SEMESTER – VI

Machine learning Applications
Code: PCC- AIML601
Contacts: 2L

Name of the Course:	**Machine learning Applications**	
Course Code: **PCC- AIML601**	Semester: VI	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:2 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	2	

- Introduction to linear regression (and multivariate linear regression)
- Logistic Regression and regularization
- Practical aspects of implementation
- Decision trees and pruning, implementation of decision trees
- Support vector machines and making them work in practice
- Boosting - implementing different boosting methods with decision trees.
- Using the algorithms for several tasks - how to set up the problem, debug, select features and develop the learning algorithm.
- Unsupervised learning - k-means, PCA, hierarchical clustering.
- Implementing the clustering algorithms
- Parallelizing the learning algorithms
- Applications
- Choosing from multiple algorithms - What will work?

Machine learning Applications Lab
Code: PCC- AIML 691
Contacts: 4P

Name of the Course:	**Machine learning Applications Lab**
Course Code: PCC- AIML 691	Semester: VI
Duration:6 months	Maximum Marks:100
Teaching Scheme:	
Theory: hrs./week	Continuous Internal Assessment
Tutorial: NIL	External Assesement:60
Practical: 4 hrs./week	Distribution of marks:40
Credit Points:	2

1. Explore visualization features of the tool for analysis and WEKA.
2. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
3. Demonstrate performing classification on data sets
4. Demonstrate performing clustering on data sets
5. Sample Programs using German Credit Data
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross validation briefly. Train a decision tree again using cross validation and report your results. Does accuracy increase/decrease? Why?
7. Check to see if the data shows a bias against “foreign workers” or “personal-status”.. Did removing these attributes have any significantly effect? Discuss
8. Another question might be, do you really need to input so many attributes to get good results? Try out some combinations.
9. Train your decision tree and report the Decision Tree and cross validation results. Are they significantly different from results obtained in problem 6
10. How does the complexity of a Decision Tree relate to the bias of the model?
11. One approach is to use Reduced Error Pruning. Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross validation and report the Decision Trees you obtain? Also Report your accuracy using the pruned model Does your Accuracy increase?
12.How Can you Convert Decision Tree in to “If then else Rules”.Make Up your own Small Decision Tree consisting 2-3 levels and convert into a set of rules. Report the rule obtained by training a one R classifier. Rank the performance of j48,PART,oneR.

Subject: Deep Learning			
Course Code: PCCAIML 602		**Semester: VI**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3 hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical:		Continuous Assessment:25	
Credit: 3			
Aim:			
Sl. No.			
1.	To improve the performance of a Deep Learning model		
2.	to the reduce the optimization function which could be divided based on the classificationand the regression problems		
Objective:			
Sl. No.			
1.	To acquire knowledge on the basics of neural networks.		
2.	To implement neural networks using computational tools for variety of problems.		
3.	To explore various deep learning algorithms.		
Pre-Requisite:			
Sl. No.			
1.	Calculus, Linear Algebra		
2.	Probability & Statistics		
3.	Ability to code in R/Python		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**

01	**Introduction** Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques.	**3**	**5**
02	**Feed forward neural network** Artificial Neural Network, activation function, multi-layer neural network, cardinality, operations, and properties of fuzzy relations.	**6**	**10**
03	**Training Neural Network** Risk minimization, loss function, backpropagation, regularization, model selection, and optimization.	**6**	**15**
04	**Conditional Random Fields** Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.	**9**	**15**
05	**Deep Learning** Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Recurrent Neural Network, Deep Belief Network.	**6**	**15**
06	**Deep Learning research** Object recognition, sparse coding, computer vision, natural **language**	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Goodfellow, I.,Bengio,Y., andCourville A.,	Deep Learning		MIT Press
Satish Kumar	Neural Networks: A Classroom Approach		Tata McGraw-Hill
Reference Books:			
Bishop, C. ,M.	Pattern Recognition and Machine Learning		Springer

Yegnanarayana, B.	Artificial Neural Networks		PHI Learning Pvt. Ltd
Golub, G.,H., and VanLoan,C.,F.	Matrix Computations		JHU Press

