NCVET Code

2022/EHW/NIELIT/05323

NSQF QUALIFICATION FILE
Approved in 16th NSQC meeting –NCVET- Dated: 24th February, 2022

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-110077

Name and contact details of individual dealing with the submission

Name	**:**	Alok Tripathi
Position in the organization	**:**	Additional Director
Address if different from above	**:**	NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY (NIELIT), Patna Adjacent to IIT Patna Amhara, Bihta, Patna– 801106
Tel number(s)	**:**	9431011532
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List of documents submitted in support of the Qualifications File

Annexure 1: Detailed Syllabus and lesson plan of the course
Annexure 2: Evidence of Course requirement in the industry
Annexure 3: Evidence of Job requirement from the industry
Annexure 4: Evidence of validation from industries

Model Curriculum to be added which will include the following:

- Indicative list of tools/equipment to conduct the training

Attached in Annexure 5

- Trainers qualification

Attached in Annexure 6

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SUMMARY

1	**Qualification Title**	Foundation course in Machine Learning using Python
2	**Qualification Code, if any**	Will be given by NCVET post-approval Sector: ITES
3	**NCO code and occupation**	2514.9900(Computer Programmers, Other)
4	**Nature and purpose of the qualification (Please specify whether qualification is short term or long term)**	➢ The purpose of this qualification is to train the students in Block Chain implementation using Python so as to upskill them and increase their employability in the field of IT/Computer Science ➢ QF is of level 4
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**	Machine Learning Engineer/ Junior Machine learning Engineer, Predictive Analyst, Software Developer/Engineer/Junior Engineer (AI/ML)
9	**Job description of the occupation**	• **Machine Learning Engineer:** Machine Learning engineers are responsible for developing, programming and training the complex networks of algorithms that make up machine learning so that they can function like a human brain. This role requires combined expertise in software development, programming, data science and data engineering • **Data Engineer:** Machine Learning Engineers build, test,

		and deploy models, as well as maintain the underlying AI infrastructure. They are problem-solvers who can navigate between traditional software development and machine learning implementations. • **Machine Learning Model Developer**: Designing and developing machine learning and deep learning systems, Running machine learning tests and experiments
10	**Licensing requirements**	NA
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**	90 Hours
14	**Indicative list of training tools required to deliver this qualification**	Attached in Annexure 5
15	**Entry requirements and/or recommendations and minimum age**	2nd Year Polytechnic Diploma in Computer Science/ IT/ Electronics /Electrical/ Instrumentation/ **or** Final year BCA/B.Sc.(Electronics/CS/IT) **or** Pursuing MCA/MSC(CS/IT) /PGDCA **or** Pursuing B.E/B.Tech in any domain **or** NIELIT O Level(IT)
16	**Progression from the qualification (Please show Professional and academic progression)**	**Professional** Application Developer (Machine Learning). Senior Application Developer (Machine Learning). Tech Lead Application Developer (Machine Learning)

		Academic **i)Horizontal:** Courses in the area of Python Programing, Mathematics **ii)Vertical:** Post Graduate diploma in Data Science, Courses in Artificial Intelligence and Deep learning
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
1	Basic	Mandatory	2 Hours	4
2	Python Eco System	Mandatory	2 Hours	4
3	Methods for Machine Learning	Mandatory	4 Hours	4
4	Data Loading for ML Projects	Mandatory	5 Hours	4
5	Understanding Data with Statistics	Mandatory	8 Hours	4
6	Understanding Data with Visualization	Mandatory	10 Hours	4
7	Preparing Data	Mandatory	8 Hours	4
8	Data Feature Selection	Mandatory	10 Hours	4
9	Machine Learning Algorithms	Mandatory	18 Hours	4
10	Machine Learning with Pipelines	Mandatory	7 Hours	4

11	Improving Performance of ML Models	Mandatory	8 Hours	4
12	Mini Project	Mandatory	8 Hours	4

SECTION 1

ASSESSMENT

21	**Body/Bodies which will carry out assessment:** The Examination Wing 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.** ASSESSMENT GUIDELINE: The candidate shall be assessed for his learnings about Fundamental of AI, Components of AI, Applications of AI in various fields • Criteria for assessment based on each learning outcome, will be assigned marks proportionately to its importance. • Assessment comprises the following components: o Exercises carried out in labs o Theory and practical exam Attendance and punctuality

24. ASSESSMENT EVIDENCE

Title of Unit/Component:

Outcomes to be assessed	Assessment Criteria for the outcome	Means of Assessment		
		Total Marks	Written	Practical

