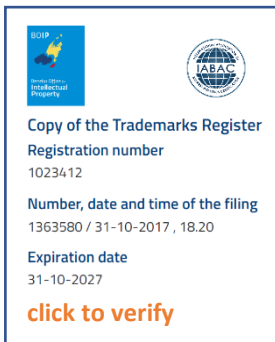




Artificial Intelligence Foundation (AIF)

CODE: AI3010

Syllabus and Examination



The International Association for Data Science Certification (IABAC®) is a globally recognized professional association dedicated to growing and enhancing the field of applied Data Science and Business Analytics.

IABAC™ founding principles are based on Edison Data Science Framework (EDSF), a European commission initiative, with the goal of aligning data science skills to industry requirements. IABAC was founded in the year 2017 as an association and, in the year 2018, registered as The Netherlands B.V (equivalent of English Private Limited).

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1 INTRODUCTION

This document is intended to provide information on Artificial Intelligence Foundation (AIF-AI3010) certification for IABAC registered training providers to structure the course curriculum as per IABAC syllabus guidelines and for individuals, who are preparing for AIF certification exam.

2 COURSE SYLLABUS

2.1 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

- History of Artificial Intelligence (AI)
- Five domains of AI
- Why AI now?
- Limitation of AI.

2.2 MACHINE LEARNING PRIMER

- Machine Learning Primer
- Machine Learning core concepts, scalable algorithms, project workflow.
- Objective Functions and Regularization
- Understanding Objective Function of ML Algorithms
- Metrics, Evaluation Methods and Optimizers
- Popular Metrics in Detail: R2 Score, RMSE, Cross Entropy, Precision, Recall, F1 Score, ROC-AUC, SGD, ADAM
- Artificial Neural Network
- ANN in detail, Forward Pass and Back Propagation
- Machine Learning Vs Deep Learning
- Core difference b/w ML and DL from implementation perspective

2.3 ADVANCED PYTHON FOR DEEP LEARNING

- Python Programming Primer
- Installing Python, Programming Basics, Native Data types
- Class, Inheritance and Magic Functions
- Python Classes, Inheritance Concepts, Magic Functions
- Special Functions in Python
- Overview, Array, selecting data, Slicing, Iterating, Array Manipulations, Stacking, Splitting arrays, Key functions
- Decorators and Special Functions
- Decorators implementation with class
- Context Manager 'with' in Python
- Context Manager Application
- Exception Handling
- Try and Catch block

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- Python Package Management
- Bundling and export python packages

2.4 TENSORFLOW 2.0 AND KERAS FOR DEEP LEARNING

- TensorFlow 2.0 Basics
- TensorFlow core concepts, Tensors, core APIs
- Concrete Functions, Datatypes, Control Statements
- Polymorphic Functions, Concrete Functions, Datatypes, Control Statements, NumPy, Pandas
- Autograph eager execution
- tf.function autograph implementation
- Keras (TensorFlow 2.0 Built-in API) Overview
- Sequential Models, configuring layers, loading data, train and test, complex models, call backs, save and restore Neural Network weights
- Building Neural Networks in Keras
- Building Neural networks from scratch in Keras

2.5 MATHEMATICS FOR DEEP LEARNING

- Linear Algebra
- Vectors, Matrices, Linear Transformation, Eigen Vectors, Matrix Operations, Special Matrices
- Calculus – Derivatives: Calculus essentials, Derivatives and Partial Derivatives, Chain Rule, Derivatives of special functions
- Probability Essentials: Probability basics and notations, Conditional probability, Essential Probability theorems for Machine Learning
- Special functions: Relu, Sigmoid, SoftMax, Popular Loss Functions – Cross Entropy, Quadratic Loss Functions

2.6 DEEP LEARNING FOUNDATION

- Deep Learning Network Concepts
- Core concepts of Deep Learning Networks
- Deep Dive into Activation Functions
- Building simple Deep Learning Network
- Tuning Deep Learning Network

3 EXAMINATION

3.1 PRE-REQUISITE QUALIFICATIONS

1. No mandatory prerequisites
2. Recommended essential knowledge in
 - a. Mathematics: Calculus, Statistics, Linear Algebra, Probability
 - b. Machine Learning and Python/R Programming
3. Training: Though formal training is not mandatory; it is recommended to attend IABAC® registered course through Registered Education Partners

3.2 MATERIAL PERMITTED

1. The examination is 'closed book'
2. No material permitted and No Internet Access

3.3 EXAM DURATION AND FORMAT

1. The computer-based exam is timed for 60 mins. No breaks allowed.
2. The exam consists of 25 **Multiple-Choice** Questions with three difficulty levels: easy, medium and difficult questions
3. Each question carries **5 Marks / 10 Marks**
4. No Negative marking

3.4 EXAM MODE

1. IABAC® certification exam is computer based and conducted through IABAC® Exam portal only
2. Candidates require a computer with internet and webcam (video and audio) to take the exam
3. Computer screen recording permission should be granted

3.5 PASS CRITERIA

1. The candidate needs to score **60% or higher** in order to pass the examination
2. The results will be declared after validation of the exam recording video session and identity proof verification.

