Office of the Registrar
FORM 40 REV. 11/09

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

`Print Form`

EFD 24-11
(201230)

DEPARTMENT School of Electrical and Computer Engineering (EFD 24-11)   EFFECTIVE SESSION Summer 2012

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

[X]	1.	New course with supporting documents
[ ]	2.	Add existing course offered at another campus
[ ]	3.	Expiration of a course
[ ]	4.	Change in course number
[ ]	5.	Change in course title
[ ]	6.	Change in course credit/type

[ ]	7.	Change in course attributes (department head signature only)
[ ]	8.	Change in instructional hours
[ ]	9.	Change in course description
[ ]	10.	Change in course requisites
[ ]	11.	Change in semesters offered (department head signature only)
[ ]	12.	Transfer from one department to another

PROPOSED:

Subject Abbreviation ECE

Course Number 30010

Long Title Introduction to Machine Learning and Pattern Recognition

Short Title Intro to Mach Learn & Pat Rec

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

EXISTING:

Subject Abbreviation

Course Number

TERMS OFFERED
Check All That Apply:

[X] Summer   [ ] Fall   [ ] Spring

CAMPUS(ES) INVOLVED

[ ] Calumet	[ ] N. Central
[ ] Cont Ed	[ ] Tech Statewide
[ ] Ft. Wayne	[X] W. Lafayette
[ ] Indianapolis	

CREDIT TYPE

1. Fixed Credit: Cr. Hrs. [3]
2. Variable Credit Range:
   Minimum Cr. Hrs
   (Check One)   To [ ]   Or [ ]
   Maximum Cr. Hrs.
3. Equivalent Credit: Yes [ ]   No [ ]

1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
   Maximum Repeatable Credit:
4. Credit by Examination
5. Special Fees

COURSE ATTRIBUTES: Check All That Apply

[ ]	6. Registration Approval Type	Department [ ] Instructor [X]
[ ]	7. Variable Title	
[ ]	8. Honors	
[ ]	9. Full Time Privilege	
[X]	10. Off Campus Experience	

Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	60	5	8	100
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
See attached.

*COURSE LEARNING OUTCOMES:
See attached.

Calumet Department Head	Date	Calumet School Dean	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date
North Central Department Head	Date	North Central Chancellor	Date
West Lafayette Department Head	10/5/11	West Lafayette College/School Dean	1/19/12

West Lafayette Registrar   1/25/12

OFFICE OF THE REGISTRAR

LD
1/25/12

Form 40 attachment

School of Electrical and Computer Engineering (EFD 24-11)

Description: Intelligent information processing, search and retrieval, classification, recognition, prediction and optimization with machine learning and pattern recognition algorithms such as neural networks, support vector machines, decision trees and data mining methods, current models and architectures, implementation topics especially in software, applications in areas such as information processing, search and retrieval of internet data, forecasting (prediction), classification, signal/image processing, pattern recognition, optimization, simulation, system identification, communications, control, management and finance. Topics covered will also be illustrated with the software package MATLAB and related toolboxes.

Prerequisite: MA 26100 or MA 26500

Restrictions: none

Learning Outcomes:

i. an ability to apply knowledge of mathematics, science, and engineering . [1; a]
ii. an ability to design and conduct experiments, as well as to analyze and interpret data . [4; b]
iii. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. [4; c]
iv. an ability to function on multi-disciplinary teams . [3; d]
v. an ability to identify, formulate, and solve engineering problems . [3; e]
vi. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice . [3; f]
vii. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context . [7; h]

TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Electrical and Computer Engineering

RE: New Undergraduate Course: ECE 30010, Introduction to Machine Learning and
Pattern Recognition

The faculty of the School of Electrical and Computer Engineering has approved the following
new course. This action is now submitted to the Engineering Faculty with a recommendation for
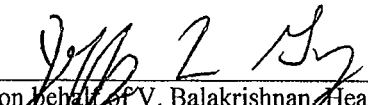approval.

ECE   30010   Introduction to Machine Learning and Pattern Recognition
Sem. Maymester, Lecture 3, Cr. 3.

