

YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING (An Autonomous Institution affiliated to R T M Nagpur University Nagpur) Accredited by NAAC (1<sup>st</sup>Cycle) with 'A' Grade (Score 3.25 on 4 Point Scale)

Wanadongri, Hingna Road, Nagpur-441110

## Department of Computer Technology (Honors in AIML)



B.E. Honors in Artificial Intelligence and Machine Learning SoE & Syllabus 2021-22



## Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

Department of Computer Technology

SoE and Syllabus B.E Honors in Artificial Intelligence and Machine Learning SoE No. HON-101

**B.E Honors in Artificial Intelligence and Machine Learning** Information Brochure of Honor Program

- 1. Title of Program: Honors Course in Artificial Intelligence and Machine Learning
- 2. Type of Program: Honor
- 3. Department offering the program: Computer Technology.
- 4. Department eligible to opt for the program:

## Students of Department of Computer technology are only eligible to opt for this program. Department of Computer Technology

5. General information about courses in program:

The focus of this course in to cover the concepts of Artificial Intelligence and the Machine Learning. Artificial Intelligence and Machine Learning are the buzzwords in industry. This program contains four theory courses and 6 lab courses which needs to be completed in the span of three semesters (5, 6, 7 semester). This course covers the concept of knowledge representation and reasoning using Artificial Intelligence. Also, it covers search methods for problem solving in Artificial Intelligence. This program also covers the deep learning used to solve the advanced problems. Natural Language Processing is one of the important components of Artificial Intelligence, this course also focuses on that. This courses. It includes the advance technologies like TensorFlow as the lab course. This program will have great impact on students' placement as the maximum courses (which are completely industry required) will be completed before the students appear for the placement process.

#### 6. Advance knowledge or research orientation of Program:

The main objective of the program is to cover the advance technologies in the field of artificial intelligence and machine learning. The exposure of the courses like AI knowledge representation and reasoning, AI search methods and problem solving, are going to give the students opportunity to pursue research in the Artificial Intelligence research area. The other components of this program like Deep Learning and Natural Language Processing are most sought after by industry and also in demand for the research.

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## 7. Employability potential of program:

According to a Gartner report, Artificial Intelligence (AI) is estimated to pave way for close to 2.3 million opportunities by the year 2020. Artificial intelligence will transform the global economy, and AI jobs are in high demand. Companies like Google, Quora, and Facebook hire people with the knowledge of machine learning.

The knowledge of Artificial Intelligence and Machine Learning are going to open job opportunities as Machine Learning Engineer, Data Scientist, Business Intelligence Developer, Research Scientist, Big Data Architect/ Engineer etc. One more important aspect of this field is there is no upper limit on the salary of machine learning professionals at top companies.

Google says" Machine Learning is the future", so future of machine learning is going to be very bright.

This program will act as trump card for you in the cut throat competition during the placements drives.

CNI	Norma of the Feerley	Deat	Designation		Contact
SIN	Name of the Faculty	Post	Designation	e-mail ID	Contact
	Member				Number
1	Dr. G. M. Dhopavkar	HoD &	Asst. Prof.	hod_ct@ycce.edu	9822087970
		Chairman			
2	Dr. P. A. Deshkar	Member	Asst. Prof.	padeshkar@ycce.edu	9923401052
3	Dr. K. R. Singh	Member	Asso. Prof.	singhkavita19@gmail.com	8275783031
4	Dr. S. D. Kamble	Member	Asso. Prof.	shailesh_2kin@rediffmail.com	9158886477
5	Dr. R. D. Wajgi	Member	Asst. Prof	rdwajgi@ycce.edu	9970238062
6	Dr. L. B. Damahe	Member	Asst. Prof.	lalitdamahe3379@ycce.edu	9823289971
7	Prof. N. M. Mangrulkar	Member	Asst. Prof.	nmangrulkar@ycce.edu	7767888776

