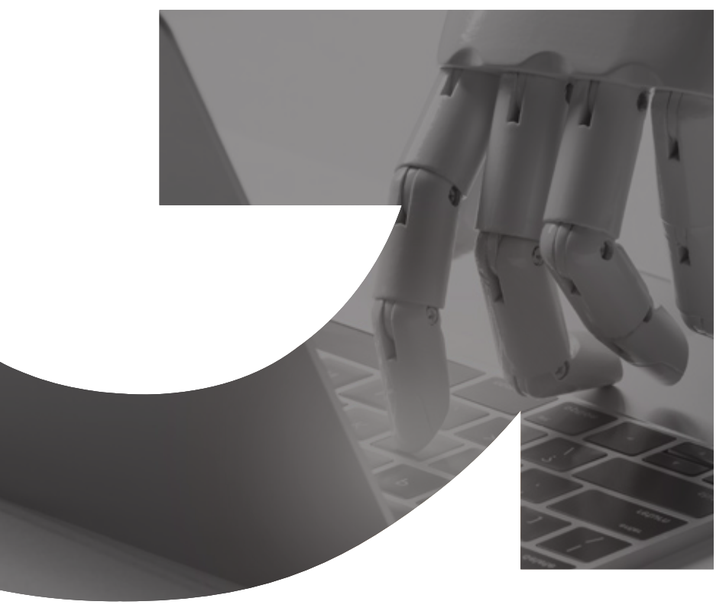

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Note: This curriculum is subject to change based on inputs from IIITB and Industry

COURSE	MODULE NAME	SESSION	SESSION NAME
PREPARATORY CONTENT	**INTRODUCTION TO PYTHON FOR DATA ANALYSIS**	DATA STRUCTURES IN PYTHON	INSTALLATION
			BASICS - PRINTING, APPLICATIONS IN DATA ANALYSIS, DEVELOPMENT, DATA VISUALISATION ETC.
			LISTS
			TUPLES
			DICTIONARIES
			SETS
			IMPORTING MODULES AND PACKAGES
		CONTROL STRUCTURES & FUNCTIONS	IF-ELIF-ELSE
			LOOPS & CONDITIONAL STATEMENTS
			COMPREHENSIONS
			FUNCTIONS
			EXCEPTION HANDLING
			MAP, FILTER & REDUCE
		BASICS OF OBJECT ORIENTED PROGRAMMING	CLASSES AND OBJECTS
			INHERITANCE
		CREATING YOUR OWN MODULES AND PACKAGES	CREATING MODULES
			CREATING PACKAGES
			IMPORTING MODULES AND PACKAGES
		DATA VISUALISATION IN PYTHON	INTRODUCING NUMPY
			INTRODUCING PANDAS
			MERGING, SUBSETTING, GROUPING & AGGREGATION
	SQL	INTRO TO SQL	BASICS OF SQL - SELECT, FROM, WHERE
			ORDERING, GROUPING, SUBQUERIES, VIEWS
			SQL WITH PYTHON (PYMYSQL ETC.)
	MATH FOR DATA ANALYSIS	LINEAR ALGEBRA	BASICS OF MATRICES - REVISION
			VECTOR SPACES, LINEAR TRANSFORMATIONS, SUBSPACES
			EIGENVALUES AND EIGENVECTORS
			INNER PRODUCT SPACES
		APPLICATIONS OF LINEAR ALGEBRA	SOLVING A SYSTEM OF LINEAR EQUATIONS, WHAT DOES IT MEAN TO SOLVE A SYSTEM OF LINEAR EQUATIONS IN N-DIMENSIONS
			LEAST-SQUARES BEST FIT LINE
			FOURIER SERIES EXPANSION
	DATA MANIPULATION IN PYTHON	GETTING DATA IN PYTHON	GETTING LOCAL DATA
			DATA FROM SQL
			JSON DATA
		MANIPULATING DATA IN PYTHON	WIDE & LONG DATAFRAMES (MELT, RESHAPE ETC.)
