

**ICT  
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## Course Details

### Course Title: Training on AI for Immersive Technology

#### COURSE 1: AI and Machine Learning (ML) with Python

##### Module A: Python Programming

###### Lesson Plan

Lecture	Topic	Teaching-Learning Methodology	Assessment	Hours
Lecture: 1-2	<b>Preparing Machine and environment Set up</b> -Fundamentals of Python: • Introduction to python • Writing python code • Running python code <b>Working with different types of data in python:</b> • Data types and variables • Using numeric value Using string variables	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	quiz	03
Lecture: 3-4	Input & output methods in python: <ul style="list-style-type: none"> <li>• Printing with parameters</li> <li>• Getting input from users</li> <li>• String formatting</li> </ul> Simple and complex decisions making using “if-else” statement: <ul style="list-style-type: none"> <li>• The “if” Statement</li> <li>• Logical Operators</li> <li>• More Complex Expressions</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 5-6	Implement different types of loops and practice associated problems: <ul style="list-style-type: none"> <li>• “for” loops</li> <li>• “while” loops</li> </ul> Advanced data storage technique in python:	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03

	<ul style="list-style-type: none"> <li>• Indexing in list and dictionary</li> <li>• Create, update and delete list and dictionary elements</li> <li>• Perform basic operations on list and dictionary elements</li> </ul>			
Lecture: 7-8	Learn about different string functions and implement them: <ul style="list-style-type: none"> <li>• String input methods</li> <li>• Manipulate strings</li> <li>• Built-in string functions</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 9-10	Implement basic I/O functions: <ul style="list-style-type: none"> <li>• Opening and closing files</li> <li>• Different modes of accessing files</li> <li>• Create, update and delete a file</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 11-12	-Different types of data analysis using Python -Data visualization and explainability of data for decision making	<ul style="list-style-type: none"> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 13-14	Evaluation	<i>Test, quiz, exam, project implementation</i>		02
<b>Total (Hrs)</b>				<b>20</b>

## Module B: AI and Machine Learning

### Lesson Plan

Lecture	Topic	Teaching-Learning Methodology	Assessment	Hours
Lecture: 1-2	Introduction of AI & ML, History of AI, Weak and Strong AI, AI and Its Applications, AI+ML Current & Future Trends, Prospects of AI+ML, Necessary Skills for learning AI+ML	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 3-4	Intelligent Agents, Uninformed Search, Informed Search, Heuristic Search	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on</li> </ul>	Tests, quiz, assignment	03

		implementation		
Lecture: 5-6	Game AI (Mini-max & alpha-beta pruning, Constraint Satisfaction Problem	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 7-8	Propositional & Predicate Logic, Planning, Natural Language Processing, Frame Problem	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	02
Lecture: 9-10	Difference between AI & ML, ML Applications, Importance of AI+ML on Industry 4.0	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 11-12	Prediction problem in ML, Classification problems in ML, Clustering problems in ML, AI & ML Tools, Libraries, Software	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	02
Lecture: 13-14	Linear algebra, Statistics Probability theory	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 15-16	Data processing, cleaning, and manipulation, exploratory data analysis	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 17-18	Branches of ML: <ul style="list-style-type: none"> <li>• Supervised learning</li> <li>• Unsupervised learning</li> <li>• Reinforcement learning</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on</li> </ul>	Tests, quiz	03

