DIRECTORATE OF INNOVATIVE LEARNING AND TEACHING (DILT)

(formerly SCDE_ School of Continuing and Distance Education)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

Kukatpally, Hyderabad – 500 085, Telangana, India

Notification for
Six Months Online Certificate Courses – 2023

Advt. No.: JNTUH/DILT/Certificate Course/2023 Date: 26.11.2023

Online applications are invited from the eligible candidates for the following **Six Months Online Certificate Courses**, offered by**, JNTUH,** Kukatpally, Hyderabad on or before **22.12.2023**.

1. Cyber Security
2. Data Science with Python Programming
3. Artificial Intelligence and Machine Learning

For details please see the website: **www.jntuh.ac.in**.
Contact No**.: 9154251963**
E- mail: **pa2scdedirector@gmail.com** Sd/-

DIRECTOR, DILT, JNTUH

DIRECTORATE OF INNOVATIVE LEARNING AND TEACHING

ONLINE CERTIFICATE COURSES – 2023

ADMISSION NOTIFICATION

INFORMATION TO THE CANDIDATES

Dt.26.11.2023

Online Applications are invited from faculty, working employees, students and other eligible candidates for admission into following Six Months Online Certificate Courses, offered at **DILT, JNTUH** Kukatpally, Hyderabad for the academic year 2023-24.

S.No.	Important dates	Dates
1	**Date of Notification**	**26-11-2023**
2	**Last date for online submission**	**15-12-2023**
3	**Last date for online submission with fine of Rs.500/-**	**22-12-2023**

I. Six Months Online Certificate Courses:

S.No.	Name of the Certificate Course	Subjects		Credits	Lectures (2 hours duration)	Clock Hours
1	Cyber Security	Subj-1	Cyber Security Fundamentals	3	24 classes(2 Months duration)	48
		Subj-2	E- Commerce and Digital Security	3	24 classes(2 Months duration)	48
		Subj-3	Cyber Laws and Security Management	3	24 classes(2 Months duration)	48
2	Data Science with Python Programming	Subj-1	Programming using Python	3	24 classes(2 Months duration)	48
		Subj-2	Machine Learning	3	24 classes(2 Months duration)	48
		Subj-3	Natural Language Processing (NLP) and Big Data	3	24 classes(2 Months duration)	48
3	Artificial Intelligence and Machine Learning	Subj-1	Python for Data Science	3	24 classes(2 Months duration)	48
		Subj-2	Machine Learning	3	24 classes(2 Months duration)	48
		Subj-3	Artificial Intelligence	3	24 classes(2 Months duration)	48

Note: In addition to three theory subjects in each course there will be **Project work** with 6 Credits with one-month duration

II. Eligibility:

Sl.No	Name of the Course	Eligibility
1	Cyber Security	Candidates who have completed or pursuing Diploma / UG / PG Degree
2	Data Science with Python Programming	Candidates who have completed or pursuing Diploma / UG / PG Degree
3	Artificial Intelligence and Machine Learning	Candidates who have completed or pursuing Diploma / UG / PG Degree

Contd..page2

III. Desirable: Candidates applying for online certificate courses are presumed to have basic Computer knowledge with any programming language writing skills.

IV. Registration: The registration process is through **online mode only**

Selection Procedure: Admissions will be made on First-Come-First Serve basis **in online mode** after evaluation by admission committee. The JNTUH Hyderabad reserves right to increase / decrease the total number of seats in each course or to cancel the entire admission process

V. Duration of the Course: Six Months

VI. Class Work Timings: 6:30 PM to 8:30 PM (Through online mode only)

VII. Fee Details:

(i) **Registration Fee:** Rs.500/- to be paid (add late fee of Rs. 500/- if applicable) at the time of online registration.

(ii) **Admission fee:** Rs. 1,000/- for the candidates who get admitted.

(iii) **Course Fee:** The candidate has to pay Course fee of Rs. 25,000/-. At the time of admission. *Fee once paid will not be refunded*. Examination fee will be collected separately.

VIII. Practical theory session:

(i) 75% attendance is compulsory for each Theory/ Lab session.

(ii) Condonation of shortage of attendance upto 10% i.e. between 65 and 75% may be given by the Director, DILT on genuine and valid grounds with supporting evidence, and shortage of attendance below 65% shall in no case be condoned.

(iii) The theory & practical sessions will be held through Online Mode.

IX. Evaluation Scheme:

(i) Completion of the Certificate Course requires successful completion of both Assignment component/ Lab record and End examination component for each Theory & practical course in the Certificate Course.

(ii) Continuous evaluation through assignments with a weightage of 40%(Theory/Lab)

(iii) The End examination shall have a weightage of 60% (Theory /Lab).

(iv) The requirement for passing (Theory / Lab) would be at least 40% in Continuous evaluation and 40% in the End examination with an overall average of 40% for a PASS (Theory / Lab) in the course.

Scanned Document Copies to be uploaded through online:

a) S.S.C.
b) Intermediate Certificate and Consolidated Marks Memo / Diploma Certificate
c) Under Graduate Certificate and Consolidated Marks Memo/ Study Certificate in case of current undergraduate students
d) Any other relevant Certificates if any

Contd..page 3

X. Regulations:

i) A candidate after securing admission shall pursue the Online Certificate Course in period of Six months.

ii) Each Certificate Course is of 15 credits with three subjects and a Project.

iii) Permission was accorded to engage the faculty by consideration in SCM for the faculty having specialization in interdisciplinary branches (with two individual Subjects offered as part of Six Months Online Certificate Course).

iv) The credits allotted for each subject are equivalent to the credits of the individual subjects offered in B. Tech., as per JNTUH Academic Regulations-2022.

v) The credits for the Project is not equivalent to the B. Tech., Major/ Mini Project of JNTUH Academic Regulations.

vi) The students of constituent and Affiliated Colleges (both Autonomous & non-Autonomous) can avail the provision of transfer of credits earned for the individual theory subjects offered as a part of Certificate Courses for the award of U.G. degree as per the provisions of B. Tech., Academic Regulations-2022 of JNTUH.

vii) The internal staff (teaching & non-teaching) of the University and current students of constituent academic units can avail 40% fee concession.

