



Guru Nanak Dev Engineering College, Ludhiana Department of Computer Science & Engineering

Ref. No .:. CS E/228

Dated 25-02-2020

Minutes of meeting of internal members of Board of Studies of Computer Science and Engineering department held on 24.02.2020 at 11:30am in the office of HOD (CSE).

The following persons were present:

- 1. Dr. Parminder Singh, Professor & Head, Department of Computer Science and Engineering, GNDEC, Ludhiana (Chairman)
- 2. Er. Amanpreet Singh Brar, Associate Professor, Department of Computer Science and Engineering, GNDEC, Ludhiana (Member)
- 3. Er. Amandeep Kaur Sohal, Assistant Professor, Department of Computer Science and Engineering, GNDEC, Ludhiana (Member)
- 4. Dr. Sumeet Kaur Sehra, Assistant Professor, Department of Computer Science and Engineering, GNDEC, Ludhiana (Member)
- 5. Dr. Vivek Thapar, Assistant Professor, Department of Computer Science and Engineering, GNDEC, Ludhiana (Member)

The meeting started with welcome address by chairman BOS. Following decisions were taken unanimously:

# Proceedings:

# Agenda Item 1

To review/simplify the syllabi of four subjects – Cloud Computing, Artificial Intelligence, Machine Learning and Internet of Things to be taught to the students of all B.Tech. branches other than B.Tech. (Computer Science and Engineering) and B.Tech. (Information Technology) as recommended by NPIU, MHRD, New Delhi and further discussed in the 11<sup>th</sup> Academic Council meeting.

The syllabi of four subjects – Cloud Computing, Artificial Intelligence, Machine Learning and Internet of Things to be taught to the students of all B.Tech. branches (2018 admission batch onwards) other than B.Tech. (Computer Science and Engineering) and B.Tech. (Information Technology) as recommended by NPIU, MHRD, New Delhi and further discussed in the 11<sup>th</sup> Academic Council meeting; are discussed in detail.

Dr. Parvainder Singh

Dr. Sumeet Kaur Sehra

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Er.	Amanpreet Singh	Brar

Er. Amandeep Kaur Sohal

Dr. Vivek Thapar

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Following recommendation were given by the members of board of studies:

- 1. Machine Learning: Exclude unit "Hidden Markov Model", Clustering topic should be part of Introduction unit, in unit "Decision tree learning", the "id3 learning algorithm" should be
- 2. Cloud Computing: In Introduction part, basic topics related to computer networks should be added. Chapter "Cloud computing platforms" should be simplified in context to other branches.
- 3. Artificial Intelligence: Uninformed search strategies should be added as prerequisite for problem solving. Unit "Planning" should be excluded to simplify the syllabus. In unit "Applications", more general applications should be added.
- 4. Internet of Things: The Python module should be removed from the syllabus.

The syllabi of these subjects after revision were attached as Annexure-I.

Dr. Parm Caur Sehra Dr. Sumeet

Er. Amanpreet Singh Brar

Er. Amandeep Kaur Sohal

Dr. Vivek Thapar

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#### Subject Name: Machine Learning

L: 3 T: 0 P: 0
Teaching Hours: 36 Hours
Credits:
Percentage of Numerical/Design/Programming Problems:20%
Duration of End Semester Exam(ESE): 3 hours
Course Status:

Additional Material Allowed in ESE: Nil

# On completion of the course the student will have the ability to:

CO #	Course Outcomes	
1.	Examine the complexity of Machine Learning algorithms and their limitations for	
	different set of problems.	
2.	Develop a good understanding of the fundamental issues and challenges of machine learning like data, model selection, model complexity, etc.	
3.	Formulate new solutions for various problems or improve efficiency of existing solutions using learned algorithms.	
4.	Analyze the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning	
5.	Identify and apply machine learning techniques suitable for a given problem.	