		implementation		
Lecture: 19-20	Evaluation 1	<i>Test, quiz, exam, project implementation</i>	03	
Lecture: 21-22	Linear regression <ul style="list-style-type: none"> <li>• Gradient descent</li> <li>• Loss computation</li> <li>• Evaluation Metrics</li> </ul> - Solving a problem with linear regression	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 23-24	Logistic regression <ul style="list-style-type: none"> <li>• Hypothesis representation</li> <li>• Cost function</li> <li>• Advanced optimization</li> </ul> - Solving a problem with logistic regression	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 25-26	Data preparation and feature extraction <ul style="list-style-type: none"> <li>• Vectorization</li> <li>• Computing on data</li> <li>• Plotting on data</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 27-28	Support vector machines <ul style="list-style-type: none"> <li>• Optimization</li> <li>• Large margin intuitions</li> <li>• Kernels</li> </ul> Overfitting & Underfitting <ul style="list-style-type: none"> <li>• Reducing network size</li> <li>• Adding weight regularization</li> <li>• Adding dropout</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 29-30	Multinomial Naïve Bayes, Stochastic Gradient Descent, Decision Tree, Random forest	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 31-32	Unsupervised Learning <ul style="list-style-type: none"> <li>• K-means</li> <li>• KNN</li> <li>• PCA</li> <li>• SVD</li> <li>• ICA</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03

Lecture: 33-34	Evaluating ML Models <ul style="list-style-type: none"> <li>• Training</li> <li>• Validation</li> <li>• Testing</li> <li>• Performance matrices</li> <li>• ML Tools &amp; library packages</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 35-36	ML Applications in NLP <ul style="list-style-type: none"> <li>• Feature extraction (TF-IDF, BoW)</li> <li>• Model Development: Training, testing</li> <li>• Classification &amp; Prediction</li> <li>• Error analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, Project	03
Lecture: 37-38	ML Applications in Computer Vision <ul style="list-style-type: none"> <li>• Visual Feature extraction</li> <li>• Feature visualization</li> <li>• Model Interpretation</li> <li>• Model training and testing</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, Project	03
Lecture: 39-40	ML-based Project development <ul style="list-style-type: none"> <li>• Image Classification</li> <li>• Character Recognition</li> <li>• Text Classification</li> <li>• Face Recognition</li> <li>• Weather Prediction</li> <li>• Sentiment Analysis</li> <li>• Brand monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, Project	03
Lecture 41-42	Importance of Data on AI-ML based system, The Future with AI, AI Issues, Concerns & Ethical Considerations	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Examples</li> </ul>	Tests, quiz	03
Lecture: 43-44	Evaluation 2	<i>Test, quiz, exam, project implementation</i>		03
<b>Total (Hrs)</b>				<b>66</b>

## COURSE 2: Deep Learning

### Lesson Plan

Lecture	Topic	Teaching-Learning Methodology	Assessment	Hours

Lecture: 1-2	Why DL, Difference between ML and DL, Real-world applications of DL, Popular DL techniques	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 3-4	DL Tools and library, Set up of DL frameworks, Experience with <b>Tensorflow/Keras</b> libraries, <b>Google colab</b>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 5-6	<p>Data preparation</p> <ul style="list-style-type: none"> <li>• Data accumulation, Data cleaning, noise removal, Data annotation</li> <li>• Annotation quality measures with Kappa,</li> <li>• Numeric mapping</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, project	03
Lecture: 7-8	Manual labelling vs. automatic labelling -Automatic labelling techniques	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz	03
Lecture: 9-10	<p>Feature extraction</p> <ul style="list-style-type: none"> <li>• Understanding the data</li> <li>• Extracting the textual, visual, speech features</li> <li>• Normalization of features</li> <li>• Features fusion</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 11-12	Visualization of word vectors with Word Cloud, histogram, heatmap, Plots, Tableau	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Tests, quiz, assignment	03
Lecture: 13-14	<p>Embedding Models</p> <ul style="list-style-type: none"> <li>• Word representation</li> <li>• Embedding matrix</li> <li>• Word2Vec, FastText and Glove</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on</li> </ul>	Tests, quiz, project	03