GENERAL INSTRUCTIONS:

- Certificate Courses will be started only if the number of eligible candidates seeking admission to the program is not less than minimum approved intake by the University.
- The University reserves the right to make alterations in intake and rules for admission.
- Incomplete online registration application will be summarily rejected. No correspondence in this regard will be entertained.
- Fee will not be refunded under any circumstances.
- If it is detected that a candidate has been admitted due to any mistake made inadvertently in the processing of registration and during the admission stage, the University reserves the right to cancel such ineligible admission at any stage.
- The candidates may note that these Certificate Courses are unique with respect to their disciplines and no equivalence shall be given by the University.
- If any dispute concerning admission in the courses of JNTUH arises, the jurisdiction shall remain with the Courts/Consumer Forum in Hyderabad only.
- In case of candidates undergoing any Certificate Courses, UG / PG Programs of any other institutions currently in offline/ online mode, it is the responsibility of the candidates to ensure that the time tables of those courses will not overlap with timetables of courses run by DILT, JNTUH.

For details please see the website: **www.jntuh.ac.in;** Contact No**.: 9154251963**
E- mail: **pa2scdedirector@gmail.com**

DIRECTOR
DILT, JNTUH Hyderabad

COURSE STRUCTURE

Sl. No.	Name of the Certificate Course	Subjects		Credits
1	Cyber Security	*Subj-1*	Cyber Security Fundamentals	3
		Subj-2	E- Commerce and Digital Security	3
		Subj-3	Cyber Laws and Security Management	3
2	Data Science with Python Programming	*Subj-1*	Programming using Python	3
		Subj-2	Machine Learning	3
		Subj-3	Natural Language Processing (NLP) and Big Data	3
3	Artificial Intelligence and Machine Learning	*Subj-1*	Python for Data Science	3
		Subj-2	Machine Learning	3
		Subj-3	Artificial Intelligence	3

- ***Each Course comprises of three subjects as given in the above table.***
- ***In addition to three subjects in each course there will be Project work with 6 Credits***
- ***Each course is of 6 months duration.***
- ***Each class is of 2 hours duration and a total of 24 classes will be held in 2 months period for each subject. (A total of 48 hours allocated for each subject)***

Class Work Timings:
6:30PMto8:30PM
(Through online mode only)

FEE DETAILS

- **Registration Fee: Rs. 500/- to be paid (add late fee of Rs. 500/-if applicable) the time of submitting the online application form.**
- **Admission fee: Rs. 1,000/- for the candidates who get admitted.**
- **Course Fee: At the time of admission, the candidate has to pay Course fee of Rs. 25,000/-. Fee once paid will not be refunded under any circumstances Examination fee will be collected separately.**

ORGANIZERS

DIRECTOR

Dr. KRISHNA MOHANA RAO
Director, D I L T , SeniorProfessor,
Dept. of Mechanical Engg. JNTUH UCESTH

COURSE COORDINATORS:

1. Cyber Security
Dr. B . S a t i s h K u m a r
Professor & HOD of CSE, JNTUH UCEJ

2. Data Science with Python Programming
Dr. T. Venugopal
Vice- Principal & Professor,
Dept. of CSE JNTUH UCEJ

3. Artificial Intelligence& Machine Learning
Dr. P. Swetha,
Professor of CSE & Dy. Director of DAAF, JNTUH

ELIGIBILITY

Sl. No	Name of the Certificate Course	Eligibility
1	Cyber Security	Candidates who have completed or pursuing Diploma / UG / PG Degree
2	Data Science with Python Programming	Candidates who have completed or pursuing Diploma / UG / PG Degree
3	Artificial Intelligence & Machine Learning	Candidates who have completed or pursuing Diploma / UG / PG Degree

Desirable:
Candidates having basic computer knowledge and any programming language.

Selection Procedure:
Admissions will be made on first-come-first serve basis after evaluation by admission committee. The JNTUH Hyderabad reserves right to increase / decrease the total number of seats in each course or to cancel the entire admission process

HURRYUP!!! LIMITED ADMISSIONS

DIRECTORATE OF INNOVATIVE LEARNING AND TEACHING
(Formerly_SCDE_SCHOOL OF CONTINUING & DISTANCE EDUCATION)
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
KUKATPALLY, HYDERABAD-500085, TELANGANA STATE, INDIA.

Offers

Six Months Online Certificate Courses-Nov 2023

Artificial Intelligence and Machine Learning

Data Science with Python Programming

Cyber Security

Course Duration "6Months"
Last Date for online submission
"22-12-2023"
Class Timings "6:30 pm to8:30 pm"
(Through online mode only)

For more details, visit
www.jntuh.ac.in

"Continuous learning is the minimum requirement for success in any field."

ABOUT DILT

School of Continuing and Distance Education, JNTUH proudly introduces Value added Certificate Courses of six months duration in Online mode. These courses enable the aspirants to stay abreast with the upcoming Technologies.

