QUALIFICATION FILE – Standalone NOS

Essentials of AI (Upskilling)

☐ Horizontal/Generic ☐ Vertical/Specialization

☒ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

☐General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☒ Future Skills ☐ OEM

NCrF/NSQF Level: 4

Submitted By:

National Institute of Electronics and Information Technology (NIELIT)

NIELIT Bhawan,
Plot No. 3, PSP Pocket, Sector-8,
Dwarka, New Delhi-110077,
Phone: - 91-11-2530 8300
e-mail: - contact@nielit.gov.in

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Section 1: Basic Details

<table>
<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Essentials of AI (Upskilling)</td></tr>
<tr><td>2.</td><td>Sector/s</td><td colspan="2">IT-ITeS</td></tr>
<tr><td>3.</td><td>Type of Qualification ☐ New ☒ Revised</td><td>NQR Code & version of the existing /previous qualification: Certified Artificial Intelligence (AI) Associate “Upakilling”</td><td>Qualification Name of the existing/previous version: 2022/ITES/NIELIT/05574</td></tr>
<tr><td>4.</td><td>National Qualification Register (NQR) Code & Version
(Will be issued after NSQC approval.)</td><td>NG-04-IT-04173-2025-V2-NIELIT</td><td>5. NCrF/NSQF Level: 4</td></tr>
<tr><td>6.</td><td>Brief Description of the Standalone NOS</td><td colspan="2">The Standalone NOS “Essentials of AI (Upskilling)” has been meticulously designed to provide a comprehensive foundation in Artificial Intelligence (AI) and its associated domains, equipping participants with the essential skills to explore career opportunities in this transformative field. The curriculum focuses on developing expertise in Python programming, statistical concepts, data science, machine learning, and deep learning while integrating theoretical knowledge with practical applications.

Participants will gain hands-on experience in programming with Python, analyzing data, applying statistical principles, and implementing machine learning and deep learning algorithms. They will also work with industry-relevant tools like NumPy, Pandas, Matplotlib, Seaborn, TensorFlow, Keras, and OpenCV.</td></tr>
<tr><td>7.</td><td>Eligibility Criteria for Entry for a Student/Trainee/Learner/Employee</td><td colspan="2">a. Entry Qualification & Relevant Experience:
<table>
<tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Required Experience (with Specialization - if applicable)</th></tr>
<tr><td>1</td><td>12th with Science subjects or equivalent</td><td>NA</td></tr>
<tr><td>2</td><td>2nd year of 3-year diploma in CS/IT/EC/EE/allied branches after 10th</td><td>NA</td></tr>
<tr><td>4</td><td>Previous relevant Qualification of NSQF Level 3.5</td><td>1.5 Year relevant experience in IT or allied sector</td></tr>
<tr><td>5</td><td>Previous relevant Qualification of NSQF Level 3</td><td>3-year relevant experience in IT or allied sector</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td colspan="2">*Prerequisite:
1. Foundation of Artificial Intelligence Technology
2. AI Development Associate
3. Programming knowledge</td></tr>
<tr><td>8.</td><td>Credits Assigned to this NOS-Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>7 Credits</td><td>9. Common Cost Norm Category (I/II/III) (wherever applicable):
Category-II</td></tr>
<tr><td>10.</td><td>Any Licensing Requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">The open-source resources can be used.
Annual subscription-based license to access cloud platform may also be purchased.</td></tr>
<tr><td>11.</td><td>Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="2">☒Offline ☐Online ☐Blended
<table>
<tr><th>Training Delivery Modes</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>Total (Hours)</th></tr>
<tr><td>Classroom (offline)</td><td>90</td><td>120</td><td>210</td></tr>
</table></td></tr>
<tr><td>12.</td><td>Assessment Criteria</td><td colspan="2">
<table>
<tr><th>Theory (Marks)</th><th>Practical (Marks)</th><th>Project/Presentation/ Assignment (Marks)</th><th>Viva/Internal Assessment (Marks)</th><th>Total (Marks)</th><th>Passing %age</th></tr>
<tr><td>100</td><td>60</td><td>20</td><td>20</td><td>200</td><td>50</td></tr>
</table>
The centralised online assessment is conducted by the Examination Wing, NIELIT Headquarters.
*Assessment strategy shall be as per NIELIT Norms prevailing at times.</td></tr>
<tr><td>13.</td><td>Is the NOS Amenable to Persons with Disability</td><td colspan="2">☒ Yes ☐ No If “Yes”, specify applicable type of Disability:
a. Locomotor Disability: Leprosy Cured Person, Dwarfism, Muscular Dystrophy and Acid Attack Victims
b. Visual Impairment: Low Vision</td></tr>
<tr><td>14.</td><td>Progression Path After Attaining the Qualification, wherever applicable (Please show Professional and Academic progression)</td><td colspan="2">Senior AI/ML/Engineer</td></tr>
</table>