#### 8. Departmental Steering committee:

#### 9. Program Coordinator :

SN	SN Name of the Faculty		Post	Designation	e-mail ID		Contact		
	Member							Number	
1	Dr. Prarthana	Dr. Prarthana A. Deshkar Coordinator Asst. Prof. pad		leshkar@ycce.edu	9923401052				
G	Grud			May 2021		1.00	Aj AY20	pplicable for 021-22 Onwards	
(	Chairperson Dean (Aca		ad. Matters)	Date of Releas	е	Version			
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#### Department of Computer Technology

SoE and Syllabus

SoE No. HON-101

**B.E Honors in Artificial Intelligence and Machine Learning** 

## SoE\_Honors in Artificial Intelligence and Machine Learning

				Credit Hours		% Weightage					ESE			
SN	Sem Code	Subject	T/P	L	Т	Р	Hrs	Credits	MSEs	ТА	CA	ESE	Duration Hours	
1	5	CTH101	AI knowledge Representation and Reasoning	Т	3	0	0	3	3	30	30		40	3
2	5	CTH102	Lab: AI knowledge Representation and Reasoning	р	0	0	2	2	1			60	40	1
3	5	CTH103	Artificial Intelligence: Search Methods for Problem Solving	Т	3	0	0	3	3	30	30		40	3
4	5	CTH104	Lab: Artificial Intelligence: Search Methods for Problem Solving	Р	0	0	2	2	1			60	40	1
5	6	CTH111	Introduction to Deep Learning	Т	3	0	0	3	3	30	30		40	3
6	6	CTH112	Lab: Introduction to Deep Learning	Р	0	0	2	2	1			60	40	1
7	6	CTH113	Applied Natural Language Processing	Т	3	0	0	3	3	30	30		40	3
8	6	CTH114	Lab: Applied Natural Language Processing	Р	0	0	2	2	1			60	40	1
9	7	CTH121	Lab: Machine Learning using TensorFlow Lab	Р	0	0	2	2	1			60	40	1
10	7	CTH122	Lab: Open-source tools for AI-ML	Р	0	0	2	2	1			60	40	1
			Total		12	0	12	24	18					

MSEs\* = Three MSEs of 15 Marks each will conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

TA \*\* = for Theory : 20 marks on lecture quizzes, 8 marks on assignments, 2 marks on class performance TA\*\* = for Practical : MSPA will be 15 marks each

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#### Department of Computer Technology

SoE and Syllabus

SoE No. HON-101

**B.E Honors in Artificial Intelligence and Machine Learning** 

#### V Semester

CTH101:	Artificial Intelligence: Know Representation and Reasonin			ledge ng	L= 3	T = 0	$\mathbf{P} = 0$	Credits = 3
Evaluation Scheme	MSE-I*	MSE-II*	ASE-II* MSE-III*		TA	ESE	Total	ESE Duration
*Best Two out of three MSE's would be considered	15	15	15		30	40	100	3 Hrs
Prerequisites								
<ul> <li>Course Objective Students should be</li> <li>1. To learn basics and Reasoning</li> <li>2. To understand be representation un logic and Conce</li> <li>3. To learn the base representation</li> <li>4. To understand be representation un frames</li> <li>5. To represent km</li> </ul>	<ul> <li>Course C Students</li> <li>1. Identi repres</li> <li>2. Map repres</li> <li>3. Mode based</li> <li>4. Attain probl and u</li> <li>5. Form</li> </ul>	<b>Dutcome</b> will be ab ify the new sentation anatural sta sentation el simple a language n the capa em domai se this to ulate and	ble to ed and imp and its me atements in application bility to re ins using le perform in solve prob	oortance o thods. nto FOL a n domains epresent v ogic based oference olems with	f knowledge nd CD in a logic- arious real life l techniques n uncertain			

#### UNIT I:

Introduction to Knowledge Representation and Reasoning, Formal logic, Propositional Logic, Syntax and truth values, Rules of Inference and Natural Deduction, The Tableau Method, The Resolution Refutation Method

