

QUALIFICATION FILE - CONTACT DETAILS OF THE SUBMITTING BODY

Name and address of submitting body:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY
NIELIT Bhawan,
Plot No. 3, PSP Pocket, Sector-8,
Dwarka, New Delhi-11007

Name and contact details of individual dealing with the submission

Name	:	Ripunjay Dinanath Singh
Position in the organization	:	Scientist-'D'
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List of documents submitted in support of the Qualifications File

1. Annexure I – Evidence of Job /Requirement in Industry
2. Annexure II – Detailed Curriculum/Syllabus
3. Annexure III –Candidates Trained and Their Feedback

NSQF QUALIFICATION FILE
Approved in 18th NSQC, dated- 28/05/22

SUMMARY

1	Qualification Title	Certified Artificial Intelligence (AI) Associate "Upskilling"
2	Qualification Code, if any	--
3	NCO code and occupation	2512.0300, Programmer, Data Analyst
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	<p>Nature:</p> <ul style="list-style-type: none"> ❖ This Course is aimed at creating qualified Data Science & Artificial Intelligence professionals which will help in employment generation and Entrepreneur development. <p>Purpose:</p> <ul style="list-style-type: none"> ❖ The purpose is to develop the skills required for AI Technologies with use of Python to analyse data, create beautiful visualizations, and problem solving using powerful Machine Learning/Deep Learning algorithms.
5	Body/bodies which will award the qualification	National Institute of Electronics and Information Technology NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077
6	Body which will accredit providers to offer courses leading to the qualification	National Institute of Electronics and Information Technology NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077
7	Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)	NA
8	Occupation(s) to which the qualification gives access	AI Engineer, AI / ML Associate, Data Analyst
9	Job description of the occupation	AI Engineer: Must have to work with deep learning libraries such as TensorFlow and Machine Learning library such as Scikit-Learn. Required to have programming skills in Python.

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		<p>Should be able to work on Image Processing and Computer Vision.</p> <p>AI / ML Associate: Creating programmes and algorithms that enable machines to take actions without being directed feed data into models defined by data scientists.</p> <p>Data Analyst: Collecting and interpreting data, analysing results, Reporting the results back to the relevant members of the business, identifying patterns and trends in data sets, working alongside teams within the business or the management team to establish business needs, defining new data collection and analysis processes.</p>
10	Licensing requirements	NA (All Open Source Software will be used)
11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)	NA
12	Level of the qualification in the NSQF	Level 4
13	Anticipated volume of training/learning required to complete the qualification	240 Hours
14	Indicative list of training tools required to deliver this qualification	Attached in Section 2 of Annexure II
15	Entry requirements and/or recommendations and minimum age	<p>Pursuing final year BE/BTech/MCA in any discipline</p> <p>Or</p> <p>BCA/ B.Sc. IT/ B.Sc. Electronics</p> <p>Or</p> <p>3 Years Diploma after class 10th in Electronics/ IT/ Electrical with 1 Years of Experience in IT Sector</p>

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		Or Level- 5 Qualified in IT Sector		
16	Progression from the qualification (Please show Professional and academic progression)	<p>Professional: AI / ML Associate / Engineer --> Senior AI / ML / Engineer --> Team Lead (AI) Data Analyst --> Senior Data Analyst --> Principal Data Analyst</p> <p>Academic: Skills gain through program will help the students pursuing higher studies in carrying out their research, application development and projects activity more appropriately by applying the data analytic and predictive modelling technique skills.</p>		
17	Arrangements for the Recognition of Prior learning (RPL)	Presently only candidates who undergo training shall be assessed. It will be incorporated once RPL strategy is finalized		
18	International comparability Where known (research evidence to be provided)	NA		
19	Date of planned review of the Qualification.	After Every 5 years		
20	Formal structure of qualification			
Module Code	Module Name	Mandatory/ Optional	Estimated Size (Learning Hours)	Level
AI101	Python Programming	Mandatory	40	5
AI102	Statistical Concepts	Mandatory	20	5
AI103	Data Science and Analytics	Mandatory	20	5
AI104	Machine Learning	Mandatory	80	5
AI105	Deep Learning	Mandatory	80	5