Soft Computing
Code: PCCAIML603 & PCCAIML693
Contacts: 3L + 4P

Name of the Course:	**Soft Computing**
Course Code: PCCAIML603 & PCCAIML693	Semester: VI
Duration:6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester exam: 15
Tutorial: NIL	Assignment and Quiz : 10 marks
	Attendance: 5 marks
Practical: 4 hrs./week	End Semester Exam: 70 Marks
	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination: 60
Credit Points:	3 + 2

Unit	Content	Hrs/Unit	Marks/Unit
1	Introduction: Introduction to soft computing; introduction to fuzzy sets and fuzzy logic systems; introduction to biological and artificial neural network; introduction to Genetic Algorithm	8	

2	Fuzzy sets and Fuzzy logic systems: Classical Sets and Fuzzy Sets and Fuzzy relations : Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets, cardinality, operations, and properties of fuzzy relations. Membership functions : Features of membership functions, standard forms and boundaries, different fuzzification methods. Fuzzy to Crisp conversions: Lambda Cuts for fuzzy sets, fuzzy Relations, Defuzzification methods. Classical Logic and Fuzzy Logic: Classical predicate logic, Fuzzy Logic, Approximate reasoning and Fuzzy Implication Fuzzy Rule based Systems: Linguistic Hedges, Fuzzy Rule based system – Aggregation of fuzzy Rules, Fuzzy Inference System- Mamdani Fuzzy Models – Sugeno Fuzzy Models. Applications of Fuzzy Logic: How Fuzzy Logic is applied in Home Appliances, General Fuzzy Logic controllers, Basic Medical Diagnostic systems and Weather forecasting	10	

3	Neural Network Introduction to Neural Networks: Advent of Modern Neuroscience, Classical AI and Neural Networks, Biological Neurons and Artificial neural network; model of artificial neuron. Learning Methods : Hebbian, competitive, Boltzman etc., Neural Network models: Perceptron, Adaline andMadaline networks; single layer network; Back- propagation and multi layer networks. Competitive learning networks: Kohonen self organizing networks, Hebbian learning; Hopfield Networks. Neuo-Fuzzy modelling:Applications of Neural Networks: Pattern Recognition and classification	10	
4.	Genetic Algorithms: Simple GA, crossover and mutation, Multi-objective Genetic Algorithm (MOGA). Applications of Genetic Algorithm: geneticalgorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition	10	
5	**PSO:**Other Soft Computing techniques: Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).	4	

Practical:

Skills to be developed:

1. Able to apply Soft Computing techniques to solve a number of real life problems.

Assignments: : Assignment from theory

List of Books

Text Books:

Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Timothy J. Ross, JohnWiley and Sons	Fuzzy logic with engineering applications		
S. Rajasekaran andG.A.V.Pai	Neural Networks, Fuzzy Logic and Genetic Algorithms		PHI
S N Sivanandam, S.Sumathi, John	Principles of Soft Computing		
Reference Books:			
George J. Klir and BoYuan	Fuzzy Sets and Fuzzy Logic: Theory and Applications		Prentice Hall
Simon Haykin	Neural Networks: A Comprehensive Foundation		Prentice Hall.

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**ALL**	**10**	**10**	**5**	**3**	**15**	**70**
B	**All**						
c	**All**			**5**	**3**	**45**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objectivepart.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**ALL**	**1**	**10**	**10**
B	**ALL**	**5**	**5**	**3**
C	**ALL**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:		
Practical Internal Sessional Continuous Evaluation		
Internal Examination:		
Continuous evaluation		**40**
External Examination: Examiner-		
Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course:	**Computer Networks**		
Course Code: PCC-CS602	Semester: VI		
Duration:6 months	Maximum Marks:100		
Teaching Scheme		**Examination Scheme**	
Theory:3 hrs./week		Mid Semester exam: 15	
Tutorial: NIL		Assignment and Quiz: 10 marks	
		Attendance: 5 marks	
Practical: hrs./week		End Semester Exam:70 Marks	
Credit Points:	3		
Objective:			
1	To develop an understanding of modern network architectures from a design and performance perspective.		
2	To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).		
3	To provide an opportunity to do network programming		
4	To provide a WLAN measurement ideas.		
Unit	Content	Hrs/Unit	Marks/Unit

