

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech and Electrical and Electronics Engineering		
Course Title	MACHINE LEARNING AND DEEP LEARNING		
Course Code	EEPE34	No. of Credits	3
Course Code of Pre-requisite subject(s)	MAIR32		
Session	January- 2022	Section (if, applicable)	A & B
Name of Faculty	Dr. Sishaj P Simon	Department	Electrical and Electronics Engineering
Email	sishajpsimon@gmail.com	Telephone No.	0431-2503265
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Introductions to Machine Learning: Categories, Supervised learning (SL), Classification, Regression-error based learning, examples, LMS, Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Unsupervised Learning (USL), Application of USL for clustering-noise reduction-Dimensionality Reduction, Semi Supervised learning, Reinforced Learning –Genetic algorithm</p> <p>Classification and Clustering: k-means clustering, Binary Classification, Multi- Class, Classification Techniques, k-nearest neighbours, Support Vector Machines, Naïve Bayes Classifier-Gaussian based Naïve Bayes, Decision Trees-Binary and Bushy tress-tree building process- Regression trees-stopping criteria & pruning</p> <p>Introduction to neural network: Biological Neural networks- Perceptron Learning Algorithm, Linear Separability-Feedforward Networks: Multilayer Perceptron, Gradient Descent; Training Neural Network-validation and testing, Backpropagation neural networks, Empirical Risk Minimization, regularization, autoencoders, model selection, and optimization</p> <p>Deep Neural Networks: Convolutional Neural networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Recurrent Neural Networks, Long Short-Term Memory, Gate Recurrent Unit, Deep Belief Network, Ensemble methods: Bagging, boosting, Evaluating and debugging learning algorithms</p> <p>ML and DL Applications: Control, Optimisation, Forecasting, Data mining, Pattern recognition, Deep learning tools, Recent trends.</p>			

Text Books

1. E. Alpaydin, Introduction to Machine Learning, MIT Press, 2009
2. Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016. J.
3. D. Kelleher, B. M. Namee and Aoife D'Arcy, MIT Press, 2015.
4. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
5. Fundamentals of Neural Networks: Architectures, Algorithms, and Applications, Laurene Fausett, Prentice-Hall, 1994

Reference Books

1. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
2. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
3. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.
4. T. M. Mitchell, Machine Learning, McGraw-Hill, 1997
5. P. Harrington, Machine learning in action, Manning Publications Co,2012
6. J. Bell, Machine Learning for Big Data, Wiley 2014.
7. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning. Cambridge University Press. 2017. [SS-2017]
8. P. Flach. Machine Learning: The Art and Science of Algorithms that Make Sense of Data. First Edition, Cambridge University Press, 2012.
9. S. J. Russell, P. Norvig. Artificial Intelligence: A Modern Approach. Third Edition, Prentice-Hall, 2010.
10. Y. S. Abu-Mostafa, M. Magdon-Ismail, H.-T. Lin. Learning from Data: A Short Course. First Edition, 2012.
11. Pattern Recognition and Machine Learning, Christopher Bishop, 2007
12. Zbigniew Michalewicz. Genetic Algorithms. + Data Structures. = Evolution Programs,Third Edition 1995.
13. NPTEL and IEEE Journals related to ML and DL.

COURSE OBJECTIVES(CB)

1. To get familiarize with the introduction to machine learning and deep learning
2. To analyse and illustrate various categories of learning schemes
3. To develop skills of solving practical applications

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)						
Upon completion of the course, the student will	PO1	PO2	PO3	PO4	PO5	PO6	PO7
1. Remember various types of machine learning and deep learning algorithms	M	H	M	M	H	H	H
	PO8	PO9	PO10	PO11	PO12	PO13	PO14
	M	H	H	M	H	H	H
2. Analyse various classification and Clustering methods in ML and DL	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	H	H	M	M	M	H	H
	PO8	PO9	PO10	PO11	PO12	PO13	PO14
	M	H	H	M	M	H	H
3. Apply ML and DL algorithms for solving practical applications related to electrical and electronics engineering	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	M	H	M	H	H	H	M
	PO8	PO9	PO10	PO11	PO12	PO13	PO14
	H	M	H	M	M	H	H

			suitable
10	Week-10 (2 nd ,3 rd ,4 th ,-Mar-22)	LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Recurrent Neural Networks, Long Short-Term Memory Gate Recurrent Unit, Deep Belief Network, Ensemble methods: 2 nd Assessment	Lecture/ PPT or any suitable
11	Week-11 (9 th ,10 th ,11 th ,-Mar-22)	Bagging, boosting, Evaluating and debugging learning algorithms	Lecture/ PPT or any suitable
12	Week-12 (16 th ,17 th - Mar-22)	ML and DL Applications: Control, Optimisation	Lecture/ PPT or any suitable
13	Week-13 (23 rd ,24 th , 25 th -Mar-22)	Forecasting, Data mining	Lecture/ PPT or any suitable
14	Week-14 (30 th ,31 st - Mar 22, 1 st - April 22)	Pattern recognition	Lecture/ PPT or any suitable
15	Week-15 (6 th ,7 th ,8 th ,- April -22)	Deep learning tools, Recent trends Compensation Assessment	Lecture/ PPT or any suitable

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	1 st Assessment (1 st and 2 nd Units)	7 th Week (10 th - Feb -22)	75 Minutes	25
2	2 nd Assessment (3 rd and 4 th Units)	10 th Week (3 rd -Mar-22)	75 Minutes	25
3	3 rd Assesment - Assignments/Mini project (1 st unit to 5 th unit)	3 rd to 14 th Week	Home Work	10
4	Compensation Assessment (1 st unit to 4 th unit)	16 th Week (7 th - April -22)	75 Minutes	25
5	Final Assessment (1 st to 5 th unit)	17 th Week	120 minutes	40

* Attending all the assessments (Assessment 1-3 and 5) are MANDATORY for every student.

COURSE EXIT SURVEY

- Feedback from the students during the class committee meetings
- Anonymous feedback through questionnaire (Mid semester & End of the Semester)

COURSE POLICY

MODE OF CORRESPONDENCE

1. All the students are advised to check their NITT WEBMAIL or group email id (if any) regularly. All the correspondence (schedule of classes/schedule of assessment/course material/any other information regarding this course) will be done through email only.
2. Queries if any can be emailed to the course teacher sishajpsimon@gmail.com

COMPENSATION ASSESSMENT POLICY

1. If any student is not able to attend 1st Assessment / 2nd Assessment due to genuine reason, student is permitted to attend the Compensation Assessment with 25% weightage (25 marks).
2. In any case, compensation test will not be considered as an improvement test.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

- Be aware of the B. Tech regulations in the institute website for passing minimum, redo, formative assessment, grades, credits etc.

FOR APPROVAL

Course Faculty SPD9
3/1/2022 CC-Chairperson [Signature]
Amessa Farhan HOD [Signature]
(1/6) 05/01/2022