#### **UNIT II:**

First Order Logic (FOL) Syntax, Semantics, Entailment and Models, Proof Systems, Forward Chaining, Unification, Forward Chaining Rule Based Systems, The Rete Algorithm, Programming in a Rule Based Language, The OPS5 Expert System Shell

#### UNIT III:

Representation in FOL Skolemization, Knowledge Representation, Properties and Categories, Reification, The Event Calculus, Mapping Natural Language to FOL: Conceptual Dependency (CD) Theory and analysis: Mapping English to CD Theory

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#### UNIT IV :

Backward Chaining, Logic Programming with Prolog, Depth First Search and Efficiency Issues, Controlling Search, The Cut Operator in Prolog, The Resolution Refutation Method for FOL, Clause Form and The Resolution Rule, FOL with Equality

#### UNIT V:

Semantic Nets, Frames, Default Reasoning, Circumscription, Default Logic, Epistemic Logic, Multi Agent Scenarios

#### UNIT VI:

Reasoning in uncertain domain, Dempster–Shafer theory Bay's rule and its use, Inference in Bayesian Network, Case study: Bayesian and belief network

Text ]	Text Books:									
	Title	Edition	Author	Publisher						
	Knowledge		Ronald J.							
1	Representation and	Latest Edition	Brachman, Hector	Morgan Kaufmann						
	Reasoning		J. Levesque							
	A First Course in			McGraw Hill Education						
2	Artificial	Latest Edition	Deepak Kheman	(India)						
	Intelligence			(mula)						
Refer	Reference Book:									
	Title	Edition	Author	Publisher						
	Knowledge									
	Representation:									
1	Logical,	Latest Edition	John F. Sowa	Brooks /Cole, Thomson						
1	Philosophical, and	Latest Lattion	John I. Sowa	Learning						
	Computational									
	Foundations									
	Artificial									
2	Intelligence: A	Latest Edition	Russell &Norvig	Prentice Hall						
	Modern Approach									

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#### V Semester

Evaluation Scheme *Best Two out of three MSE's would be	MSE-I*	MSE-II*	MSE-III*	ТА	ESE	Total	ESE
*Best Two out of three MSE's would be							Duration
considered				60	40	100	3 Hrs
Prerequisites							
<ul> <li>Course Objective</li> <li>Students should be a <ol> <li>To learn basics</li> <li>Representation</li> <li>logical represent</li> <li>To understand</li> <li>representation to order logic and</li> </ol> </li> <li>To learn the ba and its represent</li> <li>To understand representation to frames</li> <li>To represent kn domain</li> </ul>	<ul> <li>Prerequisites</li> <li>Course Objective</li> <li>Students should be able to <ol> <li>To learn basics of Knowledge <ul> <li>Representation and Reasoning and its <ul> <li>logical representation.</li> </ul> </li> <li>To understand basic of Knowledge <ul> <li>representation using concept of First order logic and Conceptual dependency</li> </ul> </li> <li>To learn the basics of Prolog program <ul> <li>and its representation</li> </ul> </li> <li>To understand basic of Knowledge <ul> <li>representation</li> </ul> </li> <li>To learn the basics of Prolog program <ul> <li>and its representation</li> </ul> </li> <li>To understand basic of Knowledge <ul> <li>representation using Semantic network, <ul> <li>frames</li> </ul> </li> <li>To represent knowledge in uncertain <ul> <li>domain</li> </ul> </li> </ul></li></ul></li></ol></li></ul>				to ed and im nd its meth statements application bility to re ns using erform inf solve pr ng Bayesia	aportance hods. into F n domain present va logic bas ference oblems va an approac	of knowledge OL and CD as in a logic- arious real life ed techniques with uncertain thes

- 1. Creation of Object model for propositional logic syntax representation.
- 2. Implementation of propositional resolution for given object model.
- 3. Implementation of Unification and matching algorithm.
- 4. Implementation of Resolution Algorithm
- 5. Implementation of Rete Algorithm.
- 6. Implementation of database Representation in Logic programming
- 7. Implementation of Semantic network Representation.
- 8. Implementation of Frame representation.
- 9. Implementation of Multi agent scenario.
- 10. Implementation of Bays theorem.
- 11. Design and analysis of Bayesian network for given case study.