1	Data communication Components: Representation of data and its flow Networks,Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.	9	
2	Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA,CSMA/CD,CDMA/CA	8	
3	Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.	14	
4.	Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.	8	
5	Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.	8	

Text book and Reference books:

1. Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.
3. "Algorithm Design" by Kleinberg and Tardos.
4. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing House, New Delhi

Course Outcomes:

On completion of the course students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today’s world is controlled by Computer, Information Technology, but tomorrow

world will be ruled by ideas, concept, and creativity.

5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Computer Networks Lab
Code: PCC-CS692
Contacts: 4P

Name of the Course:	Computer Networks Lab
Course Code: PCC-CS692	Semester: VI
Duration:6 months	Maximum Marks:100
Teaching Scheme:	
Theory: hrs./week	Continuous Internal Assessment
Tutorial: NIL	External Assesement:60
Practical: 4 hrs./week	Distribution of marks:40
Credit Points:	2

1) NIC Installation & Configuration (Windows/Linux)
2) Understanding IP address, subnet etc
Familiarization with
- Networking cables (CAT5, UTP)
- Connectors (RJ45, T-connector)
- Hubs, Switches

3) TCP/UDP Socket Programming
- Simple, TCP based, UDP based
- Multicast & Broadcast Sockets
- Implementation of a Prototype Multithreaded Server

4) Implementation of
□ □ Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window)
□ □ Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check)
□ □ Data Link Layer Error Control Mechanism (Selective Repeat, Go Back N)
5) Server Setup/Configuration
FTP, TelNet, NFS, DNS, Firewall

Any experiment specially designed by the college
(Detailed instructions for Laboratory Manual to be followed for further guidance)

Big Data Analytics
Code: PECAIML601A
Contacts: 3L

Name of the Course:	**Big Data Analytics**	
Course Code: **PECAIML601A**	Semester: VI	
Duration:6 months	Maximum Marks: 100	
Teaching Scheme		**Examination Scheme**
Theory: 3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz : 10 marks
		Attendance: 5 marks
Practical: NIL		End Semester Exam: 70 Marks
Credit Points:	3	

LECTURE WITH BREAKUP	**NO. OF LECTUR**
Unit 1: What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.	8
Unit 2: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations.	8
Unit 3: Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based datastructures	9
Unit 4: MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats	10
Unit 5:	7
Hbase, data model and implementations, Hbase clients, Hbase examples, praxis.Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.	

Unit 6: Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts. Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries.	6

References:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging
2. V.K. Jain, Big Data and Hadoop, Khanna Publishing House, New Delhi (2017).
3. V.K. Jain, Data Analysis, Khanna Publishing House, New Delhi (2019).
4. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
5. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
6. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
7. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
8. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
9. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
10. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
11. Alan Gates, "Programming Pig", O'Reilley, 2011.

Distributed Systems
Code: PECAIML-601C
Contact: 3L

Unit	Content	Hrs/Unit	Marks/Unit
1	**INTRODUCTION** Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts **DISTRIBUTED DATABASE MANAGEMENT SYSTEM ARCHITECTURE** Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues	8	
2	**DISTRIBUTED DATABASE DESIGN** Alternative design strategies; Distributed design issues; Fragmentation; Data allocation **SEMANTICS DATA CONTROL** View management; Data security; Semantic Integrity Control QUERY **PROCESSING ISSUES** Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data	11	
3	**DISTRIBUTED QUERY OPTIMIZATION** Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms **TRANSACTION MANAGEMENT** The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models **CONCURRENCY CONTROL** Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management	11	
4.	Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols Algorithm	8	
5	**PARALLEL DATABASE** SYSTEMS Parallel architectures; parallel query processing and	6	

6	**ADVANCED TOPICS Mobile** Databases, Distributed Object Management, Multi-databases	4	

Text book and Reference books:

1. Principles of Distributed Database Systems, M.T. Ozsu and PValduriez, Prentice-Hall, 1991.
2. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