# **Detailed Contents:**

### Part - A

**Introduction:** Designing a learning system, Perspectives and issues in machine learning, Types of machine learning - supervised learning, unsupervised learning. Clustering, Hierarchical clustering – Hierarchical agglomerative clustering. Non- Hierarchical clustering – K-means clustering. [7 Hours]

**Decision Tree Learning:** Decision tree representation, appropriate problems for decision tree learning, Issues in decision tree learning - overfitting, pruning, noisy data. [5 Hours]

**Bayesian Learning:** Probability theory and Bayes rule, Bayes theorem and Concept learning, Maximum likelihood estimation, Maximum A Posteriori (MAP) estimation, Bayesian estimation, Naive Bayes classifier, Parameter smoothing, Logistic regression. [6 Hours]

# Part - B

Instance Based Learning: Introduction, k-nearest neighbor learning, Distance weighted nearest neighbor algorithm, Case based learning. [4 Hours]

Artificial Neural Networks: Introduction - Neurons and biological motivation. Neural network representations, Appropriate problems for neural network learning, Perceptron's- representational power, perception training rule. Multilayer networks and Backpropagation algorithm. [7 Hours]

Support Vector Machines: Introduction, Hyper-plane, Optimal hyper-plane, Maximum margin classifier, Kernel function and Kernel SVM, Multiclass SVM. [4 Hours]

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Agenda Item

Applications: Machine learning applications for Feature extraction, Pattern recognition, Data mining Fraud detection, Search engines and recommendation systems. [3 Hours

### **Text Books:**

- 1. Tom Mitchell, "Machine Learning", McGraw-Hill.
- 2. Ethem Alpaydin, "Introduction to Machine Learning", PHI.
- 3. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press.
- 4. Christopher D. Manning, Hinrich Schiitze "Foundations of Statistical Natural Language Processing", MIT Press.

### **Reference Books:**

- 1. Richard Duda, Peter Hart and David Stork, "Pattern Classification," John Wiley & Sons.
- 2. Bishop, C."Pattern Recognition and Machine Learning", Berlin: Springer-Verlag.

### E-Books and online learning material

1. Understanding Machine Learning: From Theory to Algorithms by Shai Shalev-Shwartz and Shai Ben-David

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- Introduction to Machine Learning by Nils J. Nilsson <u>https://ai.stanford.edu/~nilsson/MLBOOK.pdf</u>
  A Course in Machine Learning by Hal Daume III
- http://ciml.info/dl/v0\_8/ciml-v0\_8-all.pdf Accessed on Feb. 24, 2020

# **Online Courses and Video Lectures**

1.	https://nptel.ac.in/courses/106106139/	Accessed on Feb. 24, 2020
2.	https://www.coursera.org/learn/machine-learning	Accessed on Feb. 24, 2020
3.	https://www.edx.org/learn/machine-learning	Accessed on Feb. 24, 2020
4.	https://online.stanford.edu/courses/cs229-machine-learning	Accessed on Feb. 24, 2020

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Subject Name: Cloud Computing

Programme: B.Tech	L: 3 T: 0 P:0
Semester:	Teaching Hours: 36
Theory / Practical: Theory	Credits: 3
Internal Marks: 40	<b>Percentage of Numerical/Design/Programming Problems:</b> 10%
External Marks: 60	Duration of End Semester Exam (ESE) : 3 hrs
Total Marks: 100	Elective Status : Elective

# Additional Material Allowed in ESE: [NIL]

### On Completion of the course, the student will have the ability to:

CO#	Course Outcome (CO)
1	Compare and contrast the different computing paradigms
2	Make use of core technologies of cloud computing in selection of cloud deployment model.
3	Classify the various service models of cloud.
4	Assess the various issues and challenges in context of cloud security.
5	Compare and contrast open cloud platforms with commercial cloud platforms.
6	Design and plan a cloud using open cloud platforms.

### **Detailed Contents:**

# Part-A

**Cloud Computing Fundamentals**: Introduction to Networking: Peer to Peer network, Client-Server network, Internet and Intranet. Evolution of cloud computing, Overview of computing paradigms: Distributed computing, Cluster computing, Grid computing, Utility computing, Autonomic computing, and Cloud computing. The NIST model of cloud computing, Benefits and challenges of cloud computing, Big Data, Internet of things (IoT). [9 Hours]

**Cloud Concepts and Technologies:** Virtualization: Definition, Characteristics and benefits of virtualization, Virtualization and cloud computing, Types of virtualization, and Load balancing Hypervisors, Multitenancy, Scalability and elasticity, Service level agreement (SLA). [9 Hours]

### Part-B

Cloud Architecture and Services: Cloud computing reference model architecture, Cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Cloud-based services and applications: Cloud computing for healthcare, Energy systems Transportation systems, Manufacturing industry, Government, and Education. Cloud deployment

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models: Public, Private, Community, and Hybrid cloud.