15.	**How participation of women will be encouraged?**	Participation by women can be ensured through Government Schemes. Occasionally, exclusive batches for women would be run for the proposed courses. Funding is available for women's participation under other schemes launched by the Government from time to time.	
16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Qualification file available in English & Hindi Language.	
17.	**Is similar NOS available on NQR-if yes, justification for this qualification**	**☐ Yes ☒ No URLs of similar Qualifications:**	
18.	**Name and Contact Details Submitting / Awarding Body SPOC** *(In case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**Name:** Ankit Kumar **Designation:** Scientist 'C' **Email:** ankit@nielit.gov.in **Contact No:**011-25308300 **Website:** https://nielit.gov.in	
19.	**Final Approval Date by NSQC: 08.05.2025**	**1. Validity Duration: 3 Years**	**2. Next Review Date: 08.05.2028**

Section 2: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	B.E./B. Tech in CS/IT/EC/EE/ allied branches with 2 years of relevant experience. Or M.Sc. in Electrical/Electronics/IT/Comp. Sc. and allied branches; with 2 years of relevant experience.
2.	**Master Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	B.E./B. Tech in CS/IT/EC/EE/ allied branches with 3 years of relevant experience. Or M.Sc. in Electrical/Electronics/IT/Comp. Sc. and allied branches with 3 years of relevant experience.
3.	**Tools and Equipment Required for the Training**	☒Yes ☐No (If "Yes", details to be provided in Annexure-II)
4.	**In Case of Revised NOS, details of Any Upskilling Required for Trainer**	Not Applicable

Section 3: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	B.E./B. Tech in CS/IT/EC/EE/ allied branches with 3 years of relevant experience.
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines), (wherever applicable)*	The assessor carries out theory online assessments through the remote proctoring methodology. Theory examination would be conducted online, and the paper comprise of MCQ. Conduct of assessment is through trained proctors. Once the test begins, remote proctors have full access to the candidate's video feeds and computer screens. Proctors authenticate the candidate based on registration details, pre-test image captured and I- card in possession of the candidate. Proctors can chat with candidates or give warnings to candidates. Proctors can also take screenshots, terminate a specific user's test session, or re-authenticate candidates based on video feeds.
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	External Examiners/ Observers (Subject matter experts) are deployed including NIELIT scientific officers who are subject experts for evaluation of Practical examination/ internal assessment / Project/Presentation/ assignment and Major Project (if applicable). Qualification is generally B.Tech.
4.	**Assessment Mode** *(Specify the assessment mode)*	A centralized online examination will be conducted.
5.	**Tools and Equipment Required for Assessment**	Same as for training ☒ Yes ☐ No

Section 4: Evidence of the Need for the Standalone NOS

Provide Annexure/Supporting documents name.

1.	Government /Industry initiatives/ requirement (Yes/No): Yes
2.	Number of Industry validation provided: 04
3.	Estimated number of people to be trained: 2500
4.	Evidence of Concurrence/Consultation with Line/State Departments (In case of regulated sectors): (Yes/No): No, NIELIT is recognized as AB and AA under Government Category. NIELIT is an HRD arm of MeitY, therefore, the Line Ministry Concurrence is not required.