COURSEOBJECTIVES

- Provides in depth knowledge of the understanding of the technology to meet the industry requirements & helps in staying competitive.
- Focused on job aspirants for the enhancement of employability opportunities for Graduates and also for working professionals by providing wide range of skills to deal with complex projects that help the individuals to quickly advance in their career.
- Certificate Courses hold wide scope and better opportunities for faculty through the improvement of their teaching skills & knowledge in the upcoming areas.
- Online Certificate Courses gives an opportunity to the students for credits transfer as per National Education Policy (NEP-2020)

ATTENDANCE

75% attendance is compulsory for each Theory / Lab session. Condonation of shortage of attendance upto 10% i.e. between 65 and 75% may be given by the Director, SCDE on genuine and valid grounds with supporting evidence, and shortage of attendance below 65% shall in no case be condoned. The theory & practical sessions will be held through Online mode.

REGULATIONS

- A candidate after securing admission shall pursue the Certificate Course in period of 6months.
- Each Certificate Course is of 15 credits with three subjects' and a Project.
- **Permission was accorded to engage the faculty by consideration in SCM for the faculty having specialization in interdisciplinary branches (with individual Subjects offered as part of Six Months Online Certificate Course).**
- The credits allotted for each subject are equivalent to the credits of the individual subjects offered in B.Tech., as per JNTUH Academic Regulations.
- The credits for the Project is not equivalent to the B.Tech., Major/Mini Project of JNTUH Academic Regulations.
- **The students of constituent and Affiliated Colleges (both Autonomous & non-Autonomous) can avail the provision of transfer of credits earned for the individual theory subjects offered as a part of Certificate Courses for the award of U.G. degree as per the provisions of B.Tech Academic Regulations-2022 of JNTUH.**
- The internal staff (teaching & non-teaching) of the University and current students of constituent ca-demic units can avail 40% fee concession.
- Completion of the certificate course requires

EVALUATIONSCHEME

successful completion of both assignment component/ Lab record and end examination component for each Theory & practical course in the certificate course.

- Continuous evaluation through assignment with a weight age of 40% (Theory/Lab).
- The end examination with a weight age of 60%(Theory /Lab).
- The requirement for passing (Theory /Lab) would beatleast40%in
- Continuous evaluation and 40% in the end examination with an overall average of 40% for a pass (Theory/Lab) in the course.

REGISTRATION

https://dilt.jntuh.ac.in/pages/certificate_courses_home

-Please use the above link for the Registration.

Registration link

Last date for online submission:

15-12-2023 by4.00 p.m. without fine

22-12-2023 by 4.00 p.m. with fine of Rs.500/

Scanned Document Copies to be uploaded Through online:

- S.S.C.
- Intermediate Certificate and Consolidated Marks Memo /Diploma Certificate
- Under Graduation Certificate and Consolidated Marks Memo / Study Certificate in case of Current undergradu-ate students
- Other relevant Certificates if any

IMPORTANTDATES

S.No	Event	Date
1	Date of Notification	26-11-2023
2	Last date for online submission	15-12-2023
3	Last date for online submission with fine of Rs.500/-	22-12-2023

For More Details

Website: www.jntuh.ac.in

Contact No.: 9154251963

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Python Programming

S.No.	Module Name	Topic
Module: 1	Introduction to Python	What is AI ML DL NLP
		Basics of Algorithm/Pseudocode, Program, Kinds of Programming Languages, Compilers, and Interpreters
		Introduction to Python, Types of IDE (Anaconda)
		Identifiers, Variables, Operators, Data Types,
		Conditions, Loops
Module: 2	Data Structures using Python	Strings: Introduction, functions, and operations on Strings, Application Programs on Strings.
		List: Introduction, functions and operations on List, Application Programs on Lists. Tuple: Introduction, functions, and operations on Tuple
		Dictionaries: Introduction, functions and operations on Dictionaries, Application Programs on Dictionaries.
		Sets: Introduction, functions, and operations on Sets, Applications on Sets, Frozensets
		List Comprehension, Dictionary Comprehension
		Functions Defining and Invoking functions, Scope, Parameter types
Module: 3	Functions, Modules and Collections	Recursive functions
		Built in Functions such as enumeration, zip, sorted, map, filter and Applications
		Modules in Python, creating custom modules and calling them
		Lambda functions
		Collections, Iterators, Generators, Decorators, OrderedDict, defaultdictetc
		File I/O operations: Reading and Writing data from various formats
Module: 4	Working with Databases and Text	Regular Expressions, Identifiers, Quantifiers. Application Programs on Regular expressions
		Working with Databases: Databases and Data Science, SQLite database and Insert, Update, Delete, Retrieve operations,
		Exception Handling: Need for Exception handling, Raising exceptions,
		Need for Object Orientation, OOPS basics, Principles of OOPS
Module: 5	Object Oriented Programming using Python	Classes, Objects, Pass by reference, Self, Collection of objects, Constructors
		Need for Encapsulation and Abstraction, Private Attributes, Getter, and Setter Methods– Python Implementation
		Inheritance: Need for Inheritance, Kinds of Inheritance
		Polymorphism Abstract methods, Overloading and Overriding
		Statistics for Data Science
Module: 6	Mathematical modelling for Data Science	Mathematical Computing with NumPy
		Statistics and Probability using Numpy
		Data Manipulation and Analysis
Module: 7	Exploratory Data Analysis and Data Visualization	Exploratory Data Analysis with Pandas
		Matplotlib and Seaborn libraries for Visualization
		Web Programming using Flask
Module: 8	GUI Programming	GUI programming TCL TK

