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## ***Data Science for Product Owners Syllabus***



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## Introduction

This qualification is based on the Data Science for Product Owners course first developed by GoDataDriven. The course provides guidance on the principles and practice of bringing data products from the ideation phase to production and is divided into six separate knowledge chapters:

1. Introduction to Data Science
2. The Value Chain of Data Science
3. the AI Solution Framework
4. the Ideation
5. Experimentation
6. Industrialization Phase.

## 1 Foundation Qualification

### 1.1 Purpose of the Foundation Qualification

The purpose of the Foundation qualification is to measure whether a candidate has sufficient knowledge and understanding of the life cycle of data science product from a product owner or subject matter expert perspective.

### 1.2 Target Audience

This qualification is aimed at individuals who work or will work closely with teams developing data science products. These individuals require a working knowledge of the key principles of data science, they need to know the terminology used and some of the theory behind the practice.

### 1.3 High Level Performance Definition of a Successful Foundation Candidate

The candidate who meets this High Level Performance Definition should as a minimum be able to recall, recognize and demonstrate understanding of the theories, concepts, models and approaches outlined in the course

Specifically they should be able to demonstrate this understanding by being able to:

- Select the right machine learning algorithm for your business challenge
  - Understand the three different machine learning applications: clustering, regression, classification
  - For each application, have an overview of the existing machine learning algorithms
  - For each application, have a detailed understanding of at least one commonly used algorithm
  - For each application, understand the trade-offs involved in selecting the right algorithm and parameters
- Select the right accuracy metric suited for your business challenge
- Have hands-on experience with applying a machine learning algorithm to an example business problem
- Be able to identify key-stakeholder and end-users for your use cases
- By estimating impact and feasibility be able to prioritize use cases
- Have the tools and knowledge to fill a one-pager to onboard new data science use cases, including translating business requirements in data science ideas
- Have clear what the various stages between ideation and production are and are empowered to ensure the successful implementation of products.

## 2 Assessment Model

Each learning outcome in the High Level Performance Definition requires the candidate to demonstrate specific knowledge and skills. For each learning outcome a number of learning outcome measures are identified which are evaluated in the examination, in accordance with the Examination Design, to confirm that the learning outcome has been achieved. These learning outcome measures are shown as syllabus topics and define the scope of the standard required to achieve the qualification.

A classification widely used when designing assessments for certification and education is the Bloom's Taxonomy of Educational Objectives. This classifies learning objectives into six ascending learning levels, each defining a higher degree of competencies and skills. (Bloom et al, 1956, Taxonomy of Educational Objectives).

APMG have incorporated this into a Learning Outcomes Assessment Model that is then used to develop each qualification's Assessment Model. The model provides a simple and systematic means for assessing and classifying the learning outcome measures. .

This structured approach helps to ensure:

- The appropriate level is identified for a qualification
- A clear delineation in learning level content between different qualifications
- Wording is standardized and syllabi are presented consistently across APMG's qualification portfolio
- Exam questions and papers are consistent in their design..

The Foundation qualification examines at levels 1 (recall) and 2 (understand). The Practitioner qualification tests at levels 2 (understand), 3 (apply) and 4 (analyse).

| QUAL Assessment Model  |   |   |   |  |
|--|---|---|---|--|
|  | 1. Recall   | 2. Understand   | 3. Apply  | 4. Analyse   |
| <b>APMG Learning Level Definition</b>  | <i>remember previously learned information</i>  | <i>grasp the meaning and make sense of information</i>  | <i>use information to perform a skill or task</i>                                       | <i>identify whether information has been used appropriately according to the rules and guidance</i>                                |
| <b>Generic APMG Headers</b><br><br><i>For introducing the learning outcome measures (topics) in the Syllabus</i> | Recall terms and key facts about concepts, principles and procedures from the reference material                          | Understand key facts, concepts, principles and procedures from the reference material                   | Apply key facts, concepts, principles and procedures to a given scenario                | Differentiate between appropriate and inappropriate use of the reference material in a given scenario                              |
| <b>Qualification Example</b>   | Recall terms and key facts about theories, concepts, principles, model types and approaches relating to the syllabus area | Understand the theories, concepts, principles, model types and approaches relating to the syllabus area | Apply particular models or approaches relating to the syllabus area to a given scenario | Differentiate between appropriate and inappropriate use of particular approaches and models within the context of a given scenario |

### 3 Qualification Scope

The definition of scope for each qualification is presented in the syllabus tables at the end of this document. Each syllabus area is a unit of learning that relates to the reference material or training course module.