Section 5: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	**Annexure:** NCrF/NSQF level justification based on NCrF/NSQF descriptors *(Mandatory)*	Available at Annexure-I: Evidence of Level
2.	**Annexure:** List of tools and equipment relevant for NOS *(Mandatory, except in case of online course)*	Available at Annexure-II: Tools and Equipment
3.	**Annexure:** Industry Validation	Available at Annexure-III: Industry Validation
4.	**Annexure:** Training Details	Available at Annexure-IV: Training Details
5.	**Annexure:** Blended Learning *(Mandatory, in case selected Mode of delivery is "Blended Learning")*	Available at Annexure-V: Blended Learning
6.	**Annexure/Supporting Document:** Standalone NOS- Performance Criteria Details Annexure/Document with PC-wise detailing as per NOS format (Mandatory- Public view)	Available at Annexure-VI: Standalone NOS- Performance Criteria details
7.	**Annexure:** Detailed Assessment Criteria *(Mandatory)*	Available at Annexure-VII: Assessment Criteria
8.	**Annexure:** Assessment Strategy *(Mandatory)*	Available at Annexure-VIII: Assessment Strategy
9.	**Annexure:** Acronym and Glossary *(Optional)*	Available at Annexure-IX: Acronym and Glossary
10.	**Supporting Document:** Model Curriculum *(Mandatory – Public view)*	Available at Annexure-A: Model Curriculum

Annexure-I: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	● Proficiency in Python programming for data handling, visualization, and model development. ● Mastery of statistical concepts, including probability, regression, and hypothesis testing, to support machine learning models. ● Deep understanding of machine learning and deep learning algorithms, such as decision trees, neural networks, and support vector machines. ● Ability to implement and deploy AI models using tools like TensorFlow, Keras, and OpenCV.	The qualification ensures a comprehensive grasp of the theoretical concepts and technical processes required to design, implement, and deploy artificial intelligence solutions. It equips learners with problem-solving abilities to apply AI algorithms effectively across diverse domains, reflecting advanced theoretical and process-based knowledge aligned with industry standards.	**4**
Professional and Technical Skills/ Expertise/ Professional Knowledge	Apply AI and ML concepts to build and deploy real-world models and solutions. Ability to analyze data, develop predictive models, and create intelligent systems.	Graduates of this course will possess the expertise required for roles in AI-driven industries, such as data analysts, machine learning engineers, and AI developers.	**4**
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Develop the ability to think critically, solve problems, and apply innovative AI solutions in industry-specific contexts. Entrepreneurial capability to launch AI-related businesses or services.	This program equips learners with the skills and mindset required to meet industry expectations, become job-ready, and even venture into AI-based entrepreneurship.	**4**
Broad Learning Outcomes/Core Skill	This program equips learners with the skills and mindset required to meet industry expectations, become job-ready, and even venture into AI-based entrepreneurship.	The qualification prepares candidates to adapt to emerging trends and industry demands by applying AI solutions to real-world challenges.	**4**
Responsibility	Able to design, implement, and deploy AI-based applications independently or within a team, ensuring the quality and effectiveness of solutions.	Takes responsibility for the quality of AI solutions and shares accountability for team-based deliverables.	**4**

Annexure-II: Tools and Equipment (lab set-up)

List of Tools and Equipment
Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	Classroom	1 (30 Sq. m)	1
2	Students Chair	30	30
3	Students Table	15 (2 students sharing 1 table)	15
4	LCD Projector	1	-
5	Trainer Chair & Table	1	-
6	Pin up Boards	1	-
7	White Board	1	-
8	Desktop computer with accessories	Installed with any ● Anaconda ● Jupyter ● Pycharm ● Python Idle ● Spyder	30
9	Desk jet printer	A4	1

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. LCD Projector/Smart Board
2. Pin-up Board
3. White Board, Markers

Annexure-III: Industry Validations Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID
1	Strategic Marketing	Vikas Dewan	Director	29/3-4, First Floor, Rajpur Road, Anekant Place, Dehra dun	6399112559,9412055380	strategic291@gmail.com
2	Lamzing Technologies Private Limited	Ailan Maibam	Managing Director	Software Technology Park of India, G-Floor, MIMS Building, Manipur University, Canchipur, Imphal Manipur	9963382225	contact@lamzing.com
3	Say Technologies	Surender Sharma	Lead Consultant	Airport Road, Karan Bagh, Jammu-180004	9419194968	surender.sharma@saytechnologies.in
4	Aditya Infotech Ltd	Munishor Kumar	Manager	#44A Gandhi Nagar, Jammu	9779150228	Munishar_sudam@adityainfo.in

Annexure-IV: Training Details

Training Projections:

Year	Estimated Training # of Total Candidates	Estimated training # of Women	Estimated training # of People with Disability
2025	800	400	25
2026	850	450	30
2027	850	450	30

Data to be provided year-wise for next 3 years.