3.6 RESULTS TIMELINE

1. The preliminary results are usually released within **9 days** of the exam date
2. The official results are usually released within **15 days** from the exam date

3.7 CERTIFICATE ISSUANCE

1. IABAC® e-certificate will be issued through the candidate's registered email
2. The e-certificate is digital verifiable at <https://www.iabac.org/verify-certificate>
3. The candidate has license to share digital certificate validation in professional networking portals such as www.linkedin.com
4. The candidate has a license to print physical copy (hardcopy) of the certificate

4 IABAC® KNOWLEDGE AREAS MAPPING

Knowledge Area	Syllabus Details	Bloom's Index
<p>KAG1-DSDA: Data Analytics group including Machine Learning, Statistical Methods, and Business Analytics</p>	<ul style="list-style-type: none"> ● Case Study on Statistical Analysis ● Curating the Data and performing, Discrete Mathematics, Probabilistic Reasoning ● Statistical Methods, including Descriptive Statistics, Exploratory Data Analysis (EDA) and Confirmatory Data Analysis (CDA) ● Case Study & Creating Machine Learning Model ● With detailed implementation of algorithms: Artificial Intelligence, Natural Language Processing ● Knowledge Representation and Reasoning ● Data Mining and knowledge discovery ● Text analysis, Data Mining, Text Analytics including Statistical, Linguistic, and Structural Techniques to analyse Structured and Unstructured data ● Creating Predictive Forecasting Models ● Decision Analysis and Decision Support Systems ● Data Mining 	6
<p>KAG2-DSENG: Data Science Engineering group including Software and Infrastructure Engineering</p>	<ul style="list-style-type: none"> ● Set Up Infrastructure and Big Data Applications ● Computer Networks for high-performance computing and Big Data Infrastructure ● Cloud Enabled Applications development ● Modelling and Simulation ● Modelling and Simulation Theory and Techniques (general and domain oriented) ● Large Scale Modelling and Simulation Systems ● Set up Big Data (Data Science) Applications Design ● Programming Languages for Big Data Analytics: R, Python, others ● Models and Languages for complex interlinked Data Presentation and Visualisation 	5

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<p>KAG3-DSDM: Data Management group including Data Curation, Preservation and Data Infrastructure</p>	<ul style="list-style-type: none"> ● Creating Database Models and Data Curation ● Data Modelling, Databases and Database Management Systems, Data Models and Query Languages, Database Administration ● Set up Data Management and Enterprise Data Infrastructure ● Data management, including Reference and Master Data, Data Warehousing and Business Intelligence, Data storage and Operations ● Data Archives/Storage Compliance and Certification Metadata, Linked data, Provenance ● Data Infrastructure, Data Management and Organisation Research Data Infrastructure, Open Science, Open Data, Open Access, Data Infrastructure Compliance and Certification, Ethical Principle and Data Privacy 	4
<p>KAG4-DSRM: Scientific and Research Methods group</p>	<ul style="list-style-type: none"> ● Scientific/Research Methods ● Research Methodology, Paradigms and Research Cycle, Modelling and Experiment Planning ● Data Selection and Quality Evaluation ● Use Case Analysis: Research Infrastructures and Projects Research Data Management plan and Ethical Issues 	6
<p>KAG5-DSBPM: Business Process Management group</p>	<ul style="list-style-type: none"> ● Business Process Management ● Business Processes and Operations, Project Scope and Risk Management ● Business Analysis - Organisation and Management ● Business Analysis - Planning and Monitoring ● Requirements Analysis and Design Definition ● Requirements Life Cycle Management (from inception to retirement) Solution Evaluation and Improvements Recommendation ● Business analysis and Enterprise Organisation ● Agile Data Driven Methodologies, Processes and Enterprises ● Use Case Analysis: Business and Industry 	4
<p>KAG6-DSDK: Data Science Domain Knowledge group includes domain specific knowledge</p>	<ul style="list-style-type: none"> ● Applied Data Science use cases in Domains, HR, Retail, Fraud Analytics, Finance Trends, Health Care, Infrastructure Management 	2

5 BLOOM'S TAXONOMY REFERENCE

Bloom's Learning Index	Description
1	Remembering: Recall or retrieve previous learned information.
2	Understanding: Comprehending the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.
3	Applying: Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations in the workplace.
4	Analysing: Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.
5	Evaluating: Make judgments about the value of ideas or materials.
6	Creating: Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.

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