2. Machine Learning (Supervised & Unsupervised learning)

S.No.	Module Name	Topic
Module 1	**Machine Learning Introduction**	Introduction to Machine Learning •Types of Machine Learning • Supervised Learning • Unsupervised Learning • Reinforce Learning
	Data Preprocessing	• Data Imputation • Data Encoding (Feature transformation (one-hot (dummy variable), label encoding) • Data Integration • Data Normalization • Outlier detection Techniques • Dimensionality reduction • Feature Engineering Machine Learning Packages: • Scikit-Learn → Custom Transformers, • Scikit-Learn → Pipeline.
Module 2	**End-to-End Regression And Deployment**	• Simple Linear Regression • Multilinear Regression • Poisson Regression • Polynomial Regression • Model Selection (Train/Validation/Test split, K-Fold Cross Validation), • Evaluation metrics (R-Squre, Adj R-Squre, MSE, RMSE), • Regularization Techniques (Ridge, Lasso and Elastic Net) • Linear Regression Solvers, Normal Equation • Gradient Descent (Batch, Stochastic and Mini-Batch), • Fine Tuning model • Overfitting vs Underfitting (bias-variance tread off) • Simple Flask Web Service Development • Basic concepts of Git, Code repository in Git, • Basic Docker concepts, • Use Case: Melbourne House price prediction

Module 3	**End-to-End Classification and Metrics for Classification**	• KNN classifier
		• Logistic Regression classifier (Binary class Classification)
		• Decision Tree classifier (Entropy, Gini Index, Information Gain)
		• Naïve Bayes Classifier
		• SVM classifier
		• Accuracy score, Confusion matrix, Precision, Recall, Precision – Recall tread off curve, ROC curve, AUC score
		• Learning Best Practices for Model Evaluation
		  • ML Pipeline techniques
		  • Parameter Tuning mechanisms (Grid Search/ Random Search)
		  • Debugging algorithms with learning and validation curves

Module 4	**Ensemble Methods and Neural Networks**	• Voting Classifiers (Ensemble Models), • Homogeneous Ensemble Models, • Random Forest, Bagging, • Pasting Feature selection
		• Gradient Descent, • Forward Propagation, • Back Propagation • Use Case: Handwritten digit recognition (MINST dataset)
Module 5	**Problems domains in Banking, Stock Market, Medical Domain, Weather, Insurance, on AWS CLOUD**	Examples like • Credit Card Fraud detection – • Anomaly Detection Algorithm, • Deploy ML model as REST Full web service on AWS EC2 server, • Weather Prediction, • Stock Market Price Prediction, • Medical Domain: Brain Tumor Prediction, etc
Module 6	**Clustering**	• K-Means Clustering, • Hierarchical Clustering • DBSCAN – Image segmentation, • How to use unsupervised outcome as support to solve supervised problem. • Use Case: Cluster analysis in Image Data
	Association Analysis	• Association Rules & Interesting measures • Apriori Algorithm, • FP-Grouth algorithm • Case Studites on Retail Analysis

3. Natural Language Processing

S.No	Module Name	Topic
Module 7	**Introduction to NLP.**	What is NLP, Various levels of NLP. • Morphological, • Lexical Analysis, • Syntactic analysis, • Semantic analysis, • Discourse level, • Pragmatic • Applications of NLP
	Text Processing using NLTK, Blob, Spacy	**– Introduction to Text Processing** Working with • Text Files, • HTML files, Web scraping • XML files, • JSON files and • PDF files • Working with Regular Expressions
		Text Processing • Tokenization, • Stemming, • Lemmatization,

		• Removal of Stop Words, • POS tagging and • Named Entity recognition, • Text Preprocessing, • Phrase Matching
		Text Feature Extraction using SciKit-Learn • Vector Space Model representation, • Term Frequency, • Document Frequency, • TF_IDF frequency, • Count Vectorizer, • TF-IDF Transformer, • TF-IDF Vectorizer • Text Similarity • Word Embedding Layer using Deep Learning, • Word2Vec and Doc2Vec
Module 8	**Applications of NLP**	• Text Classification, • Text Clustering • Text Summarization • Topic Modelling • Recommendation Systems - Collaborative filtering • Case Studies and Application development
	Sentiment Analysis	• Introduction to Sentiment Analysis • Creating NLP Pipeline for Text Mining (Social Media data/Web data) • Using Bag Of Words representation, using TF-IDF representations Data Set : IMDB dataset using Scikit-Learn
	Natural Language Understanding	• Parts of Speech Tagging (POS), • Dependency Parsing, • Named entity recognition (using Spacy module)
	Web Mining and Generative AI	• Web Scraping • Textual data sources and formats, social media, web scrapping APIs (example: scrapy) • NLP Chatbot & Voice bots

Artificial Intelligence

Machine Learning - Natural Language Processing

Web Mining: Textual data sources and formats, social media, web scrapping APIs (example: scrapy).
Introduction to NLP: What is NLP?, Tokenization, N-Grams, Stemming & Lemmatization, What is syntactic representation of text data?, Bag Of Words (BOW) representation, TF-IDF representation.
Sentiment Analysis: using Bag Of Words representation, using TF-IDF representations
Data Set : IMDB dataset using Scikit-Learn
Introduction to Natural Language Understanding: Parts of Speech Tagging (POS), Dependency Parsing, Named entity recognition (using Spacy module) .