		implementation		
Lecture: 15-16	Evaluation 1	<i>Test, quiz, exam, project implementation</i>	03	
Lecture: 17-18	Pre-trained word embedding • Implications of pre-trained word vectors • Tuning the word vectors • Embedding model (Intrinsic & Extrinsic) evaluation	• Lecture on theoretical background • Hands on demonstration on implementation	Tests, quiz, assignment	03
Lecture: 19-20	ANN & CNN • Network design • Convolution operation • Max-pooling operation • Building network • Training, testing, validation	• Lecture on theoretical background • Hands on demonstration on implementation	Tests, quiz, assignment	03
Lecture: 21-22	CNN Variations: AlexNet, VGG-16, VGG-19, GoogLeNet, ResNet-18, ResNet-34, ResNet-50, ResNet-101, ResNet-152 MobileNet	• Lecture on theoretical background • Hands on demonstration on implementation	Tests, quiz, assignment	03
Lecture: 23-24	CNN Variations: ResNet-18, ResNet-34, ResNet-50, ResNet-101, ResNet-152, MobileNet	• Lecture on theoretical background • Hands on demonstration on implementation	Tests, quiz, assignment	03
Lecture: 25-26	Optimization of hyperparameters • Understanding parameters and hyperparameters • Tuning hyperparameters • Effect of hyperparameter tuning	• Lecture on theoretical background • Hands on demonstration on implementation	Tests, quiz, project	03
Lecture: 27-28	Recurrent neural networks • Backpropagation • Why RNNs • Vanishing gradient in RNNs • GRU, LSTM • Bidirectional RNNs	• Lecture on theoretical background • Hands on demonstration on implementation	Tests, quiz, assignment	03
Lecture: 29-30	Ensemble of DL Models -Why ensemble?	• Lecture on theoretical	Tests, quiz	03

	<ul style="list-style-type: none"> <li>-How to ensemble?</li> <li>-Average ensemble</li> <li>-Weighted ensemble</li> <li>-Voting ensemble</li> </ul>	<p>background</p> <ul style="list-style-type: none"> <li>• Hands on demonstration on implementation</li> </ul>		
Lecture: 31-32	<ul style="list-style-type: none"> <li>Project development using DL</li> <li>-Handwritten character/digit recognition</li> <li>-Image classification</li> <li>-Object recognition</li> <li>-Face detection</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Quiz, Project	03
Lecture: 33-34	<ul style="list-style-type: none"> <li>Project development using DL</li> <li>-Language modelling</li> <li>-Recommender system</li> <li>-Sentiment analysis</li> <li>-Emotion Analysis</li> <li>-Text classification</li> <li>-Aggressive text detection</li> <li>-Multimodal meme detection</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Quiz, Project	03
Lecture 35-36	<ul style="list-style-type: none"> <li>Introduction to transformer-based models</li> <li>Why use transformer-base models?</li> <li>Transformer vs. DL models</li> <li>Design of m-BERT, distil-BERT, XLM-R, RoBERTa</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz	03
Lecture 37-38	<ul style="list-style-type: none"> <li>Evaluation of DL models</li> <li>-Performance matrices</li> <li>-Error analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 39-40	Evaluation 2	<i>Test, quiz, exam, project implementation</i>		03
<b>Total (Hrs)</b>				<b>60</b>

### **COURSE 3: Training on Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR) and Extended Reality (XR)**

#### **Lesson Plan**

<b>Lecture</b>	<b>Topic</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment</b>	<b>Hours</b>
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Lecture 1-2	<b>Introduction to Immersive Technologies</b> -A Brief History of AR/VR/MR/XR - Components of a AR/VR/MR/XR Systems -Reality, Virtuality & Immersion	• Lecture on theoretical background • Hands on demonstration on implementation	Test, quiz	03
Lecture 3-4	-VR, AR, MR, XR: similarities and differences -Current trends and state of the art in immersive technologies, developing platforms and consumer devices -The future of human experience	• Lecture on theoretical background • Hands on demonstration on implementation	Test, quiz	03
Lecture 5-6	<b>Motion tracking, navigation and controllers</b> -Position and Motion Trackers -Inside Out/Outside In -Tracker Performance Parameters -Optical - Active and Passive Trackers -Inertial and Hybrid Trackers - HMD Trackers -Magnetic Trackers -Mechanical Trackers -Ultrasonic Trackers	• Lecture on theoretical background • Hands on demonstration on implementation	Test, quiz	03
Lecture 7-8	- HMD Trackers -Magnetic Trackers -Mechanical Trackers -Ultrasonic Trackers -Laser Sensors, Vision Sensors -Control devices	• Lecture on theoretical background • Hands on demonstration on implementation	Test, quiz, assignment	03
Lecture 9-10	-Navigation and Manipulation Interfaces -Tracker-Based Navigation/Manipulation Interfaces -Three-Dimensional Probes and Controllers -Data Gloves and Gesture Interfaces	• Lecture on theoretical background • Hands on demonstration on implementation	Test, quiz, assignment	03
Lecture 11-12	<b>The Human behind the lenses</b> -Human Perception and Cognition -The Human Visual System -The Human Auditory System -The Human Vestibular System -Physiology, Psychology and the Human Experience	• Lecture on theoretical background • Hands on demonstration on implementation	Test, quiz, assignment	03
Lecture 13-14	-Adaptation and Artefacts -Ergonomics	• Lecture on theoretical background	Test, quiz, assignment	03

