable for real life applications.

c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Apply the principles of machine learning using appropriate techniques, tools, and languages.
- P.2 Apply the principles of machine learning techniques to various types of data.

d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Work as a part of a team to produce reports.
- G.2 Work as a part of a team to find a solution for practical problems and projects.
- G.3 Write structural reports.
- G.4 Apply specific task in certain period of time “training problems in labs.

V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Introduction	1	K1	I1	P1	
2-	Learning by Risk Minimization	1	K1	I1,I2,I3	P1	G4
3-	Kernels and Linear Classifiers	1	K1			G2,G4
4-	Support Vector Classification Learning	2	K1	I1,I2,I3	P1,P2	G2,G4
5-	Adaptive Margin Machines	1	K1,K2			G2,G4
6-	The Bayesian Framework	1	K1,K2			G1,G2,G4
7-	Gaussian Processes	2	K1,K2	I1,I2,I3	P1,P2	G2,G4
8-	The Relevance Vector Machine	1	All			All
9-	Bayes Point Machines	1	All	I1,I2,I3	P1,P2	G1,G2,G3
10-	Fisher Discriminants & Learning Theory	2	All	I1,I2,I3	P1,P2	All
	Net Teaching Weeks	13				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	Introduction	2.5	2.5	
2	Learning by Risk Minimization	4	2.5	1.5
3	Kernels and Linear Classifiers	4	2.5	1.5
4	Support Vector Classification Learning I	4	2.5	1.5
5	Support Vector Classification Learning II	4	2.5	1.5
6	Adaptive Margin Machines	4	2.5	1.5
7	Midterm Exam			
8	The Bayesian Framework	4	2.5	1.5
9	Gaussian Processes I	4	2.5	1.5
10	Gaussian Processes II	4	2.5	1.5
11	The Relevance Vector Machine	4	2.5	1.5
12	Bayes Point Machines	4	2.5	1.5
13	Fisher Discriminants	4	2.5	1.5
14	Learning Theory	4	2.5	1.5
15	Final Exam			
Total Teaching Hours		51	33	18

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars		K1,K2,K3	I1,I2		
Tutorials					
Computer lab Sessions					
Practical lab Work				P1,P2	G2,G4
Reading Materials					
Web-site Searches					G3,G1
Research & Reporting					G3,G1
Problem Solving / Problem-based Learning			I1,I2,I3		G1,G3
Projects					G2,G4
Independent Work					
Group Work			I1,I2,I3		G1,G2
Case Studies					
Presentations					
Simulation Analysis					
Others (Specify):					



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam		All	I1,I2			10%	7
Final Exam		All	I1,I2			60%	15
Quizzes							
Course Work					G4		
Report Writing					G1,G3		
Case Study Analysis							
Oral Presentations							
Practical				P1,P2		15%	
Group Project			I1,I2,I3	P1,P2	G2	15%	
Individual Project							
Others (Specify):							

IX. List of References

Essential Text Books	<ul style="list-style-type: none">Ralf Herb Rich. Learning Kernel Classifiers: Theory and Algorithms. MIT Press
Course notes	<ul style="list-style-type: none">Course notes provided by the DR
Recommended books	<ul style="list-style-type: none">None
Periodicals, Web sites, etc ...	<ul style="list-style-type: none">None

X. Facilities required for teaching and learning

List the facilities required <ul style="list-style-type: none">Lecture HallLabsMatlab Software
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Course coordinator: Prof. Amr Badr

Head of Department: Prof. Abeer El Korany

Date: September 2014