Deep Neural Networks, Convolutional Neural Networks

Artificial Neural Networks: Introduction

Deep Neural Networks: Introduction to Neural Networks, Linear Regression Gradient Descent (Batch, Stochastic and Mini-Batch), Logistic/Sigmoid neuron, Forward propagation, Back propagation, Neural Network Architecture, Layers of a Deep Neural Network, Back propagation, Activation Functions (Sigmoid, Tanh, ReLU, Leaky ReLU), Softmax regression classifier, Softmax Regression Classification

Tensor Flow: Introduction to TensorFlow 2.x, Construction Phase, Execution Phase

Use Case: Build handwritten digit recognition model with TensorFlow

Gradient Descent: Exponentially weighted moving average, Gradient Descent with Momentum, Gradient Descent with RMSProp (Root Mean Squared Propagation), Gradient Descent with ADAM (Adaptive Momentum Estimation), Batch Normalization

Regularizing Deep Neural Networks, l1, l2 regularization, Dropout regularization, Vanishing & Exploding Gradients, Weight initializations (He/Xavier initialization), Algorithm Optimizers, Momentum - Exponentially weighted moving average

Convolutional Neural Networks: Introduction to CNN (Convolutional Neural Networks), Computer Vision, Convolution and Edge detection, Padding, Striding Convolutions, Convolution Neural Network. Edge Detection, Padding, Stride, Pooling, ResNets (CNN build with Residual Block), Inception Network (filter size, pooling, stride all combined layer), Data Augmentation, Transfer Learning

Use Case: Cat vs Dog classification (Image Classification using 2d Convolutions)

Artificial Intelligence – Natural Language Processing with Deep Learning

Introduction to Semantic Natural Language Representation: Word embeddings/vector representation, Word2Vec model, Introduction to Transformer Networks and word embeddings.

Sentiment Analysis: Build sentiment analysis model Using Gensim word2vec representation (DNN, 1d convolution for dimensionality reduction)

Artificial Intelligence – Time Series (RNN), Computer Vision and Model Deployment

Recurrent Neural Networks & Attention Based Networks: Recurrent Neural Networks, Bidirectional Recurrent Neural Networks, Gated Recurrent Units (GRU), Long short-term memory (LSTM), Auto encoders.

Time series (Stock price prediction), Introduction to Transformer Networks, Seq2Seq Model: Text Summarization - Language Generation (Sequence to Sequence model)

Use Case: Stock Market Prediction (Time Series problem)

Computer Vision: Object Localization, Intersection over Union, Anchor Boxes, Non Max Suppression (NMS), YOLO Algorithm, Object Detection, Face Detection

Deep Learning Model Deployment: Setup AWS EC2 server with necessary software, Deploy Deep Learning Modle (TensorFlow or PyTorch), Expose deep learning model as anRESTFul Web Service.

TEXT BOOKS:

1. Eric Matthews, 'Python Crash Course'

2. Joe Papa, PyTorch Packet Reference Building and Deploying Deep Learning Models

3. AurelienGeron, Hands On Machine Learning with Scikit-Learn and Tensor Flow Concepts, Tools and Techniques to Build Intelligent Systems

4. Eric Matthews, 'Python Crash Course'

5. Joe Papa, PyTorch Packet Reference Building and Deploying Deep Learning Models

6. AurelienGeron, Hands On Machine Learning with Scikit-Learn and Tensor Flow Concepts, Tools and Techniques to Build Intelligent Systems

REFERENCE BOOKS:

1. Mark Lutz, Learning Python, 5th Edition

2. Paul Barry, Head-First Python

3. Adnan Aziz, Elements of Programming Interviews in Python: The Insiders'

4. AndriyBurkov, The Hundred-Page Machine Learning Book

5. Drew Conway and John Myles White, Machine Learning for Hackers: Case Studies and Algorithms to Get you Started

6. Nishant Shukla, Machine Learning with TensorFlow

7. Mark Lutz, Learning Python, 5th Edition

8. Paul Barry, Head-First Python

9. Adnan Aziz, Elements of Programming Interviews in Python: The Insiders'

10. AndriyBurkov, The Hundred-Page Machine Learning Book

A Six Months Course

on

CYBER SECURITY

DETAILED COURSE STRUCTURE

Course Coordinator:

Dr. B. Sateesh Kumar

Professor & Head,

Department of CSE,

JNTUH University College of Engineering Jagtial.

STRUCTURE OF CYBER SECURITY COURSE

SUBJECT NAME	CYBERSECURITY FUNDAMENTALS
SESSION-1	**INTRODUCTION TO CYBERSECURITY**
DAY-1	**Understanding Cyberspace** Defining Cyberspace and Overview of Computer and Web Technology, Architecture of Cyberspace
DAY-2	**Internet Technology** Communication and Web Technology, Internet, World Wide Web, Advent of the Internet
DAY-3	**Regulation and Governance of Cyberspace** Regulation of Cyberspace, Internet Infrastructure for Data Transfer and Governance, Internet Society
DAY-4	**Cybersecurity Fundamentals and Challenges** Concept of Cybersecurity, Issues and Challenges of Cybersecurity
SESSION-2	**CYBER-ATTACKS OVERVIEW**
DAY-5	**Basics of Cybersecurity Attacks** Need for Cybersecurity, Introduction to Cyber Attacks, Classification of Cyberattacks, Classification of Malware, Threats
DAY-6	**Security Models and Mechanisms** Different Security Models and Security Mechanisms, Information Security and Network Security
DAY-7	**Intrusion Detection and Prevention** Intrusion Detection Systems, Intrusion Prevention Systems
SESSION-3	**CYBER CRIMES & CYBER LAWS**
DAY-8	**Types of Cybercrime and Prevention** Classification of Cybercrimes, Common Cybercrimes - Cybercrime Targeting Computers and Mobiles, Cybercrime Against Women and Children, Financial Frauds, Social Engineering Attacks, Malware and Ransomware Attacks, Zero-Day and Zero-Click Attacks, Cyber Criminals' Modus Operandi, Reporting of Cybercrimes, Remedial and Mitigation Measures
DAY-9	**Legal Aspects and Regulations** The Legal Perspective of Cybercrime, IT Act 2000 and Its Amendments, Cybercrime and Offences, Organizations Dealing with Cybercrime and Cybersecurity in India
DAY-10	**Case Studies and Practical Application** Case Studies
SESSION-4	**SECURITY ESSENTIALS**
DAY-11	**Web Browser Security:** Securing web browser, Two-step Authentication
DAY-12	**Password Security:** Guidelines for setting up a secure password, Security Guidelines for Point of Sales (POS)