	<ul style="list-style-type: none"> <li>-Ethics</li> <li>-Scientific Concerns</li> <li>-VR Health and Safety Issues</li> <li>-Effects of VR Simulations on Users</li> <li>-Cybersickness, before and now</li> </ul>	<ul style="list-style-type: none"> <li>• Hands on demonstration on implementation</li> </ul>		
Lecture 15-16	<ul style="list-style-type: none"> <li>-Guidelines for Proper VR Usage</li> <li>-User-centered Design, User Experience and an Ethical Code of Conduct</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 17-18	<p><b>Emergence of XR in the Workplace</b></p> <ul style="list-style-type: none"> <li>-Areas and industries for immersive reality applications</li> <li>-Entertainment</li> <li>-Education</li> <li>-Training</li> <li>-Medical</li> <li>-Industrial</li> <li>-Military</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz	03
Lecture 19-20	<ul style="list-style-type: none"> <li>-Use-cases, applications and production pipelines</li> <li>-From Sensing to Rendering</li> <li>-Mobile, Standalone and high-end immersive computing platforms</li> <li>-VR, Immersive Tech and the Society</li> <li>-Impact on Professional Life</li> <li>-Impact on Private Life</li> <li>-Impact on Public Life</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz	03
Lecture 21-22	<p><b>Camera tracking and 3D Rendering for Immersive Environments</b></p> <ul style="list-style-type: none"> <li>• Inside-Out Camera tracking</li> <li>-Depth Sensing</li> <li>-Microsoft HoloLens</li> <li>-Vrvana Totem</li> <li>-Low cost AR and MR systems</li> <li>-Mobile Platforms</li> <li>• Full-Body tracking</li> <li>-Inverse &amp; Forward Kinematics</li> <li>-Kinect</li> <li>-Intel Realsense</li> <li>-Full body inertial tracking</li> <li>-Ikinema</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03

	<ul style="list-style-type: none"> <li>-Holographic Video</li> <li>• Rendering Architecture <ul style="list-style-type: none"> <li>-Graphics Accelerators,</li> <li>-3D Rendering API's, OpenGL, DirectX, Vulkan, Metal,</li> <li>-Best practices and Optimization techniques</li> </ul> </li> <li>• Distributed VR Architectures <ul style="list-style-type: none"> <li>-Multi-pipeline Synchronization</li> <li>-Co-located Rendering Pipelines</li> <li>-Distributed Virtual Environments</li> </ul> </li> </ul>			
Lecture 23-24	<p><b>Modelling the Physical World</b></p> <ul style="list-style-type: none"> <li>• Geometric Modelling <ul style="list-style-type: none"> <li>-Virtual Architecture</li> <li>-Virtual Object Shape</li> <li>-Virtual Object Appearance</li> <li>-Procedural Textures</li> <li>-Advanced Material Properties</li> <li>-Procedural Objects</li> <li>-Photogrammetry</li> </ul> </li> <li>• Kinematics Modelling <ul style="list-style-type: none"> <li>-Homogeneous Transformation Matrices</li> <li>-Object Position</li> <li>-Transformation Invariants</li> <li>-Object Hierarchies</li> <li>-Scale, Perspective and Perception</li> <li>-Physical Modelling</li> <li>-Collision Detection</li> <li>-Surface Deformation</li> <li>-Force computation</li> <li>-Force Smoothing and Mapping</li> <li>-Haptic Texturing</li> </ul> </li> <li>• Behaviour Modelling</li> <li>• Model Management <ul style="list-style-type: none"> <li>-Level-d-Detail Management</li> <li>-Cell Management</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 25-26	<p><b>Sound in Immersive Environments</b></p> <ul style="list-style-type: none"> <li>• Evolution of Sound Systems <ul style="list-style-type: none"> <li>-From mono to stereo to surround</li> <li>-Object Based Sound</li> <li>-Ambisonics</li> <li>-HRTF</li> </ul> </li> <li>• Sound Design Basics <ul style="list-style-type: none"> <li>-Sound as Information</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03