[8 Hours]

Security in Clouds: Cloud security issues and challenges, Cloud security reference model, Encryption techniques: Symmetric key encryption and Asymmetric key encryption. Identity and key management, Digital signature, Secure socket layer (SSL). [5 Hours]

Cloud Computing Platforms: Study and comparison of various open source and commercial cloud platforms. [5 Hours]

#### **Text Books:**

- 1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, "Cloud Computing: Principles and Paradigms", Wiley Publication
- 2. Barrie Sosinsky, "Cloud Computing Bible", Wiley India Pvt. Ltd.
- 3. John Rittinghouse, James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press Taylor and Francis Group.
- 4. Anthony Velte, Toby Velte, Robert Elsenpeter, "Cloud Computing: A practical Approach", Tata McGrawHill
- 5. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, "Cloud Computing for Dummies", Wiley Publication.

#### **Reference Books:**

- 1 R.L. Krutz and R.D. Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India.
- 2 Thomas Erl, Zaigham Mahmood, Ricardo Puttini, "Cloud Computing Concepts, Technology, & Architecture" Prentice Hall
- 3 Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Appraoch", Tata McGrawHill.
- 4 Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi, "Mastering Cloud Computing" Tata McGrawHill.

### E-Books and online learning Material:

- 1 Introduction to Cloud Computing by Dan C. Marinec, <u>https://www.cs.ucf.edu/~dcm/Tutorials/</u> <u>RCIS-Tutorial.pdf</u> Accessed on Feb. 24th, 2020.
- 2 Security Guidance for Critical Areas of Focus in Cloud Computing by Cloud Security Alliance, https://cloudsecurityalliance.org/artifacts/security-guidance-for-critical-areas-of-focus-in-cloudcomputing-v1-0/ Accessed on Feb. 24th, 2020.

#### **Online Courses and Video Lectures**

- 1 https://nptel.ac.in/courses/106105167/ accessed on Feb. 24th, 2020.
- 2 https://freevideolectures.com/course/3649/cloud-computing Accessed on Feb. 24th, 2020.

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# Subject Name: Artificial Intelligence

Programme: B.Tech.	L: 3 T: 0 P: 0
Semester:	Teaching Hours: 36
Theory/Practical: Theory	Credits:
Internal Marks: 40	Percentage of Numerical/Design/Programming Problems: 50%
External Marks: 60	Duration of End Semester Exam (ESE): 3 hrs
Total Marks: 100	Elective Status:

Prerequisites: Probability, basics of Data Structures.

# Additional Material Allowed in ESE: [Scientific Calculator or NIL]

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the informed and uninformed problem types and apply search strategies to
2	solve them.
2	Apply and analyze AI techniques to solve real-world problems doing enpirit and
3	Design and evaluate intelligent expert models for perception and prediction from
	intelligent environment.
4	Formulate valid solutions for problems involving uncertain inputs or outcomes by using
	decision making techniques.
5	Demonstrate and enrich knowledge to select and apply AI tools to synthesize
	information and develop models within constraints of application area.
1	Examine the issues involved in knowledge bases and reasoning systems.
6	Examine the issues involved in knowledge bases and reasoning systemet

### **Detailed Contents:**

# Part- A

Introduction: Intelligence, Foundations of artificial intelligence (AI). History of AI, Agents and the architecture, Communication among agents.

Problem Formulation and solution, Problem types, States and operators, State space. Uninforme Search Strategies: DFS, BFS, DFID, Bi-directional. Informed Search Strategies- Best first search, A algorithm, Heuristic functions.

Game playing - Perfect decision game, Imperfect decision game, Evaluation function, Minima 9 Hour algorithm, Alpha-beta pruning.

Logical Reasoning: Inference, Propositional logic, Predicate logic (first order logic), Resolutio Logical reasoning, Forward chaining, Backward chaining; Knowledge representation technique [9 Hour semantic networks, Frames.

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### Part B

Uncertainty: Basic probability, Bayes rule, Belief networks, Default reasoning, Fuzzy sets and fuzzy logic; Decision making-Utility theory, Utility functions, Decision theoretic expert systems. [7 Hours]

Inductive learning: Decision trees, Rule based learning, Current-best-hypothesis search, Leas commitment search, Neural networks, Reinforcement learning, Genetic algorithms. [7 Hours

Applications: Areas of AI, Case study of existing expert systems.

# **Text Books:**

- 1. Stuart Russel and Peter Norvig, "Artificial Intelligence A Modern Approach", Pearson Education Press.
- 2. Kevin Knight, Elaine Rich, B. Nair, "Artificial Intelligence" McGraw Hill.
- 3. George F. Luger, "Artificial Intelligence", Pearson Education.
- 4. Saroj Kaushik, "Artificial Intelligence", Cengage Learning.