DAY-13	**Mobile Security:** Wi-Fi Security, Smartphone Security, Android Security, Online Banking Security, Mobile Banking Security, Security of Debit and Credit Cards, UPI Security, E-wallet Security
SESSION-5	**SOCIAL MEDIA SECURITY-1**
DAY-14	**Social Media Basics:** Introduction to Social networks, Types of Social media, Social media platforms
DAY-15	**Social Media Engagement and Strategy:** Hashtag, Viral content, Social media marketing, Social media monitoring
DAY-16	**Social Media Concerns and Considerations:** Social media privacy, Challenges, opportunities, and pitfalls in online social networks
SESSION-6	**SOCIAL MEDIA SECURITY-2**
DAY-17	**Security and Content Control:** Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content
DAY-18	**Best Practices and Responsible Usage:** Best practices for the use of social media
DAY-19	**Illustrative Examples:** Case studies
PRACTICAL SESSION-1	
DAY-20	1. Checklist for reporting cyber crime at Cyber crime Police Station.
DAY-21	2. Checklist for reporting cyber crime online.
DAY-22	3. Reporting phishing emails. 4. Demonstration of email phishing attack and preventive measures.
PRACTICAL SESSION-2	
DAY-23	1. Basic checklist, privacy and security settings for popular Social media platforms.
DAY-24	2. Reporting and redressal mechanism for violations and misuse of Social media platforms.

STRUCTURE OF CYBER SECURITY COURSE

SUBJECT NAME	E-COMMERCE & DIGITAL SECURITY
SESSION-1	**E-COMMERCE**
DAY-1	**E-Commerce Fundamentals:** Definition of E-Commerce, Main components of E-Commerce
DAY-2	**E-Commerce Security:** Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices
SESSION-2	**DIGITAL PAYMENTS**
DAY-3	**Digital Payment Fundamentals:** Introduction to digital payments, Components of digital payment and stakeholders
DAY-4	**Modes of Digital Payments and Security:** Modes of digital payments (Banking Cards, UPI, e-Wallets, USSD, Aadhar enabled payments), Digital payments related common frauds and preventive measures
DAY-5	**Legal and Regulatory Framework:** RBI guidelines on digital payments and customer protection in unauthorized banking transactions, Relevant provisions of Payment Settlement Act, 2007
SESSION-3	**DIGITAL DEVICES SECURITY**
DAY-6	**Device and Mobile Security:** End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy
DAY-7	**Tools and Technologies for Cyber Security:** Authentication tools, firewalls, intrusion detection systems, and antivirus and encryption software.
DAY-8	**Cyber Security Best Practices:** Cyber Security best practices, Significance of host firewall and Anti-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions
SESSION-4	**CYBER SECURITY LANDSCAPE**
DAY-9	**Cyber Threat Landscape and Terminology:** Cyber security increasing threat landscape, Cyber security terminologies (Cyberspace, attack, attack vector, attack surface, threat, risk, vulnerability, exploit, exploitation, hacker), Non-state actors, Cyber terrorism
DAY-10	**Protection and Security Measures:** Protection of end-user machines, Critical IT and National Critical Infrastructure, Cyberwarfare
DAY-11	**Practical Insights and Examples:** Case Studies

SESSION-5	**CYBER CRIMES**
DAY-12	**Cyber Crimes Targeting Computer Systems and Mobile Devices:** Data diddling attacks, Spyware, Logic bombs, DoS (Denial of Service), DDoS (Distributed Denial of Service), APTs (Advanced Persistent Threats), Viruses, Trojans, Ransomware, Data breach
DAY-13	**Online Scams and Frauds:** Email scams, Phishing, Vishing, Smishing, Online job fraud, Online sextortion, Debit/credit card fraud, Online payment fraud
DAY-14	**Cyberbullying and Web Exploitation:** Cyberbullying, Website defacement, Cybersquatting, Pharming
DAY-15	**Darknet and Illicit Activities:** Cyber espionage, Crypto-jacking, Darknet activities, including illegal trades, drug trafficking, and human trafficking
SESSION-6	**SOCIAL MEDIA SECURITY**
DAY-16	**Social Media Scams, Frauds, and Cyber Crimes:** Impersonation, Identity theft, Job scams, Misinformation and fake news
DAY-17	**Cyber Crimes Against Persons and Social Engineering:** Cyber grooming, Child pornography, Cyber stalking, Social Engineering attacks
DAY-18	**Law Enforcement and Reporting:** Cyber Police stations, Crime reporting procedure, Case studies
PRACTICAL SESSION-1	
DAY-19	1. Configuring security settings in Mobile Wallets and UPIs. 2. Checklist for secure net banking.
DAY-20	3. Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User). 4. Setting and configuring two factor authentication in the Mobile phone.
DAY-21	5. Security patch management and updates in Computer and Mobiles. 6. Managing Application permissions in Mobile phone.
PRACTICAL SESSION-2	
DAY-22	1. Installation and configuration of computer Anti-virus.
	2. Installation and configuration of Computer Host Firewall.
DAY-23	3. Wi-Fi security management in computer and mobiles for reporting cyber-crimes.
DAY-24	4. Checklist for reporting cyber-crimes online