The following syllabus areas are identified.

| Syllabus Area Code | Syllabus Area Title             |
|--------------------|---------------------------------|
| DS                 | Fundamentals of Data Science    |
| VC                 | The Value Chain of Data Science |
| SF                 | AI Solution Framework           |
| ID                 | Ideation Phase                  |
| EX                 | Experimentation Phase           |
| IN                 | Industrialization Phase         |

### 4 Syllabus Presentation

For each syllabus area the learning outcome measures are presented in order of learning level and are introduced by a standard header. There is only one header at each learning level for each syllabus area. The wording in this header is derived from the Assessment Model. Each measure is specific to a learning level.

The scope of each examination is shown by a tick in the respective column to the right of the topic description.

Practitioner qualification requirements are a summation of the Foundation and Practitioner learning outcome measures. All Foundation level requirements are required for Practitioner level but are assumed to have been met and are not directly assessed again, although Foundation level knowledge and understanding will be used when demonstrating Practitioner application and analysis learning outcomes.

Each of the syllabus areas is presented in a similar format as follows:

| Syllabus Area Code  |        | Syllabus Area :   |  | Foundation | Practitioner | Primary References |
|---|--------|---|--|------------|--------------|--------------------|
| DS [2]  |        | <b>DS for POs Syllabus Area (DS)</b><br><b>Theme: <i>Fundamentals of Data Science</i> [1]</b> |  |            |              |                    |
| Level   | Topic  |   |  |            |              |                    |
| <b>Recall terms and key facts about the concepts, principles and procedures relating to <i>syllabus area</i>. [3]</b><br><b>Specifically to recall:</b> |        |   |  |            |              |                    |
| 01 [4]  | 01 [5] | [6]<br>History of Analytics<br><i>Replace this with example from the qualification</i>        |  | [7]<br>✓   |              | [8]                |
| 01  | 02     | What is a model   |  | ✓          |              |                    |

## Key to the Syllabus Area table

|   |  |   |
|---|--|---|
| 1 | Syllabus Area  | Unit of learning, e.g. course module, key activity area or section of the reference guide.  |
| 2 | Syllabus Area Code                                       | A unique 2 character code identifying the syllabus area.  |
| 3 | Learning Level Header                                    | Header introducing the syllabus topics ( <i>learning outcome measures</i> ) for a given learning level..                                |
| 4 | Level  | Learning level of the learning outcome measure..  |
| 5 | Topic Reference  | Number of the topic within the learning level.  |
| 6 | Topic Description<br>( <i>Learning Outcome Measure</i> ) | Precise and specific description of what is required of the candidate to demonstrate that a learning outcome has been achieved.         |
| 7 | Foundation/Practitioner                                  | Shows at which qualification level the topic <b>is assessed</b> .<br><b>Note: A measure is only applied at one qualification level.</b> |
| 8 | Primary Reference  | The main reference supporting the learning outcome measure.   |