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V Semester								
Artificial In Methods fo	Artificial Intelligence: Search Methods for Problem Solving			L= 3	T = 0	<b>P</b> = 0	Credits = 3	
Evaluation MSE-I* MSE-II*		MSE-III*		ТА	ESE	Total	ESE Duration	
15	15	15		30	40	100	3 Hrs	
Prerequisites								
Prerequisites         Course Objective         Students should be able to         1. To understand various basic concepts used in AI         2. To understand how state space is explored by intelligent agents using various searching techniques         3. To understand various optimization algorithms used during searching state space         4. To understand how AI is used in the domain of game playing         5. To understand various components of expert systems			Course C Students 1. Des 2. Imp 3. Des 4. Use des: 5. Des	Jutcome will be ab sign abstra blement va sign advan e AI techn ign a gam sign an ex	le to act view of arious sear aced optim iques in ga e pert syster	f intelliger rching alg nization al ame desig n for give	nt agent orithms gorithm ning and n problem	
UNIT I:								
	Artificial In Methods fo MSE-I* 15 15 e able to ad how state sp at agents using chniques ad various opti used during sea and how AI is u ame playing ad various corr ms	Artificial Intelligence: Set         Methods for Problem Sol         MSE-I*       MSE-II*         MSE-I*       MSE-II*         15       15         e       e         e       able to         nd various basic concepts use         nd various optimization         used during searching state         nd how AI is used in the         ame playing         nd various components of         ms         rview and Historical Perspector	V Set         Artificial Intelligence: Search Methods for Problem Solvin         MSE-I*       MSE-II*       M         15       15       15         15       15       15         e       e       e         e       e       e         e       e       e         e       e       e         e       e       e         e       e       e         e       e       e         e       e       e         e       e       e         e       able to       o         nd how state space is explored       agents using various         chniques       o       various optimization         bed during searching state       o         nd how AI is used in the       ame playing         od various components of       ms	V Semester         Artificial Intelligence: Search Methods for Problem Solving         MSE-I*       MSE-II*       MSE-II*         MSE-I*       MSE-II*       MSE-II*         15       15       15         15       15       15         e       e       E         e able to       od various basic concepts used       1. Des         ad how state space is explored at agents using various chniques       1. Des       2. Imp         ad various optimization used during searching state       3. Des       4. Use         ad how AI is used in the ame playing ad various components of ms       5. Des       1.	V Semester         Artificial Intelligence: Search Methods for Problem Solving       L=3         MSE-II*       MSE-III*       L=3         MSE-I*       MSE-II*       MSE-III*       TA         15       15       15       30         e       e able to       15       15       30         nd how state space is explored to agents using various chniques and various optimization ised during searching state       1. Design abstrate         nd how AI is used in the ame playing advarious components of ms       5. Design an explored to the agents using various for the agents used in the ame playing advarious components of ms       5. Design and particular to the agents used in the agents used used used used used used used use	V SemesterArtificial Intelligence: Search Methods for Problem Solving $L=3$ $T=0$ MSE-I*MSE-II*MSE-III*TAESE1515153040a 1515153040a 1515153040a ble to ad various basic concepts used and how state space is explored at agents using various chniques and various optimization used during searching state and how AI is used in the ame playing and various components of msCourse Outcome Students will be able to 1. Design abstract view of 2. Implement various sear 3. Design advanced optim 4. Use AI techniques in g design a game 5. Design an expert systema how AI is used in the ame playing and various components of msSum and Historical Perspective. Turing Test. Physical Symbol	V SemesterArtificial Intelligence: Search Methods for Problem SolvingL=3 $T=0$ $P=0$ $MSE-I*$ $MSE-II*$ $MSE-III*$ $TA$ $ESE$ $Total15151515304010015151530401001515151530401001515151530401001615151530401001718191010010018191010010019101010010010101010010101001010100101010010101001010100101001001010010011101001210100131010014100100151010161010017101001810100191010010101001010100101010011101001210100131010014100100141001001510100<$	

Introduction: Overview and Historical Perspective, Turing Test, Physical Symbol Systems and the scope of Symbolic AI, Agents.