	<ul style="list-style-type: none"> <li>-Earcons</li> <li>-Impact of Sound in Objects and Actions</li> <li>-Natural vs Real Sound</li> </ul>			
Lecture 27-28	Familiarity with Unity Engine, Set up and running the applications	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 29-30	Development with Unity -Build Interactivity with Timeline -Create Animated Stories with Unit -Create Compelling Shots with Cinemachine	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 31-32	-Create High-Fidelity Lighting in the High-Definition Render Pipeline -Create Real-Time Visualizations with Unity -DOTS (Data-Oriented Technology Stack) Fundamentals - Data-Oriented Design	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 33-34	Develop 3D Mobile Games Develop Interactive User Interfaces in Unity Develop Mobile AR Applications	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 35-36	Develop VR & XR Applications with Unity, Unreal Engines and the XR Interaction Toolkit	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 37-38	<b>Introduction to Mixed Reality (MR)</b> -Explore MR devices -Understand holograms -Design and develop in MR -Use cases and examples -MR cloud services and applications -Introduction to the MR Toolkit-- Set Up Project & Use Hand Interaction -Configure Windows MR -Import and configure resources -Interaction models -Add hand interaction scripts to an	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03

	object			
Lecture 39-40	<b>Types of MR apps &amp; Hardware</b> <ul style="list-style-type: none"> <li>-Enhanced environment apps (HoloLens only)</li> <li>-Blended environment apps</li> <li>-Immersive environment apps</li> <li>-Techniques for expanding the design process           <ul style="list-style-type: none"> <li>-MR Hardware: HoloLens 2, Immersive headset</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 41-42	<b>Designing Holograms</b> <ul style="list-style-type: none"> <li>-Designing for mixed reality</li> <li>-Exploring the doll house</li> <li>-1:1 vs 1:10 prototypes</li> <li>-Using Mixed Reality Capture</li> <li>-Manipulating captures and virtual objects</li> <li>-Head Gaze Adjustment</li> <li>-Syncing Animated Objects</li> <li>-UI creative process</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 43-44	<b>Design &amp; Develop MR Applications</b> <ul style="list-style-type: none"> <li>-Structural elements: App model, coordinate systems, spatial mapping, scene understanding</li> <li>-Interactions: system gesture, instinctual interaction, hands &amp; motion controllers model, hand-free model, eye-based interaction</li> <li>-UX elements: Visual, spatial sound, controls and behaviours</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture on theoretical background</li> <li>• Hands on demonstration on implementation</li> </ul>	Test, quiz, assignment	03
Lecture 45-46	Evaluation	<i>Test, quiz, exam, project implementation</i>		04
<b>Total Hours</b>				<b>70</b>