Annexure-V: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools: NA

Annexure-VI: Standalone NOS- Performance Criteria details

1. Description

The **Essentials of AI (Upskilling)** is designed to provide a strong foundation in Python programming, statistical concepts, data science, machine learning, and deep learning. This qualification equips learners with the skills to analyze data, develop AI models, and implement advanced algorithms using tools like TensorFlow, Keras, and OpenCV. With a blend of theoretical knowledge and hands-on practice, the course prepares individuals to solve real-world problems, drive innovation, and pursue careers in AI across various industries.

2. Scope

The **Essentials of AI (Upskilling)** qualification offers a wide scope for individuals aspiring to work in AI and machine learning. Graduates can pursue careers in data science, AI development, machine learning engineering, and deep learning specialization across healthcare, finance, retail, and automation. The qualification also provides entrepreneurial opportunities, enabling individuals to create AI-driven solutions and businesses. With an emphasis on theoretical knowledge and practical skills, this qualification prepares candidates to meet the growing demand for AI professionals in the global job market.

3. Elements and Performance Criteria:

Element 1: Python Programming

PC1. Demonstrate the ability to program in Python, including basic syntax, functions, and control structures.
PC2. Implement file handling and exception handling effectively in Python.
PC3. Develop Python classes and modules to structure code and enhance reusability.
PC4. Apply Python programming skills to process and analyze data for machine learning and AI applications.

Element 2: Statistical Concepts

PC5. Understand and explain the principles of descriptive and inferential statistics.
PC6. Apply probability concepts to machine learning models, including Bayes Theorem and probability distributions.
PC7. Conduct hypothesis testing, entropy and information gain analysis, and regression analysis to interpret data.
PC8. Implement confusion matrix analysis, bias, and variance concepts to evaluate model performance.

Element 3: Data Science and Analytics

PC9. Apply data science principles using Python tools like NumPy and Pandas for data analysis.
PC10. Perform exploratory data analysis (EDA) to identify patterns and insights from datasets.
PC11. Use data visualization tools (e.g., Matplotlib, Seaborn, Plotly) to present data in an understandable format.
PC12. Design and implement interactive visualizations to represent findings dynamically.

Element 4: Machine Learning

PC13. Demonstrate proficiency in implementing machine learning algorithms such as linear and logistic regression, decision trees, random forests, and clustering algorithms.
PC14. Apply machine learning techniques to solve real-world problems using Python.
PC15. Use scikit-learn for model training, evaluation, and optimization.
PC16. Understand and implement artificial neural networks (ANN) and algorithms such as PCA and Naive Bayes.

Element 5: Deep Learning

PC17. Understand and apply the principles of deep learning and its algorithms, such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN).
PC18. Develop AI models using deep learning tools like Keras and TensorFlow.
PC19. Apply techniques like gradient descent and stochastic gradient descent to optimize deep learning models.
PC20. Implement natural language processing (NLP) and computer vision tasks using OpenCV.
PC21. Deploy deep learning models in real-world applications.

4. Knowledge Criteria (KCs):

KU1. Understand Python programming concepts, including syntax, control flow, functions, modules, exceptions, file handling, and classes.

KU2. Grasp key statistical principles like probability theory, regression analysis, hypothesis testing, entropy, information gain, and the understanding of bias and variance in model evaluation.

KU3. Acquire knowledge of data analysis techniques using Python libraries like NumPy and Pandas, and understand data visualization concepts with tools like Matplotlib, Seaborn, and Plotly.

KU4. Learn and understand various machine learning algorithms, including linear and logistic regression, decision trees, random forests, support vector machines, clustering techniques, and artificial neural networks.

KU5. Understand the principles and techniques of deep learning, including the architecture of artificial neural networks, convolutional neural networks (CNN), recurrent neural networks (RNN), and their applications in natural language processing and computer vision.