#### UNIT II:

State Space Search: Depth First Search, Breadth First Search, DFID, Heuristic Search: Best First Search, Hill Climbing, Beam Search

#### UNIT III:

Traveling Salesman Problem, Tabu Search, Simulated Annealing, Population Based Search: Genetic Algorithms, Ant Colony Optimization

#### UNIT IV :

Branch & Bound, Algorithm A, Admissibility of A, Monotone Condition, IDA, RBFS, Pruning OPEN and CLOSED in A

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B.E Honors in Artificial Intelligence and Machine Learning

#### UNIT V:

Problem Decomposition, Algorithm AO, Game Playing, Algorithms Minimax, AlphaBeta, SSS, Planning: Forward/Backward Search, Goal Stack Planning, Sussman's Anomaly, Plan Space Planning, Algorithm Graphplan

#### UNIT VI:

Rule Based Expert Systems, Inference Engine, Rete Algorithm

Textb	oooks:				
	Title	Edition	Author	Publisher	
1	A First course in Artificial Intelligence	Latest Edition	Deepak Khemani	MHT Publications	
2	Stochastic Local Search: foundations and Applications	Latest Edition	Holger H. Hoos, Thomas stutzle	Morgan Kauffman series in AI	
Refer	ence Book:				
	Title	Edition	Author	Publisher	
1	Artificial Intelligence : A Modern Approach	Latest Edition	Russell and Norvig	Pearson	

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SoE No. HON-101

SoE and Syllabus B.E Honors in Artificial Intelligence and Machine Learning

#### **V** Semester

CTH104	Artificial In Methods fo	ntelligence: Se Problem So	earch lving Lab	L= 0	T = 0	P = 1	Credits = 1
Evaluation Scheme	MSE-I*	MSE-II*	MSE-III*	ТА	ESE	Total	ESE Duration
*Best Two out of three MSE's would be considered				60	40	100	3 Hrs
Prerequisites							1
<ul> <li>Course Objective</li> <li>Students should be able to</li> <li>1. To understand various basic concepts used in AI</li> <li>2. To understand how state space is explored by intelligent agents using various searching techniques</li> <li>3. To understand various optimization algorithms used during searching state space</li> <li>4. To understand how AI is used in the domain of game playing</li> <li>5. To understand various components of expert systems</li> <li>Course Outcome</li> <li>Students will be able to</li> <li>1. Design abstract view of intelligent agent</li> <li>2. Implement various searching algorithms</li> <li>3. Design advanced optimization algorithm</li> <li>4. Use AI techniques in game designing and design a game</li> <li>5. Design an expert system for given problem</li> </ul>							
1. Implement A <sup>3</sup>	* algorithm.						
2. Implement A	O* algorithm						
3. Implementation	on of Ant Col	ony Optimizat	tion Algorithm	.S			
4. Implementation	on of Genetic	Algorithm					
5. Implementation	on of Unifica	tion Algorithm	1.				
6. Implementation	on of Truth m	aintenance sys	stem using pro	log.			
7. Implementation	7. Implementation of Min/MAX search procedure for game Playing.						
8. Parsing Metho	8. Parsing Method Implementation using Prolog.						
9. Development	of mini expe	rt system usin§	g Prolog / Expe	ert System	n Shell "V	idwan"	
10. Case study of	any one Exp	ert System					

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B.E Honors in Artificial Intelligence and Machine Learning