Fundamentals of Machine Learning	Basics of Machine Learning, Methods , Python Ecosystem	20	10	10
	Working with CSV file , Understanding Data with Statistics	30	20	10
	Total	**50**	**30**	**20**
Data for Machine Learning Applications	Data Visualization, Preparing Data	20	10	10
	Data Feature Selection	30	20	10
	Total	**50**	**30**	**20**
Machine Learning Algorithms	Machine Learning Models	50	30	20
	ML with Pipelines, Improving Performance of ML Algorithms	10	10	0
	Total	**60**	**40**	**20**
Internal Assessment		**20**	**0**	**20**
Assignment		**20**	**0**	**20**
Total Marks		**200**	**100**	**100**

Means of assessment

S. No	Examination Pattern	Modules Covered	Duration in Minutes	Maximum Marks
1	Theory	1-11	60	60
3	Practical	1-11	120	100
4	Internal Assessment	1-11	-	20
5	Project/Presentation	1-11	-	20

	/Assignment			
Total				**200**

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 %)	>85%	75%-84%	65%-74%	55%-64%	50%-54%

3. Theory examination would be conducted online and the paper comprise of MCQ and each question will carry 1 marks.
4. Practical examination/Internal Assessment/Assignment would be evaluated internally.
5. Candidate may apply for re-examination within the validity of registration.
6. The examinations would be conducted in English Language only.

SECTION 2

25. EVIDENCE OF LEVEL

Title : Foundation course in Machine Learning using Python			**Level : 4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the job role relates to the NSQF Level Descriptors**	**NSQF Level**
Process required	Apply Machine Learning in different Fields like Supervised Learning, Unsupervised learning, Deep Learning using Python. To apply Machine Learning Algorithms for predictive Analysis	The job holder is expected to perform his/her work with well-developed skill in Applying Machine Learning and its components in different fields using Python	4
Professional knowledge	Apply and analyze the different packages available in Python for Machine Learning and it applications in different fields	The job holder is expected to know the different packages and libraries available in Python for Applying Machine Learning and its components in different fields like	4

		Supervised Learning, Unsupervised learning, Deep Learning using Python. He is also expected to apply Machine Learning Algorithms for predictive Analysis	
Professional skill	Selection of Appropriate library and packages available in Python for Applying AI and its components in different fields like Supervised Learning, Unsupervised learning, Deep Learning using Python. To apply Machine Learning Algorithms for predictive Analysis and resolving errors during compile time and run time while applying these libraries and packages.	The job holder is expected to have cognitive and practical skill in Python and various libraries and packages available in Python for Application of Machine Learning and its components	4
Core skill	Building Machine learning applications and Models using Python	The job holder is expected to have full knowledge of Libraries and packages which are available in Python to completely apply Machine Learning and its components in various fields like Supervised Learning, Unsupervised learning, Deep Learning using Python. To apply Machine Learning Algorithms for predictive Analysis	4
Responsibility	Apply the different libraries and packages available in python for building right applications and models of AI a like Supervised Learning, Unsupervised learning, Deep Learning using Python. To apply Machine Learning Algorithms for predictive Analysis using Python. To implement	The job holder is expected to complete assigned tasks and IPR of organization & customers. He/she is expected to undertake on-the-job learning and participate in training and development,	4

	Machine Learning Algorithms using Python.	interventions and assessments Hence the individual working in this job role has complete responsibility for delivering quality of his own work & some responsibility for others works too and can be placed at level 5 And contribute in achieving the industry's profit margin.	

NSQF QUALIFICATION FILE

SECTION 3

EVIDENCE OF NEED

26	**What evidence is there that the qualification is needed?** Attached in Annexure 2
27	**What is the estimated uptake of this qualification and what is the basis of this estimate?** Estimated uptake is 30 students per Batch with 4 Batches per Year and on the basis of Facilities and Infrastructure in respective NIELIT Centre.
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 is originally designed by curriculum head, industrial expert, and academic professional experts. The work group under the guidance of curriculum development committee already conducted desk search as well as refers the qualification packs for as a supporting document for the mapping of curriculum. As per the search it is found that, no duplicate course in Machine Learning Associate is existing in the NQR as on date
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.

SECTION 4
EVIDENCE OF PROGRESSION

30	**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?** This qualification has been designed in consultation with industry and domain expert keeping in mind today's need. Qualification file is finalized

	after discussion and modification through internal committees of NIELIT. Evaluation criteria have been added to ensure progression to related path ways identified as per career path.