STRUCTURE OF CYBER SECURITY COURSE

SUBJECT NAME	CYBER LAW & SECURITY MANAGEMENT
SESSION-1	**CYBER LAWS-1**
DAY-1	**Cybercrime and Legal Landscape Around the World:** Introduction Cybercrime and Legal Landscape Around the World
DAY-2	**IT Act Amendments and Limitations:** IT Act, 2000 and its amendments. Limitations of IT Act, 2000. Cybercrime and punishments.
SESSION-2	**CYBER LAWS-2**
DAY-3	**Cyber Laws and Legal and Ethical Aspects Related to New Technologies:** Legal and ethical aspects related to new technologies - AI/ML, IoT, Blockchain, Darknet, and Social media.
DAY-4	**Cyber Laws of Other Countries** Cyber Laws of other countries – Importance and Examples.
DAY-5	**Case Studies:** Case Studies on Cyber Laws and their Execution.
SESSION-3	**DATA PRIVACY AND DATA SECURITY -1**
DAY-6	**Data Definitions and Data Protection:** Defining data, meta-data, big data, and nonpersonal data. Data protection, data privacy, and data security.
DAY-7	**Legal Framework and Compliance:** Personal Data Protection Bill and its compliance. Data protection principles.
DAY-8	**Challenges and Issues with Big Data:** Big data security issues and challenges.
SESSION-4	**DATA PRIVACY AND DATA SECURITY -2**
DAY-9	**Data Protection Regulations of Other Countries:** General Data Protection Regulation (GDPR), 2016. Personal Information Protection and Electronic Documents Act (PIPEDA).
DAY-10	**Social Media Data Privacy and Security:** Social media data privacy and security issues.
DAY-11	
SESSION-5	**CYBER SECURITY MANAGEMENT**
DAY-12	**Cybersecurity Policies and Planning:** Cybersecurity Plan, Cybersecurity Policy, Cyber Crisis Management Plan
DAY-13	**Business Continuity and Risk Assessment:** Business Continuity, Risk Assessment, Examples.

DAY-14	**Security Controls and Goals:** Types of Security Controls, Goals of Security Controls
DAY-15	
SESSION-6	**CYBER SECURITY COMPLIANCE AND GOVERNANCE**
DAY-16	**Cyber security audit and compliance:**
DAY-17	**National cyber security policy and strategy:**
DAY-18	
PRACTICAL SESSION-1	
DAY-19	1. Configuring security settings in Mobile Wallets and UPIs. 2. Checklist for secure net banking.
DAY-20	3. Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User). 4. Setting and configuring two factor authentication in the Mobile phone.
DAY-21	5. Security patch management and updates in Computer and Mobiles.
DAY-22	6. Managing Application permissions in Mobile phone.
PRACTICAL SESSION-2	
DAY-23	1. Installation and configuration of computer Anti-virus. 2. Installation and configuration of Computer Host Firewall.
DAY-24	3. Wi-Fi security management in computer and mobiles for reporting cyber-crimes. 4. Checklist for reporting cyber-crimes online

References:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd.

2. Information Warfare and Security by Dorothy F. Denning, Addison Wesley.

3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform.

4. Data Privacy Principles and Practice by Natraj Venkataramanan and Ashwin Shriram, CRC Press.

5. Information Security Governance, Guidance for Information Security Managers by W. Krag Brothy, 1st Edition, Wiley Publication.

6. Auditing IT Infrastructures for Compliance By Martin Weiss, Michael G. Solomon, 2nd Edition, Jones Bartlett Learning.

7. "Cybersecurity and Cyberwar: What Everyone Needs to Know" by P.W. Singer and Allan Friedman, 1st Edition, Oxford University Press.

8. "Applied Cryptography" by Bruce Schneier, 2nd Edition, Wiley.

9. "The Web Application Hacker's Handbook" by Dafydd Stuttard and Marcus Pinto, 2nd Edition, Wiley.

10. "Hacking Exposed" by Stuart McClure, Joel Scambray, and George Kurtz, 7th Edition, McGraw-Hill Education

CERTIFICATE COURSE ON DATA SCIENCE WITH 1.PYTHON PROGRAMMING

UNIT-I

Introduction to Python: What is Data Science and why Data Science?
Applications and Components of data Science,Why Python for Data Science?
Basics of Algorithm/ Pseudocode , Program, Kinds of Programming Languages, Compilers, and Interpreters Introduction to Python, Types of IDE (Anaconda/PyCharm)
Identifiers, Variables, Operators, Data Types,
Conditions, Loops

UNIT-II

Introduction to Data Structures using Python:
Strings: Introduction, functions, and operations on Strings, Application Programs on Strings.
List: Introduction, functions and operations on List, Application Programs on Lists
Tuple: Introduction, functions, and operations on Tuple
Dictionaries: Introduction, functions and operations on Dictionaries, Application Programs on Dictionaries.
Sets: Introduction, functions, and operations on Sets, Applications on Sets, Frozensets List Comprehension, Dictionary Comprehension

UNIT-III

Functions, Modules and Collections : Functions Defining and Invoking functions, Scope, Parameter types Recursive functions, Built in Functions such as enumeration, zip, sorted, map, filter and Applications
Modules in Python, creating custom modules and calling them
Lambda functions , Collections, Iterators, Generators, Decorators, OrderedDict, defaultdictetc

UNIT-IV

Working with Databases and Text: File I/O operations: Reading and Writing data from various formats,Regular Expressions, Identifiers, Quantifiers. Application Programs on Regular Expressions
Working with Databases: Databases and Data Science, SQLite database and Insert, Update, Delete, Retrieve operations,
Exception Handling: Need for Exception handling, Raising exceptions,