#### **VI** Semester

CTH111 :	Introductio	on to Deep Lea	arning	L= 3	T = 0	$\mathbf{P} = 0$	Credits $= 3$	
Evaluation Scheme	MSE-I*	MSE-II*	MSE-III*	ТА	ESE	Total	ESE Duration	
*Best Two out of three MSE's would be considered	15	15	15	30	40	100	3 Hrs	
Prerequisites								
<b>Course Objective</b>			Course Ou	Course Outcome				
Students should be	able to:		Students will be able to					
1. Understand	the importa	ance deep	1. Exp	lain and	apply the	e concept	t of deep	
learning and op	otimization		lear	ning and o	ptimizatio	n		
2. Study and unde	erstand neura	l network	2. Exp	lain and de	esign neur	al networ	k	
3. Study deep lear	rning for sequ	iences	3. Des	3. Describe and design recurrent neural network				
4. Study deep learning for images			4. Inter	rpret and	construct	convolut	ional neural	
5. Understand un	netv	vork						
learning			5. Con lear	nprehend ning	the con	cept of	unsupervised	

#### UNIT I :

Introduction: History of Deep Learning, Deep Learning Success Stories, Deep learning in current scenario, Deep learning Vs Machine Learning, Linear regression, Overfitting and underfitting problem, Hyperparameter and model validation, Estimators, Bias and Variance

#### UNIT II:

Introduction to optimization: Gradient Descent, Model regularization, Stochastic gradient descent, Minibatch gradient descent

#### UNIT III :

Introduction to neural network: McCulloch Pitts Neuron, Thresholding Logic, Perceptron's, Perceptron Learning Algorithm, Feedforward Neural Networks, Backpropagation, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons

#### UNIT IV :

Deep learning for sequences: Recurrent layers, Simple RNN and Backpropagation, Training RNN, dealing with vanishing and exploding gradients

#### UNIT V:

Deep Learning for images: CNN architecture, training CNN. Learning new tasks with pre-trained CNNS, data transformation using PCA, Deep learning for Computer vision

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#### **Department of Computer Technology**

**SoE and Syllabus** 

SoE No. HON-101

**B.E Honors in Artificial Intelligence and Machine Learning** 

UNIT VI:

Unsupervised representation learning: Autoencoders, autoencoders applications, Word embeddings, Generative Models, Generative Adversarial Networks, Applications of Adversarial approach

Text ]	Books:			
	Title	Edition	Author	Publisher
1 Introduction to Deep learning		Latest Edition	Eugene Charniak	MIT Press
2				
Refer	ence Book:			
	Title	Edition	Author	Publisher
1	Deep Learning	Latest Edition	Ian GoodFellow, YoshuaBengio, Aaron Courville	MIT Press

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B.E Honors in Artificial Intelligence and Machine Learning

#### **VI** Semester

CTH112 :	Introduction to Deep Learning Lab			L= 0	T = 0	<b>P</b> = 1	Credits = 1		
Evaluation Scheme	MSE-I*	MSE-II*	MSE-III*	ТА	ESE	Total	ESE Duration		
*Best Two out of three MSE's would be considered				60	40	100	3 Hrs		
Prerequisites			- 1						
<b>Course Objective</b>			Course Outcome						
Students should be	able to:		Students will be able to:						
1. Understand	the importa	ance deep	1. Explain	and appl	y the cond	cept of d	eep learning		
learning and op	otimization		and opt	imization					
2. Study and unde	erstand neura	l network	2. Explain	and desig	gn neural 1	network			
3. Study deep lear	rning for sequ	lences	3. Describ	e and dest	ign recurre	ent neural	network		
4. Study deep lear	rning for ima	ges	4. Interpre	et and c	onstruct	convoluti	onal neural		
5. Understand una	supervised re	presentation	network	K					
learning	5. Compre	ehend th	e conce	pt of ı	unsupervised				
learning									
1. Implementa	tion of basic	1. Implementation of basic machine learning algorithms.							