			SLICE, DICE, ORDER, GROUP, AGGREGATE
	DATA VISUALISATIO IN PYTHON	INTRODUCTION TO DATA VISUALISATION	TYPES OF VISUALISATIONS
			INTERPRETING BASIC CHART TYPES
		VISUALISATIONS IN PYTHON USING MATPLOTLIB	CREATE SCATTER PLOTS, HISTOGRAMS, BAR CHARTS
			FACETS, GRIDS, BOXPLOTS

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COURSE	MODULE NAME	SESSION	SESSION NAME
STATISTICS ESSENTIALS	**INTRODUCTION TO DATA ANALYSIS**	JARGON BUSTING	JARGON BUSTING AND CRISP-DM FRAMEWORK
		FRAMEWORK FOR DATA ANALYSIS	
	INVESTMENT CASE STUDY	DATA MANIPULATION AND ANALYSIS (INDIVIDUAL PROJECT)	RECOMMENDING INVESTMENT STRATEGIES TO SPARK FUNDS
	INFERENTIAL STATISTICS (OPTIONAL)	PROBABILITY, CONDITIONAL PROBABILITY, BAYES THEOREM	BASIC PROBABILITY
			CONDITIONAL PROBABILITY
			BAYES THEOREM
		RANDOM VARIABLES, PDFS, CDFS, BINOMIAL AND NORMAL DISTRIBUTION	RANDOM VARIABLES - DISCRETE AND CONTINUOUS
			PDFS AND CDFS
			BINOMIAL DISTRIBUTION
			NORMAL DISTRIBUTION
		SAMPLING DISTRIBUTIONS AND THE CLT	SAMPLING METHODS
			THE CENTRAL LIMIT THEOREM
			APPLICATIONS OF CLT
		CONFIDENCE INTERVALS, Z-TABLES	CONFIDENCE INTERVALS
			Z-TABLES
	HYPOTHESIS TESTING	CONCEPTS IN HYPOTHESIS TESTING	BASIC PROBABILITY
			NULL & ALTERNATE HYPOTHESIS
			STANDARDISED SCORE APPROACH
			UNSTANDARDISED TEST SCORE
			P-VALUE APPROACH
			TYPES OF TESTS
			TYPES OF ERRORS
		SETTING UP HYPOTHESIS TEST	1-POPULATION MEAN TEST
			2-POPULATION MEAN TEST
			1-POPULATION PROPORTION TEST
			2-POPULATION PROPORTION TEST
		WHEN NOT TO USE Z-TEST	UNDERSTANDING T-DISTRIBUTION
			SETTING UP T-TEST
			NON-PARAMETRIC TEST
			SETTING UP CHI-SQUARE TEST
	EXPLORATORY DATA ANALYSIS	UNIVARIATE AND SEGMENTED UNIVARIATE ANALYSIS	SUMMARISING ONE VARIABLE USING MEAN, MEDIAN
			MEASURING THE SPREAD - ST DEV, QUARTILE DISTRIBUTION
			OUTLIER DETECTION
			COMPARISON OF MEANS ACROSS SEGMENTS
		MULTIVARIATE ANALYSIS	BIVARIATE ANALYSIS - CORRELATIONS, CORRELATION MATRICES
			ANALYSING MORE THAN TWO VARIABLES AT A TIME
		DERIVING NEW VARIABLES	DERIVING NEW METRICS/FEATURES FROM DATES AND TIME
			OTHER TYPES OF NEW DERIVATIVE METRICS
	GROUP PROJECT	EDA PROJECT	LENDING CLUB CREDIT DEFAULT ANALYSIS

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MACHINE LEARNING	**LINEAR REGRESSION**	SIMPLE LINEAR REGRESSION	INTRO TO SIMPLE LINEAR REGRESSION
			LINEAR REGRESSION IN SKLEARN
		MULTIPLE LINEAR REGRESSION	INTRO TO MULTIPLE LINEAR REGRESSION
			MULTIPLE LINEAR REGRESSION IN SKLEARN
	NAÏVE BAYES	NAÏVE BAYES CLASSIFIER	NAÏVE BAYES WITH 1 FEATURE
			CONDITIONAL INDEPENDENCE
			USING NAÏVE BAYES TO MAKE PREDICTIONS
			NAÏVE BAYES WITH CONTINUOUS DATA
			NAÏVE BAYES IN SKLEARN
	LOGISTIC REGRESSION	INTRO TO LOGISTIC REGRESSION	SIGMOID FUNCTION
			ESTIMATING & INTERPRETING THE COEFFICIENTS
			CHOOSING A PROBABILITY CUTOFF
		MULTIVARIATE LOGISTIC REGRESSION	FEATURE SELECTION THROUGH STEPWISE
			FEATURE SELECTION - VIF
		MODEL EVALUATION	C-STATISTIC