| Syllabus Area Code<br><br>DS  |       | Syllabus Area:<br><b>DS for POs Syllabus Area (DS)</b><br>Theme: <i>Fundamentals of Data Science</i> | Foundation | Practitioner | Primary Manual Reference |
|---|-------|--|------------|--------------|--------------------------|
| Level   | Topic |  |            |              |                          |
| <b>Know facts, terms and concepts relating to the syllabus area. Specifically to recall:</b>              |       |  |            |              |                          |
| 01  | 01    | History of Analytics   | Y          |              |                          |
| 01  | 02    | What is a model  | Y          |              |                          |
| 01  | 03    | Descriptive, Diagnostic, Predictive, and Prescriptive Analytics                                      | Y          |              |                          |
| 01  | 04    | Supervised and Unsupervised models   | Y          |              |                          |
| 01  | 05    | Regression, Classification, Clustering   | Y          |              |                          |
| 01  | 06    | Bias /variance tradeoff  |            |              |                          |
| <b>Understand how the DS theme is applied throughout the project processes. Specifically to identify:</b> |       |  |            |              |                          |
| 02  | 01    | Examples of use cases solved by regression, classification, clustering                               | Y          |              |                          |
| 02  | 02    | Examples of use cases using descriptive-prescriptive analytics                                       | Y          |              |                          |
| 02  | 03    | How to identify what model should be used  | Y          |              |                          |

| Syllabus Area Code<br>VC  |       | Syllabus Area :<br><i>DS for POs Syllabus Area (VC)</i><br>Theme: <i>The Value Chain of Data Science</i> | Foundation | Primary Manual Reference |
|---|-------|--|------------|--------------------------|
| Level   | Topic |  |            |                          |
| <b>Know facts, terms and concepts relating to the syllabus area. Specifically to recall:</b>              |       |  |            |                          |
| 01  | 01    | Why companies struggle to create value with data science   | Y          |                          |
| 01  | 02    | How to get value from your data  | Y          |                          |
| 01  | 03    | Create smart products and services   | Y          |                          |
| 01  | 04    | What is the Value Chain of Data Science  | Y          |                          |
| <b>Understand how the VC theme is applied throughout the project processes. Specifically to identify:</b> |       |  |            |                          |
| 02  | 01    | Selling, Insights, AI solution   | Y          |                          |
| 02  | 02    | Pro-active, Personalized, Engaging Services  | Y          |                          |
| 02  | 03    | The generic architecture of AI solutions   | Y          |                          |
| 02  | 04    | How to apply algorithms to data  | Y          |                          |
| 02  | 05    | The action as a mean to the value  | Y          |                          |
| 02  | 06    | Collecting the relevant metrics  | Y          |                          |
| 02  | 07    | Start from the value, arrive at the data   | Y          |                          |
| 02  | 08    | Using opportunity trees to prioritize use cases  | Y          |                          |
| 02  | 09    | Change management to become data-driven  | Y          |                          |

| Syllabus Area Code<br>SF  |       | Syllabus Area :<br><i>DS for POs Syllabus Area (SF)</i><br>Theme: <i>AI Solution Framework</i>  | Foundation | Primary Manual Reference |
|---|-------|---|------------|--------------------------|
| Level   | Topic |   |            |                          |
| <b>Know facts, terms and concepts relating to the syllabus area. Specifically to recall:</b>                                    |       |   |            |                          |
| 01  | 01    | The AI Solution Framework   | Y          |                          |
| 01  | 02    | Team composition  | Y          |                          |
| 01  | 03    | Task Intensity  | Y          |                          |
| 01  | 04    | Other skills needed   | Y          |                          |
| <b>Understand how the SF theme is applied throughout the project processes. Specifically to identify:</b>                       |       |   |            |                          |
| 02  | 01    | Design Thinking, Lean Start-up, Agile   | Y          |                          |
| 02  | 02    | Project Sponsorship, Data Science, and Engineering  | Y          |                          |
| 02  | 03    | Minimum Viable Team   | Y          |                          |
| <b>Be able to apply and tailor the relevant aspects of the SF theme to a project scenario-based situation. Specifically to:</b> |       |   |            |                          |
| 03  | 01    | Be able to sketch a plan of approach, splitting the project in the three phases described in 0101   |            |                          |
| 03  | 02    | Determine a potential composition of a Data Science team to execute a project, possibly extending the minimum team with further relevant members. |            |                          |