Detail Curriculum attached at **Annexure II.**

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SECTION 1

ASSESSMENT

21	Body/Bodies which will carry out assessment: The Examination Section National Institute of Electronics and Information Technology NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077
22	How will RPL assessment be managed and who will carry it out? RPL Policy will be described as and when available
23	Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF. The emphasis is on practical demonstration of skills & knowledge based on the performance criteria. Student is required to pass in all OUTCOMES individually and marks are allotted. The Following assessment methodologies are used. A. Written Assessment (Multiple Choice Questions) B. Practical Assessment & Assignments C. Mini Project The assessment results are backed by following evidences. 1. The assessor collects a copy of the attendance for the training done under the scheme. The attendance sheets are signed and stamped by the course coordinator of the Training Centre. 2. The assessor verifies the authenticity of the candidate by checking the photo ID card issued by the institute as well as any one Photo ID card issued by the Central/Government. The same is mentioned in the attendance sheet. 3. The assessor assigns roll number. 4. The assessor takes signature of all the students along with the assessor in a prescribed attendance sheet.

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ASSESSMENT EVIDENCE

24. Title of Unit/Component:

Outcomes to be assessed	Assessment Criteria for the outcome	Means of Assessment		
		Total Marks	Written	Practical
Python Programming Skills Required for Artificial Intelligence	Able to write simple Python programs for Real-time problems.	20	8	12
	Develop problem solving capability using python scripts	15	6	9
	Gained Hands on experience to design object-oriented programs with python classes	15	6	9
	Total	50	20	30
Acquiring Skills on Statistical Concepts	Able to use Descriptive & Inferential Statistics concepts in data analysis and algorithm development	20	8	12
	Develop software applications using Probability Concept: Marginal, Joint & Conditional Probability, Bayes Theorem	15	6	9
	Able to write applications using Probability Distributions, Hypothesis Test, Entropy & Information Gain, Regression & Correlation, Confusion Matrix, Bias & Variance	15	6	9
	Total	50	20	30
Acquiring skills on Data Science and Analytics	Able to Analyze and Process the Data	20	8	12
	Able to use Data Analytics Library: Numpy, Panda for various application	15	6	9

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	Develop applications using Data Visualization techniques such as Matplotlib and Seaborn Library	15	6	9
	Total	50	20	30
Skills acquiring in Machine Learning	Able to develop applications using Machine learning algorithms & Scikit tool	50	20	30
	Develop ML models using Python	50	20	30
	Total	100	40	60
Skills acquiring in Deep Learning	Able to develop applications using Deep learning algorithms & Keras, TensorFlow tool	50	20	30
	Develop DL models using Python	50	20	30
	Total	100	40	60
Total Marks		350	140	210

Means of assessment

S. No	Examination Pattern	Modules Covered	Duration in Minutes	Maximum Marks
1	Theory 1 - Python Programming, Statistical Concepts and Data Science	1,2,3	90	100
2	Theory 2 - Machine Learning and Deep Learning	4,5	90	100
3	Practical 1 -Data Science, Machine Learning & Deep Learning	3,4,5	180	90
4	Internal Assessment	1,2,3,4,5	-	30
5	Project/Presentation /Assignment		-	30
	Total			350

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Theory Papers:

1. Python Programming, Statistical Concepts and Data Science - Theory 1
2. Machine Learning and Deep Learning - Theory 2

Practical Papers:

1. Data Science, Machine Learning & Deep Learning - Practical 1

Note:

1. Pass percentage would be 50% marks in each component, with aggregate pass percentage of 50% and above.
2. Grading will be as under:

Grade	S	A	B	C	D
Marks Range (in %)	$\geq 85\%$	$\geq 75\%$ and $< 85\%$	$\geq 65\%$ and $< 75\%$	$\geq 55\%$ and $< 65\%$	$\geq 50\%$ and $< 55\%$

3. Theory examination would be conducted online and the paper comprise of MCQ and each question will carry 1 mark.
4. Practical examination/Internal Assessment/ Project/Presentation/Assignment would be evaluated internally.
5. Major Project/Dissertation would be evaluated preferably by External / Subject Expert including NIELIT Officials.
6. Candidate may apply for re-examination within the validity of registration.
7. The examinations would be conducted in English Language only.