Prerequisites: MA 26100 or MA 26500

Restrictions: none

Description: Intelligent information processing, search and retrieval, classification,
recognition, prediction and optimization with machine learning and pattern recognition
algorithms such as neural networks, support vector machines, decision trees and data
mining methods, current models and architectures, implementation topics especially in
software, applications in areas such as information processing, search and retrieval of
internet data, forecasting (prediction), classification, signal/image processing, pattern
recognition, optimization, simulation, system identification, communications, control,
management and finance. Topics covered will also be illustrated with the software
package MATLAB and related toolboxes.

Reason: This course has been offered experimentally in Maymester 2008 (5 students), Maymester 2009
(12 students), and Maymester 2010 (21 students) as a Study Abroad opportunity in Turkey and is being
offered as an experimental ECE 39595 course Maymester 2011. This course serves as an EE Elective and
has been developed to help encourage ECE students to participate in an international experience.

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on behalf of V. Balakrishnan, Head
School of Electrical and Computer Engineering

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes _____ #6 _____

Date _____ 10/31/2011 _____

Chairman, ECC _____ R. Cipra _____

ECE 30010 - Introduction to Machine Learning and Pattern Recognition

Lecture Hours: 3.0 Credits: 3.0

This is a <u>Special Content</u> course. No more than 6 credits of <u>Special Content</u> type courses may apply towards the ECE Requirements of the BSEE. Excess hours can be used for Unrestricted Electives.

Requisites:
MA 26100 or MA 26500

Requisites by Topic:
Calculus and introductory linear algebra (Math 26100 and/or 26500 or equivalents with permission of the instructor)

Catalog Description:
Intelligent information processing, search and retrieval, classification, recognition, prediction and optimization with machine learning and pattern recognition algorithms such as neural networks, support vector machines, decision trees and data mining methods, current models and architectures, implementation topics especially in software, applications in areas such as information processing, search and retrieval of internet data, forecasting (prediction), classification, signal/image processing, pattern recognition, optimization, simulation, system identification, communications, control, management and finance. Topics covered will also be illustrated with the software package MATLAB and related toolboxes.

Required Text(s):

1. *Machine Learning, An Algorithmic Perspective*, Stephen Marshall, Chapman & Hall / CRC Press, 2009, ISBN No. 978-1-4200-6718-7.

Recommended Text(s):

1. *Data Mining: Practical Machine Learning Tools and Techniques,*, 2nd Edition, Ian H. Witten and Eibe Frank, Morgan Kaufmann Publishers, 2005, ISBN No. 0-12-088407-0.
2. *Unpublished course notes by the instructor, Okan Ersoy.*

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

i.   an ability to apply knowledge of mathematics, science, and engineering . [1; a]
ii.   an ability to design and conduct experiments, as well as to analyze and interpret data . [4; b]
iii. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. [4; c]

Supporting Documentation for EFD 24-11

iv.   an ability to function on multi-disciplinary teams . [3; d]
v.   an ability to identify, formulate, and solve engineering problems . [3; e]
vi.   an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice . [3; f]
vii.   the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context . [7; h]

Assessment Method for Course Outcomes: The students will be closely monitored through personal communication, homework, computer exercises, exams and final projects to make sure that the outcomes are achieved.

Lectures   Major Topics

Lectures	Major Topics
2	Machine learning and pattern recognition: introduction and examples
2	Input: concepts, representation and examples
4	Output: knowledge representation, decision trees and clusters
7	Algorithms: the basic methods with examples
4	Techniques to increase performance
5	Software implementations
3	Input and output transformations
6	Examples of real world applications
4	MATLAB: a software tool, associated toolboxes and examples of use
2	WEKA: another software tool and examples of use
3	Python: an open-source software platform with similarities to Matlab
2	Exams

Supporting Documentation for EFD 24-11

Engineering Design Content:
Establishment of Objectives and Criteria
Synthesis
Analysis
Construction
Testing

Engineering Design Consideration(s):
Economic
Environmental
Ethical
Health/Safety
Manufacturability
Social