UNIT-V

Object Oriented Programming using Python : Need for Static, Static members, Static functions Need for Encapsulation and Abstraction, Private Attributes, Getter, and Setter Methods– Python Implementation
Inheritance: Need for Inheritance, Kinds of Inheritance
Polymorphism Abstract methods, Overloading and Overriding
Statistics for Data Science
Use Case: Mathematical Computing with NumPy

UNIT-VI

Exploratory Data Analysis: Statistics and Probability using Numpy
Data Manipulation and Exploratory Data Analysis with Pandas
Matplotlib and Seaborn libraries for Visualization
Web Programming using Flask, GUI programming TCL TK

CERTIFICATE COURSE ON DATA SCIENCE WITH
2. MACHINE LEARNING AND DEEP LEARNING USING PYTHON

UNIT-I

Introduction to Data Science: Life Cycle of data science, Collection, Storing , Processing, Describing, Modeling

UNIT-II

Data Preprocessing Techniques: Data Imputation, Data Encoding ,Data Integration, Data Normalization, Outlier detection Techniques, Dimensionality reduction ,Feature Engineering
Exploratory Data Analysis (EDA) Univariant Analysis, Multivariant, Analysis Case studies

UNIT-III

Machine Learning (Supervised Learning)

Introduction to Machine Learning, Types of Machine Learning, Supervised Learning, Unsupervised Learning, Reinforce Learning
Regression Analysi, Simple Linear Regression, Multilinear Regression, Polynomial Regression, Regularization Techniques, Metrics for Evaluation, Case Studies,
Classification Techniques :KNN classifier ,Logistic Regression classifier, Decision Tree classifier, Naïve Bayes Classifier, SVM classifier, Random Forest classifier, Ensemble methods, Boosting algorithms, Bagging algorithms, Stacking algorithms, Case Studies and Applications,
Building and Deployment of MLclassifier using Flask framework

UNIT-IV

Bias, Variance and Optimization Techniques: – Model Selection and Evaluation for classification, Train/Validation/Test split, K-Fold Cross Validation
The Problem of Over-fitting and Underfitting (Bias-Variance tread-off)
Learning Best Practices for Model Evaluation and Improvement:ML Pipeline techniques,Parameter Tuning mechanisms (Grid Search/ Random Search),Debugging algorithms with learning and validation curves

UNIT-V

Machine Learning(Unsupervised Learning): Similarity distance measures, Clustering Analysis, K-means Clustering, Hierarchical Clustering, DB Scan Clustering
Case, Studites, Association Analysis: Association Rules & Interesting measures, Apriori Algorithm, FP-Grouth algorithm, Case Studites

UNIT-VI

Fundamentals of Deep Learning:

Introduction to Deep Leaning, Tensor Flow, Basic programming ,sing Tensor Flow,Basics of Image Processing, Neural Network Basics, Activation Functions, Loss functions, non-linearity, Multilayer Perceptron Algorithm, Gradient Descent Algorithm, Adam Techniques

CERTIFICATE COURSE WITH DATA SCIENCE WITH

3.Natural Language Processing and Big Data

UNIT-I

Introduction to NLP.

What is NLP, Various levels of NLP: Morphological,Lexical Analysis, Syntactic analysis, Semantic analysis,Discourse level, Pragmatic),Applications of NLP

Introduction to Text Processing: Working with,Text Files, HTML files, XML files,JSON files and PDF files,Working with Regular Expressions

UNIT-II

Text Processing using NLTK, Blob, Spacy

Text Processing: Tokenization,Stemming, Lemmatization, Removal of Stop Words, POS tagging and Named Entity recognition, Text Preprocessing, Phrase Matching

Text Feature Extraction using SciKit-Learn: Vector Space Model representation, Term Frequency, Document Frequency, TF_IDF frequency, Count Vectorizer, TF-IDF Transformer, TF-IDF Vectorizer, Text Similarity

UNIT-III

Application Development using Text using ML

Text Classification,

Text Clustering and

Text Summarization

Case Studies and Application development

Topic Modelling using NLP: Introduction to Topic Modelling, Latent Dirichlet Allocation with Python - Part Two, Case studies and Applications

Sentiment Analysis: Introduction to Sentiment Analysis

Creating NLP Pipeline for Text Mining (Social Media data/Web data), Word2Vec and Doc2Vec, Transformers, Recommendation Systems - Collaborative filtering, Overview of Language Modelling

UNIT-IV

Introduction to Big Data,Evolution of Bigdata, Types of Digital data, Characteristics& Challenges of data, Overview of Predictive Analytics, NoSQL databases

UNIT-V

Key Technologies and Drivers for Big Data

Knowledge Discovery Tools, Stream Analytics, In-memory Data Fabric, Distributed Storage and Computing, Data Integration and Visualization, Data Pre-processing

UNIT-VI

Hadoop Eco System

Hadooop for Bigdata, Overview of Apache Hadoop software, Installation of Hadoop, Architecture of Hadoop, Understanding Hadoop eco-system-HDFS, Map Reduce, Working with Hadoopeco system components- Hive, Pig, Data Ingestion with Flume &Sqoop,HBase

UNIT-VII

Bigdata&In-memory computing

Understanding In-memory computing, Resilient Distributed Databases(RDDs), Introduction to Big Data Analytics with Spark, Understading Spark eco-system components, Overview of client mode & cluster mode computing, Working with basic Spark scripts, Data Analytics using Spark eco-system

Case Studies & Applications of ML in Spark

UNIT-VIII

Real-time Streaming platforms for Big Data

Overview of Apache Kafka & Storm