5. Generic Skills (GS)

The user/individual on the job needs to know how to:

GS1. Develop the ability to analyze complex problems and implement AI and machine learning solutions to address real-world challenges across various domains.

GS2. Cultivate a mindset to evaluate and compare algorithms, models, and approaches to determine the most effective AI solutions based on specific data and problem context.

GS3. Gain proficiency in managing, processing, and analyzing large datasets, including performing statistical analysis and using data visualization tools to interpret findings.

GS4. Enhance the ability to communicate technical concepts, findings, and results effectively through reports and presentations, ensuring clarity and comprehension for diverse audiences.

GS5. Develop the ability to work collaboratively in multidisciplinary teams, contributing to developing AI solutions, troubleshooting issues, and integrating feedback to improve project outcomes.

Annexure-VII: Assessment Criteria

Detailed PC-wise assessment criteria and assessment marks for the NOS are as follows:

NOS/Module Name	Assessment Criteria for Performance Criteria	Theory Marks	Practical Marks	Project/Presentation/Assignment Marks	Internal Assessment Marks
Essentials of AI (Upskilling) **NOS Code: NIE/SSC/N1021**	**Element 1: Python Programming:** PC1. Demonstrate the ability to program in Python, including basic syntax, functions, and control structures. PC2. Implement file handling and exception handling effectively in Python. PC3. Develop Python classes and modules to structure code and enhance reusability. PC4. Apply Python programming skills to process and analyze data for machine learning and AI applications.	20	15	4	4
	Element 2: Statistical Concepts PC5. Understand and explain the principles of descriptive and inferential statistics. PC6. Apply probability concepts to machine learning models, including Bayes Theorem and probability distributions. PC7. Conduct hypothesis testing, entropy and information gain analysis, and regression analysis to interpret data. PC8. Implement confusion matrix analysis, bias, and variance concepts to evaluate model performance.	20	05	2	2
	Element 3: Data Science and Analytics PC9. Apply data science principles using Python tools like NumPy and Pandas for data analysis. PC10. Perform exploratory data analysis (EDA) to identify patterns and insights from datasets. PC11. Use data visualization tools (e.g., Matplotlib, Seaborn, Plotly) to present data in an understandable format.	20	10	3	3

	PC12. Design and implement interactive visualizations to represent findings dynamically.				
	Element 4: Machine Learning PC13. Demonstrate proficiency in implementing machine learning algorithms such as linear and logistic regression, decision trees, random forests, and clustering algorithms. PC14. Apply machine learning techniques to solve real-world problems using Python. PC15. Use scikit-learn for model training, evaluation, and optimization. PC16. Understand and implement artificial neural networks (ANN) and algorithms such as PCA and Naive Bayes.	20	15	5	5
	Element 5: Deep Learning PC17. Understand and apply the principles of deep learning and its algorithms, such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN). PC18. Develop AI models using deep learning tools like Keras and TensorFlow. PC19. Apply techniques like gradient descent and stochastic gradient descent to optimize deep learning models. PC20. Implement natural language processing (NLP) and computer vision tasks using OpenCV. PC21. Deploy deep learning models in real-world applications.	20	15	6	6
	Total Marks: 200	**100**	**60**	**20**	**20**

Annexure-VIII: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Assessment of the qualification evaluates candidates to ascertain that they can integrate knowledge, skills and values for carrying out relevant tasks as per the defined learning outcomes and assessment criteria.

The underlying principle of assessment is fairness and transparency. The evidence of the outcomes and assessment criteria. competence acquired by the candidate can be obtained by conducting Theory (Online) examination.

About Examination Pattern:

1. The question papers for the theory exams are set by the Examination wing (assessor) of NIELIT HQS.
2. The assessor assigns roll number.
3. The assessor carries out theory online assessments. Theory examination would be conducted online and the paper comprise of MCQ
4. Pass percentage would be 50% marks.
5. The examination will be conducted in English language only.

Quality assurance activities: A pool of questions is created by a subject matter expert and moderated by other SME. Test rules are set beforehand. Random set of questions which are according to syllabus appears which may differ from candidate to candidate. Confidentiality and impartiality are maintained during all the examination and evaluation processes.

Annexure-IX: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.