Certification Examination Regulations and Course Discription

This Certification Examination Regulations of the Steinbeis+Academy applies to the following course on the basis of the valid Framework for the Implementation of Certificate Courses (RZLG) in the current version.

Course title	**Data Science - Post Graduate Program**

Fields of competences

Management	Personality Development	Education Management	Healthcare	Technology
X				X

Place(s) of implementation

Bengaluru (India)				

Graduation

Diploma of Advanced Studies (DAS)	Certificate of Advanced Studies (CAS)	Diploma of Basic Studies (DBS)	Certificate of Basic Studies (CBS)
X			

Qualification aim

The course is for professionals working on Business intelligence, Data Warehousing and reporting tools to improve their knowledge in data science. Engineering freshers with the qualification they are able to work as data analyst / Business Analyst.

RZLG-Supplementary admission requirement

From any stream with good logical, mathametical and analogics skills.
Working Professional from any domain, who has good logical, mathematical and analytical skills. Level of the Certificate of Basic Studies (CBS) in datas science is required.

Teaching method

Classroom	Classroom/ Online	Online
	X	

Language

English			

Workload in hours

Total	Seminar time	Self-study time	Transfer time
330	115	40	175

Type of performance records (LNW)	Examination (K)	Presentation/ oral examination (P)	Case (C)	Transfer paper (TA)	Project study paper (PSA)
	X			X	

Contents

Modules	Key topics	Seminar time/h
Introduction to core python Programming	Overview of Python-Starting with Python; Why Python for data science? Anaconda vs. python; Introduction to installation of Python and Packages; Introduction to Python Editors & IDE's(Jupyter,/Ipython); Understand Jupyternotebook & Customize Settings; Data Types & Data objects/structures (strings, Tuples, Lists, Dictionaries); List and Dictionary Comprehensions; Debugging & Code profiling; Built-in Functions (Text, numeric, date, utility functions); User defined functions – Lambda functions.	4
Datascience Project Lifecycle	Introduction to Types of analytics, project life cycle	2
Github and Kaggle	Intro to Github and Kaggle and accounts creation	2
Introduction to R Programming	Overview of R - Starting with R; Installation R and Rstudio; Data Types & Data structures; Data Importing and Exporting	2
Basic Statistics & Scientific Work	Scientific work; methodical approach für data collection and analysis; Data Types,Measure Of central tendency,Sampling Funnel; Python DS libraries Pandas,Numpy,Scikit,matplotlib); Mesures of Dispersion,Expected Value R coding; Random Variable,Probability,Probility Distribution (Normal and Logistic) R coding; Graphical Techniques (Bar,Boxplot and histogram etc); R coding; Skewness & Kurtosis, Sampling Variation; R coding	6

Interferential Statistics	CLT, Confidence interval; R coding; Introduction to concept with examples(2 proportion test, 2 t sample t test); Python DS coding concepts and challenges; Anova and Chisquare case studies; Python DS coding challenges	4
Linear Regression	Scatter Diagram, Corr Analysis, Priciples of Regression; Python DS coding challenges; Intro to Simple Linear Regression; Python DS coding challenges; Multiple Linear Regression; Python DS coding challenges	4
Logistic Regression	Principles of Logistic regression; Python DS coding challenges; Multiple Logistic Regression, ROC curve, Gain chart, Chisquare theory hands on Python DS coding challenges	4
Data Mining - Unsupervised I	Clustering – Hierarchical; Python DS coding challenges; Clustering – Kmeans; Python DS coding challenges	4
Dimension Reduction	PCA; Python DS coding challenges	2
Data Mining - Unsupervised II	Unsupervised - Network Analytics(update the code in better way); Python DS coding challenges; Association Rules; Python DS coding challenges; Recomender System; Python DS coding challenges	6
Text Mining	Introduction to Text Mining and applications; Python DS coding challenges; Vector Space Method (VSM)[Text processing,TDM and Weights]; Python DS coding challenges; Word clouds and LDA; Python DS coding challenges; Latent Semantic Analysis (LSA); Python DS coding challenges; NLP introduction, NER and Emotion mining; Python DS coding challenges	6
Chatbot	Chatbot introduction,types bots and demo	1

Algorithms I	Naïve Bayes; KNN; Decision Tree; Random Forest; Bagging, boosting and stocking - Part1; Bagging, boosting and stocking - Part2; XGBM; LGBM; Python DS coding challenges	6
Regularization	Lasso and Ridge Regressions ; Python DS coding challenges	2
Algorithms II	ANN; SVM; Introduction to CNN and RNN; Python DS coding challenges	2
Forecasting	Introduction to Timeseries, Level, Trend and Sesonality, strategy (Python DS coding challenges); Scatter plot, Lag plot, ACF, Principles of Visualization, Naïve forecasts (Introduction to R shiny (deployment)); Forecast in Error and it metrics, Model Based Approaches (Introduction to Python flask (deployment)); Model Based approach cont, AR Model for errors (DS Project 1); Data driven approaches, MA and exp Smoothing (DS Project 1)	6
Survival Analysis	Concept with a business case (DS Project 1)	2
DS Projekt 1-8		
SQL		7
Machine Learning additional topics	Train,Test & Validation Distribution; ML Strategy,Computation Graph; Evaluation Metric,Human Level Performance; (Python DS coding concepts and challenges)	2
Mathematics	Calculus (Python DS coding concepts and challenges); Linear Algebra; Probability	2
Intro to Neural Network & Deep Learning	Intro,Deep Learning Importance [Strength & Limiltation] and SP | MLP	2

Feed Forward & Backward Propagation	Neural Network Overview,Neural Network Representation and Activation Function; Loss Function, Importance of Non-linear Activation Function and Gradient Descent for Neural Network	4
Parameter & Hyperparameter	Train, Test & Validation Set,Vanishing & Exploding Gradient , Dropout and Regularization	2
Optimization	Bias Correction; RMS Prop; Adam; Ada; AdaBoost; Learning Rate;Tuning; Softmax	2
Python Environment for Deep learning	NLTK; Spacy & Gensim; OpenCV; Tensorflow and Keras	2
Data Processing - Text Processing	Representation; Data Cleaning; Data Preprocessing and Similarity	2
Data Processing - Image Processing	Image,Image Transformation and Filters; Noise Removal,Correlation & Convolution; Edge Detection; Non Maximum Suppression & Hysterisis; Fourier Domain; Video Processing	4
Feature Extraction	Image Feature; Descriptors	2
Object Detection	Detection & Classification	2
CNN	Computer Vision; Why Convolution; Convolution; Padding; Pooling	2
CNN - Deep Convolution Model	Case Studies; Classic Networks; Inception; Open Source Implementation; Transfer Learning	2
CNN - Detection Algorithm	Object Localization; Landmark Detection; Object Detection; Bounding Box Prediction; Yolo	2
CNN - Face Recognition	What is Face Recognition; One Shot Learning; Siamese Network; Triplet Loss; Face Verification; Neural Style Transfer; Deep Conv Net Learning	2

Sequence Models	Why Sequence Model,RNN Model; Backpropogation through time; Different Type of RNNs; GRU,LSTM,Biderectional LSTM; Deep RNN; Word Embedding; Debiasing; Negative Sampling; Elmo & Bert; Beam Search; Attention Model	4
Generative and Reinforcement Learning	Autoencoders & Decoders; Adversial Network; Active Learning; Q Learning; Exploration & Exploitation	5