			KS STATISTIC & ROC CURVE
			THRESHOLD SELECTION
	CLUSTERING AND DIMENSIONALITY REDUCTION	INTRODUCTION TO CLUSTERING	UNSUPERVISED LEARNING
			CUSTOMER SEGMENTATION - APPLICATION OF CLUSTERING
		K-MEANS CLUSTERING - ALGORITHM	STEPS OF THE ALGORITHM
			VISUALISING THE K MEANS ALGORITHM
			PRACTICAL CONSIDERATIONS IN K MEANS
		K MEANS IN SKLEARN	DATA PREPARATION
			MAKING THE CLUSTERS
			DECIDING THE OPTIMAL K
			INTERPRETING THE RESULTS
		HIERARCHICAL CLUSTERING - ALGORITHM	STEPS OF THE ALGORITHM
			INTERPRETING THE DENDROGRAM
			TYPES OF LINKAGES
		HIERARCHICAL CLUSTERING IN SKLEARN	CONSTRUCTING THE DENDROGRAM
			CUTTING THE DENDROGRAM
			INTERPRETING THE DENDROGRAM
		DIMENSIONALITY REDUCTION USING PCA	THE NEED FOR DIMENSIONALITY REDUCTION
			CREATING AND INTERPRETING PRINCIPAL COMPONENTS
			CREATING CLUSTERS USING PRINCIPAL COMPONENTS
			IMPLEMENTING PCA IN PYTHON
	SUPPORT VECTOR MACHINES	HYPERPLANES AND SVMS	WHY USE SVM
			CONCEPTS OF HYPERPLANES
			MAXIMUM MARGIN CLASSIFIER
			SUPPORT VECTOR CLASSIFIER
			SVM IN SKLEARN
		KERNELS	TRANSFORMING NON-LINEAR BOUNDARIES TO LINEAR
			THE KERNEL TRICK AND KERNEL FUNCTIONS
	DECISION TREES	INTRO TO DECISION TREES	CONCEPT OF DECISION TREES
			INTERPRETING A DECISION TREE
			ADVANTAGES & DISADVANTAGES
			DECISION TREE IN SKLEARN
			REGRESSION WITH DECISION TREE
		ALGORITHMS FOR DECISION TREE CONSTRUCTION	CONCEPT OF HOMOGENEITY
			GINI INDEX
			ENTROPY & INFORMATION GAIN
			MULTISTAGE PROPERTY & GAIN RATIO
			SPLITTING BY VARIANCE
		TRUNCATION & PRUNING	TREE TRUNCATION
			TREE PRUNING
			COST CONSIDERATION & MISSING DATA
	ENSEMBLES	BAGGING & BOOSTING	WHY ENSEMBLES WORK
			CREATING AN ENSEMBLE - BAGGING AND RANDOM FORESTS
			CREATING AN ENSEMBLE - GRADIENT BOOSTING
			ENSEMBLES IN SKLEARN
	GROUP PROJECT	TELECOM CHURN PROJECT	APPLYING PCA TO SIMPLIFY A BUSINESS PROBLEM, EXTRACTING USEFUL INFORMATION: TELECOM CHURN CASE STUDY (REDUCING ~250 VARIABLES TO PRINCIPAL COMPONENTS, CREATING CLUSTERS AND CUSTOMER SEGMENTS); THEN USE A SUPERVISED LEARNING MODEL TO PREDICT CHURN

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NATURAL LANGUAGE PROCESSING	GETTING STARTED WITH NLTK, BASICS OF TEXT PROCESSING	DISTRIBUTIONAL HYPOTHESIS	TERM DISTRIBUTION AND RELEVANCE MODELS, BAG-OF-WORDS DOCUMENT MODEL, FREQUENCY, AGGREGATE FUNCTIONS ON WORDS ETC.
			INTRODUCTION TO NLTK - ACCESSING TEXT CORPORA AND LEXICAL RESOURCES
			FREQUENCY AND CONDITIONAL FREQUENCY DISTRIBUTIONS
		ACCESSING AND PROCESSING RAW TEXT	ACCESSING TEXT FROM WEB APIS, RSS FEEDS IN HTML, XML, JSON FORMATS ETC.
			PROCESSING UNICODE TEXTS
			REGULAR EXPRESSIONS
	LEXICAL PROCESSING	KEY PHRASE MANAGEMENT	USING A TAGGER
			MAPPING WORDS TO PROPERTIES USING PYTHON DICTIONARIES
			AUTOMATIC TAGGING, N-GRAM TAGGING
			PHRASE DETECTION ALGORITHMS
			DETERMINING CATEGORY OF A WORD
		DOCUMENT MODELS	APPLYING SUPERVISED CLASSIFICATION TO CLASSIFY TEXT - DECISION TREES, BAYESIAN CLASSIFIERS ETC.