# **Reference Books:**

- 1. Denis Rothman, "Artificial Intelligence by Example", Packt Publishing Ltd.
- 2. James V Stone, "Artificial Intelligence Engines: A Tutorial Introduction to the Mathematics of Deep Learning", Sebtel Press.
- 3. Nils J. Nils,"Artificial Intelligence: A New Synthesis", Morgan Kaufmann Publishers Inc.

# E-Books and online learning material

- 1. Computers and Thought: A practical Introduction to Artificial Intelligence https://www.cs.bham.ac.uk/research/projects/poplog/computers-and-thought/
- 2. Artificial intelligence : a modern approach/ Stuart Russell, Peter Norvig. https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern-approach.9780131038059.25368.pdf
- 3. Al Handbook https://stacks.stanford.edu/file/druid:gn160ck3308/qn160ck3308.pdf
- 4. Artificial Intelligence: Foundation of Computational Agents https://artint.info/html/ArtInt.html

### **Online Courses and Video Lectures**

- 1. https://nptel.ac.in/courses/106/105/106105077/
- 2. http://learn.stanford.edu/Artificial-Intelligence-Programs.html?utm\_source=google&utm\_medium=ppc&utm\_term=computerscience&utm\_campaign=AL vsrefdom=Adwords-Other&gclid=EAIaIQobChMI1Nj21s\_p5wIVkoiPCh3YQQOqEAAYBCAAEgLfq\_D\_BwE Accessed on Feb 24, 2020
- 3. https://www.coursera.org/courses?query=artificial%20intelligence Accessed on Feb 24, 2020

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Accessed on Feb 24, 2020

[4 Hours

# Subject Name: Internet of Things

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Programme: B.Tech.	L: 3 1:0 P:0
Semester:	Teaching Hours: 36
Theory/Practical: Theory	Credits:
Internal Marks: 40	Percentage of Numerical/Design/Programming
	Problems: 50%
External Marks: 60	Duration of End Semester Exam (ESE): 3 hrs
External Warks: 00	Elective Status:
Total Marks: 100	

Additional Material Allowed in ESE: NIL

On Completion of the course, the student will have the ability to:

CO#	Course Outcome	
CO1	Apply the concepts of IOT.	
CO2	Identify the different technology	
CO2	Apply IOT to different applications.	
CO4	Analysis and evaluate protocols used in IOT	
C05	Design and develop smart city in IOT	
CO6	Analysis and evaluate the data received through sensors in IOT.	

### **Detailed Contents**

### Part-A

Introduction to IoT: Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design c IoT, Functional blocks of IoT, Communication models & APIs, IoT & M2M Machine to Machine [8 Hours] Difference between IoT and M2M, Software define Networks.

Network & Communication aspects: Wireless medium access issues, Protocols in IOT, MA protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation . 107 Hour: dissemination.

Challenges in IoT Design challenges: Development challenges, Security challenges, Role of Senso [06 Hour in IOT, Introduction to Industrial Internet of Things IIOT.

### Part-B

Application of IOT: Domain specific applications of IoT Home automation, Industry application Surveillance applications, IOT Applications such as Lighting as a service (case study) Intellige Traffic systems (case study) Smart Parking (case study) Smart water management (case stud [07 Hou] Developing Smart Cities through IOT.

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Vulnerabilities: Security Requirements and Threat Analysis, Use and Misuse Cases, IoT Security Tomography and Layered Attacker Model, Identity Management and Establishment, Access Control and Secure Message Communication. [8 Hours]

# **Text Books**

- 1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach" Vijay Madisetti publishers.
- 2. Applications of IOT in Digital era, A N Sarkar, New Delhi Publishers.
- 3. Getting Started with IOT, Packt Publishers

# **Reference Books:**

- 1. The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, Miller Michael R. Pearson Publishers.
- Emerging Trends and Applications of the Internet of Things, Petar Kocovic Reinhold Behringer Muthu Ramachandran IGI Publishers.

# E-Books and online learning material

1. Introduction to IOT, Sudip Mishra, Deptt of CSE, IIT Kharagpur.

# **Online Courses and Video Lectures**

- 1. https://nptel.ac.in/courses/106105166/
- 2. Lecture Series on IOT by Edureka

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