SECTION 2

25. EVIDENCE OF LEVEL

Title: Certified Artificial Intelligence (AI) Associate			Level: 5
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF Level Descriptors	NSQF Level
Process required	Developing Artificial Intelligence models using python as the programming language and other data analytics tools.	Requires a command of wide-ranging specialized theoretical and practical skills, involving variable routine and non-routine contexts.	5

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Professional knowledge	Acquiring Knowledge in Python Fundamentals, Statistical concepts, Data Science and Analytics package required for developing Artificial Intelligence models.	Wide-ranging factual and theoretical knowledge in broad contexts within a field of work or study.	5
Professional skill	Ability to develop software systems using AI Models as per the requirement of the application for solving real life problems.	Wide range of cognitive and practical skills required to generate solutions to specific problems in a field of work of study.	5
Core skill	Ability to independently develop the Programming Skills Required for Artificial Intelligence. Ability to use Data Analytics tools: Numpy, Panda for various applications. Ability to use AI tools Scikit- Learn and keras tensorflow for various applications Good communication skills in identifying sources of data, as well as new methods of data collection, analysis, and reporting.	Good logical and mathematical skill understanding of social political and natural environment and organising information, communication and presentation skill.	5
Responsibility	Ability to manage the system resources in the most effective manner by appropriate planning, estimation, coordination and control of the activities involved in the design & development of any software applications /project	Full responsibility for output of group and development.	5

NSQF QUALIFICATION FILE – Certified Artificial Intelligence (AI) Associate

SECTION 3

EVIDENCE OF NEED

26	What evidence is there that the qualification is needed? This course has been designed for Up-skilling and to meet the increasing manpower requirements in Artificial Intelligence industry after discussion with our alumni working in various Top IT Industries across in India. a) Market Survey – https://www.grandviewresearch.com/industry-analysis/machine-learning-market b) Evidence of Requirement in the Industry https://insidebigdata.com/2020/12/21/big-data-industry-predictions-for-2021/ c) Evidence of Requirement in the Industry https://www.newgenapps.com/blog/how-machine-learning-is-changing-the-it-industry/ d) Market Shares - https://www.forbes.com/sites/louiscolumbus/2020/01/19/roundup-of-machine-learning-forecasts-and-market-estimates-2020/?sh=55cdc4e15c02
27	What is the estimated uptake of this qualification and what is the basis of this estimate? Estimated uptake is 30 students / Batch / centre with 2 Batches / Year and on the basis of Facilities and Infrastructure in respective NIELIT Centre. Program may also run using Virtual Lab setup for cloud software's and remote access facility available with NIELIT Chennai.
28	What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification The Qualification does not exist as per information available in public domain.
29	What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here Based on feedback by participants, employers and based on market survey the qualification will be reviewed in every 5 years.

NSQF QUALIFICATION FILE – Certified Artificial Intelligence (AI) Associate

SECTION 4

EVIDENCE OF PROGRESSION

30	<p>What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?</p> <p>This qualification has been designed in consultation with industry and domain expert keeping in mind today's need. Evaluation criteria have been added to ensure progression to related path ways identified as per career path.</p>
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SECTION 5

EVIDENCE OF INTERNATIONAL COMPARABILITY

List any Comparisons which have been established

1. Course on Machine Learning & Data Science

- Department of Computer Science, Harvard University offers similar course.

<https://online-learning.harvard.edu/course/data-science-machine-learning?delta=3>

2. Advanced Certification in Data Science and AI

https://intellipaat.com/advanced-certification-data-science-artificial-intelligence-iit-madras/?utm_source=google&utm_medium=search&utm_term=data%20science%20course&utm_campaign=s_datascience_in_india_nt&gclid=Cj0KCQjws4aKBhDPAIIsAIWH0JXn_HOVGpAzW_rN_HxrxQmThryLRj3xKTYk7LANtaiTc5psO33FK7kaAoybEALw_wcB

3. Course on Machine Learning & AI With Python

- iit Bombay .

(Source: https://eruditus.exec-ed.iitb.ac.in/certificate-program-in-machine-learning-and-ai-with-python/index.php?utm_source=Google&utm_medium=Search&utm_campaign=IS_IN_IITB_MLAIP_GG_SE_Dec_20_ML_Core_BMM_Tier_1&utm_content=ML_Course&utm_term=%2Bmachine%20%2Blearning%20%2Bcourse)

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NSQC Approved