Data Mining
Code: PECAIML-601B
Contacts: 3L

Name of the Course:	Data Mining		
Course Code **PEC-AIML-601B**	Semester: VI		
Duration: 6 months	Maximum Marks: 100		
Teaching Scheme		**Examination Scheme**	
Theory:3 hrs./week		Mid Semester exam: 15	
Tutorial: NIL		Assignment and Quiz: 10 marks	
		Attendance: 5 marks	
Practical: NIL		End Semester Exam:70 Marks	
Credit Points:	3		

Unit	Content	Hrs/Unit	Marks/Unit
	Unit 1:		
1	Overiew of data ming and predictive analytics. Where does it apply and where does it not apply. The emerging interdisplinary field of Data Science – what on Earth is it? The potential pitfalls of analytics including big bad data and the problem of local sparsity in large data sets -- big never guarantees sufficient. Brief discussion of Career Opportunities including an overview of the UNH MS Analytics program.	4	
2	**Unit 2:** Data preprocessing and cleanup including informative missing values and imputation.	3	

3	**Unit 3:** Unsupervised learning: Exploring data with visualization (primarily JMP Pro and Enterprise Guide), Principal Components, Cluster Analysis, Variables Clustering, and Market Basket analysis (association analysis). The problem of explanatory (traditional) vs predictive modeling and why it matters.	8	
4.	**Unit 4:** The under and overfitting dilemma of predictive modeling. Includes a discussion of measures of overfitting and underfitting such as AICc, BIC, and the very new ERIC.	6	
5	**Unit 5:** Validation strategies to assess model predictive behavior and predictive inference	2	
6	**Unit 6:** Supervised learning for classification: k-nearest neighbors, Decision Trees and Random Forests, Naïve Bayes, Neural Nets, Logistic Regression, Generalized Regression, Support Vector Machines, Discriminant Analysis. Topics include boosted neural and tree models.	5	
7	**Unit 7:** Supervised learning for prediction: review of multiple linear regression and related topics like influence and multi-collinearity, PCR, Neural Nets, Generalized Regression including the LASSO (adaptive), LARS, Ridge, and Elastic Net (adaptive). Traditional variable Selection strategies such as Forward Selection and All Possible Models will also be covered.	6	
8	**Unit 8:** Model assessment measures for predictive and classification models: model scoring, prediction error analysis, ROC and Lift curves, profit matrices for	6	

	classification, various model comparison criteria. Ensemble Modeling: combining predictive models to create even more powerful models; includes boosting and bagging strategies.		

Text book and Reference books:

1. Data Mining for Business Intelligence: Concepts, Techniques and Applications with JMP Pro; Shmueli, Bruce, Stephens, Patel 2017,Wiley & Sons
2. Preparing Data for Analysis with JMP by Robert Carver
3. Introduction to Statistical Learing, sixth printing, by Gareth, Tibshirani, Hastie, and Whitten

Database Management Systems
Code: OECAIML-601A
Contact: 3L

Name of the Course:	**Database Management Systems**	
Course Code: **OECAIML-601A**	Semester: VI	
Duration:6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance: 5 marks
Practical: hrs./week		End Semester Exam:70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/Unit
1	**Database system architecture:**Data Abstraction, Data Independence,Data Definition Language(DDL),Data ManipulationLanguage(DML). **Data models:** Entity-relationshipmodel, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	9	

2	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQLserver. **Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Losslessdesign. **Query processing and optimization:** Evaluation of relational algebra expressions,Query equivalence, Join strategies, Query optimization algorithms.	13	
3	**Storage strategies**: Indices, B-trees, hashing.	3	
4.	**Transaction processing:** Concurrencycontrol, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	5	
5	**Database Security:** Authentication, Authorization and access control, DAC,MAC and RBAC models, Intrusion detection, SQL injection.	3	
6	**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	3	

Text book and Reference books:

1. "Database System Concepts" , 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan,McGraw-Hill.
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3. Database Management Systems, R.P. Mahapatra, Khanna Publishing House, New Delhi (AICTE Recommended Textbook – 2018)
4. "Fundamentals of Database Systems" , 5th Edition by R. Elmasri and S.Navathe,
5. PearsonEducation "Foundations of Databases", Reprint by SergeAbiteboul, Richard Hull, Victor Vianu,Addison-Wesley