| Syllabus Area Code<br><br>ID  |       | Syllabus Area :<br><i>DS for POs Syllabus Area (ID)</i><br>Theme: <i>Ideation phase</i>                        | Foundation | Primary Manual Reference |
|---|-------|--|------------|--------------------------|
| Level   | Topic |  |            |                          |
| <b>Know facts, terms and concepts relating to the syllabus area. Specifically to recall:</b>              |       |  |            |                          |
| 01  | 01    | Ideas collection   | Y          |                          |
| 01  | 02    | Ideas prioritization   | Y          |                          |
| 01  | 03    | Business case refinement   | Y          |                          |
| 01  | 04    | Impact and feasibility validation  | Y          |                          |
| <b>Understand how the ID theme is applied throughout the project processes. Specifically to identify:</b> |       |  |            |                          |
| 02  | 01    | Ways to generate a solid backlog of ideas  | Y          |                          |
| 02  | 02    | Key points in collected ideas  | Y          |                          |
| 02  | 03    | The business case, what actions can be AI driven and what AI solution can be delivered with the available data | Y          |                          |
| 02  | 04    | Responsibilities during the incubation sprint  | Y          |                          |
| 02  | 05    | How to define success, and what is the expected improvement with respect to the current baseline               | Y          |                          |

| Syllabus Area Code<br><br>EX  |       | Syllabus Area :<br><i>DS for POs Syllabus Area (EX)</i><br>Theme: <i>Experimentation phase</i>             | Foundation | Primary Manual Reference |
|---|-------|--|------------|--------------------------|
| Level   | Topic |  |            |                          |
| <b>Know facts, terms and concepts relating to the syllabus area. Specifically to recall:</b>              |       |  |            |                          |
| 01  | 01    | Exploratory Data Analysis (EDA)  | Y          |                          |
| 01  | 02    | Proof of Concept (PoC)   | Y          |                          |
| 01  | 03    | Minimal Viable Product (MVP)   | Y          |                          |
| 01  | 04    | Proof of Value (PoV)   | Y          |                          |
| <b>Understand how the EX theme is applied throughout the project processes. Specifically to identify:</b> |       |  |            |                          |
| 02  | 01    | Requirements before initiating the Experimentation Phase   | Y          |                          |
| 02  | 02    | Conditions to ensure that you are aiming to a MVP  | Y          |                          |
| 02  | 03    | PoV design   | Y          |                          |
| 02  | 04    | Metrics for measuring success: business metrics, usage metrics and model metrics                           | Y          |                          |
| 02  | 05    | Most important stakeholders, required skills and typical objectives for all the four steps described in 01 | Y          |                          |
| 02  | 06    | Minimal viable experiment  | Y          |                          |

| Syllabus Area Code<br><br>IN  |       | Syllabus Area :<br><i>DS for POs Syllabus Area (IN)</i><br>Theme: <i>Industrialization phase</i> | Foundation | Primary Manual Reference |
|---|-------|--|------------|--------------------------|
| Level   | Topic |  |            |                          |
| <b>Know facts, terms and concepts relating to the syllabus area. Specifically to recall:</b>              |       |  |            |                          |
| 01  | 01    | Develop and deploy   | Y          |                          |
| 01  | 02    | Integrate and scale out  | Y          |                          |
| <b>Understand how the IN theme is applied throughout the project processes. Specifically to identify:</b> |       |  |            |                          |
| 02  | 01    | Requirements before initiating the Industrialization Phase                                       | Y          |                          |
| 02  | 02    | Scope and responsibilities   | Y          |                          |
| 02  | 03    | Key steps to transform the MVP into a production grade solution                                  | Y          |                          |
| 02  | 04    | Components of the data platform for developing, training and serving the model                   | Y          |                          |
| 02  | 05    | Monitoring strategy  | Y          |                          |
| 02  | 06    | Focus on requirements to make the solution usable  | Y          |                          |
| 02  | 07    | Key steps to involve more users and scale out  | Y          |                          |
| 02  | 08    | Strategy to promote and improve the solution   | Y          |                          |