**Course 4: Communicative English**

<b>Month 1</b>	
Week	<b>Topics/ Session titles</b>
Week 1	Class 1: Introductory and ice breaking session, class rules, motivations, theoretical and practical work-based briefing, to do and not to do list for this course Class 2: Introducing 4 modules and assessing their expectations Class 3: Introducing with new people, times and greetings practice
Week 2	Class 4: Pronunciation practice Class 5: Modulation, Intonation practice Class 6: Formal and informal conversation practice
Week 3	Class 7: How to write a latest and persuasive CV and job application Class 8: Formal and informal email writing Class 9: Use of tense and parts of speech for professional correspondence
Week 4	Class 10: Reading comprehension and finding out the jargon of ICT, CSE, Internet, Wi-Fi, digitalization Class 11: Reading techniques: Skimming, scanning, and other techniques Class 12: Techniques of faster reading
<b>Month 2</b>	
Week 5	Class 13: Listening (Practical from easy task of Cambridge IELTS materials) understanding primary information Class 14: Conversational listening Class 15: Listening practice based on the level of participants
Week 6	Class 16: Speaking practical: Role play and conversation Class 17: Practicing job interview in English (Role play) Class 18: Practicing job interview in English (Role play)
Week 7	Class 19: Understanding phonetics Class 20: Using phonetics in conversation Class 21: Understanding various English accent
Week 8	Class 22: Describing objects, picture, building

	Class 23: Describing objects, picture, building Class 24: English Story telling
<b>Month 3</b>	
Week 9	Class 25: English debate Class 26: English Story telling Class 27: English Debate
Week 10	Class 28: Writing job application practical Class 29: Writing job application practical Class 30: Writing persuasive email letter practical
Week 11	Class 31: Practicing fluency Class 32: Identifying grammatical errors in speaking using tense Class 33: Identifying grammatical errors in speaking using tense
Week 12	Class 34: How to create reading habit and reading comprehension Class 35: How to create reading habit and reading comprehension Class 36: Reading world best-selling book and telling summary (HW)
<b>Month 4</b>	
Week 13	Class 37: Situational conversation and given circumstances Class 38: Situational conversation and given circumstances Class 39: Assessment class ( Mid Mock test)
Week 14	Class 40: Suffix and prefix practice Class 41: Phrasal verb practice Class 42: Subject verb agreement
Week 15	Class 43: Advance English Conversation: Using various Tense Class 44: Advance English Conversation: Using various Tense Class 45: Advance English Conversation: Using various Tense
Week 16	Class 46: Synonyms, antonyms practice in writing Class 47: Using parts of speech for developing vocabulary Class 48:
<b>Month 5</b>	
Week 17	Class 49: Topic based Speech contest practical Class 50: Topic based Speech contest practical Class 51: Advance improvisation techniques in speaking
Week 18	Class 52: Topic based writing: Importance of digitalization in a country Class 53: Essay writing: Self-development Class 54: Topic: Knowledge management
Week 19	Class 55: Topic: Recent development of Bangladesh Class 56: Significance of ICT Class 57: 10 Proposals to ensure further development of Bangladesh
Week	Class 58: Understanding English lecture of Martin Luther King

20	Class 59: Understanding persuasive lecture of Barak Obama Class 60: Audio book: Power of believing
<b>Month 6</b>	
Week 21	Class 61: Round table discussion in English (Group Work) Class 62: Round table discussion in English (Group Work) Class 63: Individual Speech contest
Week 22	Class 64: Watching BBC documentary Class 65: Watching 'Power of Ten' Class 66: Mock test
Week 23	Class 67: Advance speaking for identifying grammatical errors Class 68: Advance speaking for identifying grammatical errors Class 69: Developing vocabularies in speaking
Week 24	Class 70: Speaking contest: open topic Class 71: Speaking contest: Given topic Class 72: Final Test

### Total Training Course Summary

Course category	Couse title	Hours
COURSE 1	<b>AI and Machine Learning with Python</b>	
Module A	Python Programming	<b>20</b>
Module B	Training on AI and Machine Learning	<b>66</b>
COURSE 2	Training on Deep Learning	<b>60</b>
COURSE 3	Training on Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR) and Extended Reality (XR)	<b>70</b>
Course 4	Communicative English	<b>72</b>
<b>Total (Hours) [two hundred eighty eight hours]</b>		<b>288</b>

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