- 2. Implementation and analysis of simple linear regression
- 3. Implementation and analysis of linear regression with gradient descent
- 4. Implementation of neural network
- 5. Implementation of Simple RNN using python
- 6. Implementation of CNN using python
- 7. Implementation of CNN for image classification
- 8. Implementation and analysis of PCA
- 9. 10. Project: Apply all knowledge of deep learning to develop a given project

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#### Department of Computer Technology

SoE and Syllabus

SoE No. HON-101

B.E Honors in Artificial Intelligence and Machine Learning

**VI** Semester

CTH113 :	Applied Nat	tural Language	Pro	cessing	L= 3	T = 0	$\mathbf{P} = 0$	Credits = 3
Evaluation Scheme	MSE-I*	MSE-II*	Μ	ISE-III*	ТА	ESE	Total	ESE Duration
*Best Two out of three MSE's would be considered	15	15	15		30	40	100	3 Hrs
Prerequisites								
<b>Course Objective</b>				Course (	Outcome			
Students should be	able to			Students will be able to				
1. Understand usa	ge of regular	expressions in	ı	1. Extract information using regular expressions.				
NLP				2. Select appropriate similarity measures				
2. Study documer	nt similarity	measures and	1	3. Use Vector space models in NLP applications				
various vector s	pace models			4. Perfo	rm Text	Classifica	tion, Clu	stering, and
3. Use Text Clas	ssification, C	Clustering, and	1	Sumr	narization			
Summarization				5. Selec	t machine	elearning	technique	s relevant to
4. Study machine	learning tech	niques relevan	t	NLP				
to NLP			6. Ana	alyze vario	ous NLP a	pplicatior	18	
5. Understand Machine translation, language generation								
TINITT T.								

#### UNIT I:

Introduction to language processing : Tokens, sentences, paragraphs, Regular expressions: extraction of

information using Regex.

#### **UNIT II:**

Document Similarity measures: Cosine and cluster measures, Spelling correction: Edit distance, Information retrieval, extraction Document Classification, Clustering, topic modeling techniques.

#### **UNIT III:**

Vector Space Model: word vectors, GloVe/Word2Vec model, word embedding.

#### UNIT IV :

Introduction to NLP Tasks: Text Classification, Clustering, and Summarization.

#### UNIT V:

Back Propagation, Recurrent Neural network relevant to NLP.

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### **Department of Computer Technology**

SoE and Syllabus

SoE No. HON-101

**B.E Honors in Artificial Intelligence and Machine Learning** 

#### **UNIT VI:**

Introduction to Machine Translation, Language Generation Applications: Sentiment Analysis, Spam

Detection, Resume Mining.

Text	Books:				
	Title	Edition	Author	Publisher	
	Foundations of				
1	Statistical Natural	Latast Edition	Chris Manning,	MIT Pross 1000	
1	Language	Latest Edition	Hinrich Schütze	WIII FICSS, 1999	
	Processing				
	Speech and		Don Jurofeky		
2	Language	Latest Edition	Lamos H. Mortin	Prentice Hall	
	Processing		James H. Martin		
Refer	ence Book:				
	Title	Edition	Author	Publisher	
	Bender's Linguistic				
1	Fundamentals for	Latast Edition	Dandam Emily	Free online through the	
1	Natural Language	Latest Eutilon	Bender: Emily	NYU	
	Processing				

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#### **Department of Computer Technology**

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SoE No. HON-101

**B.E Honors in Artificial Intelligence and Machine Learning** 

#### **VI** Semester

CTH114 :	Applied Natural Language Processing Lab			L= 0	T = 0	P = 1	Credits = 1
Evaluation Scheme	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Total	ESE Duration
*Best Two out of three MSE's would be considered				60	40	100	3 Hrs
Prerequisites			-				
<b>Course Objective</b>			Course Out	tcome			
Students should be	able to	_	Students will	ll be able	to		
<ol> <li>Understand usage of regular expressions in NLP</li> <li>Study document similarity measures and various vector space models</li> <li>Use Text Classification, Clustering, and Summarization</li> <li>Study machine learning techniques relevant to NLP</li> <li>Understand Machine translation, language generation and other NLP applications</li> </ol>			<ol> <li>Extrac</li> <li>Select analyz applica</li> <li>Perform Summ</li> <li>Select NLP</li> <li>Analyz</li> </ol>	t informat appropri- e Vecto ations m Text arization machine ze various	iate simi or space Classifica learning t NLP app	regular ex larity mo models tion, Clu techniques lications	easures and in NLP stering, and s relevant to
1. Extraction of information using Regular Expression in NLP applications							