Human Computer Interaction
Code:OECAIML-601B
Contact: 3L

Name of the Course:	**Human Computer Interaction**	
Course Code: OECAIML-601B	Semester: VI	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/ Unit
1	Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.	9	
2	Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.	11	
3.	Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.	8	
4.	Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.	8	

5.	Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.	8	
6.	Recent Trends: Speech Recognition and Translation, Multimodal System	3	

Text book and Reference books:

1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett
2. Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security,Addison Wesley.

Subject: Neural Networks			
Course Code: OECAIML-601C		**Semester: VI**	
Duration: 36		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3 Hrs./week		End Semester Exam: 70	
Tutorial: 0		Attendance : 5	
Practical:		Continuous Assessment:25	
Credit: 3			
Aim:			
Sl. No.			
1.	Develop algorithms simulating human brain.		
2.	Implement Neural Networks in Tensor Flow for solving problems.		
3.	Explore the essentials of Deep Learning and Deep Network architectures.		
4.	Define, train and use a Deep Neural Network for solving real world problems thatrequire artificial Intelligence based solutions.		
Objective:			
Sl. No.			
1.	To acquire knowledge on the basics of neural networks.		
2.	To implement neural networks using computational tools for variety of problems.		
3.	To explore various deep learning algorithms.		
Pre-Requisite:			
Sl. No.			
1.	Calculus, Linear Algebra		
2.	Probability & Statistics		
3.	Ability to code in R/Python		
Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamentallearning techniques.	**3**	**5**

02	**Feed forward neural network** Artificial Neural Network, activation function, multi-layer neural network,cardinality, operations, and properties of fuzzyrelations.	**6**	**10**
03	**Training Neural Network** Risk minimization, loss function, backpropagation, regularization, model selection, and optimization.	**6**	**15**
04	**Conditional Random Fields** Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.	**9**	**15**
05	**Deep Learning** Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, RecurrentNeural Network, Deep Belief Network.	**6**	**15**
06	**Deep Learning research** Object recognition, sparse coding, computer vision, naturallanguage	**6**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Goodfellow, I.,Bengio,Y.,and Courville A.,	Deep Learning		MIT Press
Satish Kumar	Neural Networks: A Classroom Approach		Tata McGraw-Hill
Reference Books:			
Bishop, C. ,M.	Pattern Recognition and Machine Learning		Springer
Yegnanarayana, B.	Artificial Neural Networks		PHI Learning Pvt. Ltd
Golub, G.,H., and VanLoan,C.,F.	Matrix Computations		JHU Press

Name of the Course:	Cryptography & Network Security	
Course Code: OEC-AIML 601D	Semester: VI	
Duration: 6 months	Maximum Marks: 100	
Teaching Scheme		**Examination Scheme**
Theory: 3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance: 5 marks
Practical: NIL		End Semester Exam : 70 Marks
Credit Points:	3	

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms , A Model for Network Security, Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography, Cryptographic Tools, Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data, User Authentication, Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication, Malicious Software, Types of Malicious Software (Malware), Propagation—Infected Content—Viruses, Propagation—Vulnerability Exploit—Worms, Propagation—Social Engineering—SPAM Email, Trojans, Payload—System Corruption, Payload—Attack Agent—Zombie, Bots, Payload—Information Theft—Key loggers, Phishing, Spyware, Payload—Stealthing— Backdoors, Rootkits, Countermeasures, Firewalls and Intrusion Prevention Systems, the Need for Firewalls, Firewall Characteristic, Types of Firewalls, Firewall Basing, Firewall Location and Configurations, Intrusion Prevention Systems.

Text Books:

1. Cryptography and Network Security: Principles and Practice by William Stalings 6th Edition published by PHI (2011)
2. Computer security principles and practice, William Stallings, Lawrie Brown, third edition, Prentice-Hall, 2011
3. Cryptography and Network Security, V.K. Jain, Khanna Publishing House