			MODELING LINGUISTIC PATTERNS
	SYNTAX AND SEMANTICS	SEMANTIC TAGGING	CHUNKING: DEVELOPING AND EVALUATING CHUNKERS
			SENTIMENT ANALYSIS
			TOPIC MODELS
			NAMED ENTITY RECOGNITION
		SYNTAX	UNDERSTANDING ENGLISH GRAMMAR
			PARSING, DEPENDENCY GRAMMAR
			EXTRACTING FEATURES
	MISCELLANEOUS	DOCUMENT CLUSTERING	
	PROJECT	TEXT ANALYTICS PROJECT	TRAINING A CHAT BOT ENGINE
			BUILDING A NEWS RECOMMENDER ENGINE
NEURAL NETWORKS AND DEEP LEARNING	INFORMATION FLOW IN A NEURAL NETWORK	STRUCTURE OF NEURAL NETWORKS	INSPIRATION FROM HUMAN BRAIN
			WORKING OF A NEURON
			HYPER PARAMETERS OF NEURAL NETWORKS - WEIGHTS, BIASES AND ACTIVATION FUNCTION
		FEEDFORWARD	WORKING OF A NEURON
	TRAINING A NEURAL NETWORK	TRAINING A NEURAL NETWORK - BACKPROPAGATION	DEFINING THE COST FUNCTION
			CALCULATING GRADIENT OF COST
			UPDATING THE WEIGHT & BIASES
		OPTIMISATION STRATEGIES IN NEURAL NETWORKS	STOCHASTIC GRADIENT DESCENT
			EXPLORATION & EXPLOITATION
			IMPLEMENTING A NEURAL NETWORK ON MNIST DATA IN PYTHON
	CONVOLUTIONAL NEURAL NETWORKS	CONVOLUTIONAL NEURAL NETWORKS	CONVOLUTIONAL NEURAL NETWORKS - EXAMPLES OF IMAGE CLASSIFICATION
			ARCHITECTURE OF COMPLEX NEURAL NETWORKS - SOFTMAX LAYERS, MAXPOOL ETC.
	RECURRENT NEURAL NETWORKS	RECURRENT NEURAL NETWORKS	LSTMS
			IMPLEMENTATIONS OF RNNS ON TEXT DATA (EXAMPLES)
	CREATING AND DEPLOYING NETWORKS USING TENSORFLOW AND KERAS	IMPLEMENTING NEURAL NETWORKS USING KERAS AND TENSORFLOW	WORKING WITH TENSORFLOW AND KERAS
			USING PREBUILT NETWORKS TO CLASSIFY IMAGES - ALEXNET, GOOGLENET, LENET
		MODEL DEPLOYMENT	USING APIS
			DEPLOYING AN IMAGE CLASSIFIER
	GROUP PROJECT	BUILDING AND DEPLOYING A NEURAL NETWORK	BUILD AN OBJECT DETECTION MODEL AND DEPLOY IT ON A WEB APPLICATION

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GRAPHICAL MODELS	INTRODUCTION TO BAYESIAN METHODS	1	BAYESIAN VERSUS FREQUENTIST ANALYSIS
		2	CONCEPTS IN BAYESIAN INFERENCE: POSTERIOR, PRIOR, CONJUGACY, MAP, MODEL AVERAGING
		3	EXAMPLES
	PRIMER ON GRAPHICAL MODELS	1	STRUCTURE LEARNING, PARAMETER LEARNING, INFERENCE
		2	MARKOV PROPERTIES
		3	FACTOR GRAPHS
		4	BAYESIAN BELIEF NETWORKS
	LEARNING AND INFERENCE IN GRAPHICAL MODELS	1	SUPERVISED BBN LEARNING - MAXIMUM LIKELIHOOD, PARAMETER LEARNING, OVERVIEW OF STRUCTURED LEARNING
		2	OVERVIEW OF INFERENCE IN BBNS - PEARL'S ALGORITHM, JUNCTION TREE ALGORITHM
		3	UNSUPERVISED LEARNING IN GRAPHICAL MODELS - MRFS
	PROJECT	1	OPTIMISING THE DELIVERY SCHEDULE AND ROUTES FOR AN AIR CARGO LOGISTICS COMPANY
REINFORCEMENT LEARNING	INTRODUCTION TO REINFORCEMENT LEARNING, FINITE MDPS	1	PROBLEMS IN REINFORCEMENT LEARNING
		2	MULTIARMED BANDITS
		3	CONCEPTS IN RL: MDPS, AGENT, ENVIRONMENT, GOALS, REWARDS, VALUE FUNCTIONS, POLICY
	EXACT METHODS	1	DYNAMIC PROGRAMMING
		2	MONTE CARLO METHODS
		3	TEMPORAL DIFFERENCE LEARNING
	APPROXIMATE METHODS	1	POLICY GRADIENT METHODS
	PROJECT	1	CREATING A TETRIS GAME PLAYING AGENT