- 2. Find out similarity between natural language documents
- 3. Perform Text classification based on the given criteria
- 4. Perform Clustering and text summarization
- 5. Study of Machine translation tool
- 6. Perform Document mining using NLP tools
- 7. Perform Spam Mail detection using NLP tools
- 8. Perform Twitter analysis using Python
- 9. Perform sentiment analysis using Python
- 10. Build a mini application using open source tools for NLP

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SoE No. HON-101

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#### **VII Semester**

CTH121 :	Machine Lab	earning using	Tensorflow	L= 0	T = 0	P = 1	Credits = 1
Evaluation Scheme	MSE-I*	MSE-II*	MSE-III*	ТА	ESE	Total	ESE Duration
*Best Two out of three MSE's would be considered				60	40	100	3 Hrs
Prerequisites			I				
Course Objective Students should be able to 1. Learn core concepts of TensorFlow 2. Learn machine learning algorithms in TensorFlowCourse Outcome Students will be able to 1. Comprehends the concepts of TensorFlow 2. Describe and implement the machine learning algorithms in TensorFlow						Flow learning	
<ol> <li>Getting started with Tensorflow</li> <li>Basics of TensorFlow</li> <li>Loading and Exploring the data</li> <li>Feature Extraction and Transforming data</li> <li>Machine Learning Basics</li> <li>Implementing Machine Learning Algorithms with TensorFlow</li> <li>Evaluation of machine learning algorithms using Tensor board</li> <li>CNN implementation using TensorFlow</li> <li>CNN implementation using TensorFlow</li> <li>Description</li> </ol>							

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Text	Books:			
	Title	Edition	Author	Publisher
1	Machine Learning with TensorFlow	Latest Edition	Nishant Shukla with Kenneth Fricklas, Manning	Manning Publications
2	Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts	Latest Edition	Aurelien Geron	O'Reilly
Refe	rence Book:			
	Title	Edition	Author	Publisher
1	Advanced Deep Learning with TensorFlow 2 and Keras:	Latest Edition	Rowel Atienza	Packt Publication

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#### **VII Semester**

CTH122 :	Open source	Open source tools for AI-ML Lab		L= 0	T = 0	P = 1	Credits $= 1$
Evaluation Scheme	MSE-I*	MSE-II*	MSE-III*	ТА	ESE	Total	ESE Duration
*Best Two out of three MSE's would be considered				60	40	100	3 Hrs
Prerequisites							I
<ul> <li>Course Objective</li> <li>Students should be able to</li> <li>1. Learn core working of different AI and ML open source tool</li> <li>2. Lean to create different Classification model ,its comparison and algorithm implementation using open source tool</li> <li>Course Outcome</li> <li>Students will be able to</li> <li>Comprehends the concepts of AI and ML tool</li> <li>Demonstrate and implement the AI-ML models or algorithms using open source tools</li> </ul>							d ML tool ML models ols
<ol> <li>Study of Teachable Machine ML tool</li> <li>Model creation for image classification using Teachable Machine tool</li> <li>Model creation for audio classification using Teachable Machine tool</li> <li>Model creation for body posture classification using Teachable Machine tool</li> <li>Study of WIT tool</li> <li>Model comparison using WIT tool</li> <li>Model comparison using WIT tool</li> <li>Analyze and test algorithmic fairness constraints using WIT tool</li> <li>Study of Accord .NET AI tool</li> <li>Demonstrate the corner detection in image using Accord .NET AI tool</li> </ol>							

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