



GUIDELINES

NIOS - MICROSOFT

COLLABORATIVE

COURSES /PROGRAMMES

ON

21st CENTURY IT SKILLS



National Institute of Open Schooling
(An autonomous institution under, Department of School Education and Literacy, Govt. Of India)
ISO 9001: 2015 CERTIFIED



Programmes/ Courses to be offered

- 1. Coding - (Pre – Vocational Course, OBE C- Level)**
- 2. Artificial Intelligence - (Secondary and Senior Secondary Level)**
- 3. Data Science - (Secondary and Senior Secondary Level)**



Guidelines on NIOS Microsoft Collaborative Courses/Programmes

1. Introduction: National Institute of Open Schooling in collaboration with Microsoft Corporation India Private Limited is going to offer the following three 21st century skill courses at Secondary, Senior Secondary and Vocational levels. The courses will integrate education and skilling as per mandate of NEP-2020.

In pursuance of the signing of Memorandum of Understanding (MoU) between National Institute of Open Schooling (NIOS) and Microsoft Corporation India Private Limited on 7th January 2022 for the benefit of NIOS learners to integrate education and skilling, complying with the recommendations of NEP 2020 and its commitment to promotion & development of skills in students, NIOS has taken the following initiatives from the session 2021-2022:

NIOS offers vocational education programmes at the school level keeping in view the needs of the target groups. Presently, around 100 programmes are on offer in the broad areas of Agriculture and Animal Husbandry, Business and Commerce, Computer and information Technology, Engineering and Technology, Health and paramedical, Home Science and Hospitality Management, Teacher Training etc. Some of the vocational programmes are in collaboration with the industry.

In a path breaking initiative, NIOS has made available Vocational Stream at Secondary and Senior Secondary level, where concerted efforts will be put on the development of skill training in one or related areas in a particular field alongwith taking academic subjects to qualify for certification. Many combinations of the subjects are available in the selected areas i.e. Agriculture and Animal Husbandry, Ayurveda and Yoga, Beauty & Wellness and IT & ITES.



2. Courses / Programmes offered:

(i) **Coding:** 'Coding' as a Skill Subject: Coding is a creative activity that students from any discipline can engage in. It helps to build computational thinking, develop problem solving skills, critical thinking and exposure to real life situations to solve issues in various realms. Therefore, 'Coding' is being introduced as a Skill Module in OBE C level as a pre vocational course. OBE C level as a Pre Vocational course Subject code: C109.

(ii) **Artificial Intelligence:** Artificial Intelligence (AI) as a Skill Subject both secondary and senior secondary level. These latest technologies have the potential to bring about a positive change in the way student acquire, understand and comprehend their knowledge. The ability of AI to interpret data, act intelligently, take decisions and carry out tasks, like a human, makes it the most important change force on earth. AI is not just impacting our everyday life, it is transforming all industries. AI is being introduced as a skill subject of the Secondary and Senior Secondary levels.

- a. In combination with academic Subject at Secondary level (Subject Code 859)
- b. In combination with academic Subject at Senior Secondary level (Subject Code 864)
- c. Certificate in Artificial Intelligence one year certificate programme under vocational education (Subject Codes 730 and 731) as an independent vocational course.

(iii) **Data Science:** 'Data Science' as a Skill Subject: 'Data Science' is being introduced as a Skill Subject at the Secondary and Senior Secondary levels. (Student and Faculty Handbooks and Teaching Materials have been created with support from Microsoft).

- a. In combination with academic subject at Secondary level (Subject code 858)
- b. In combination with academic Subject at Senior Secondary level (Subject code 862)
- c. Certificate in Data Science one year certificate programme under vocational education (Subject Codes 732 and 733) as an independent vocational course.

3. Entry Qualification:

- (i) Certificate in Artificial Intelligence: 10th Pass
- (ii) Certificate in Data Science: 10th Pass



4. Fee Structure:

- (a) (i) Certificate in Artificial Intelligence, as an independent certificate programme, Fee: Rs. 6000/-
(ii) Certificate in Data Science, as an independent certificate programme Fee: Rs. 6000/-
- (b) (i) Vocational Courses to be offered in combination with Academic subjects at Secondary level (Subject code – 859 & 858)
Fee: Fee will be paid as per Academic Prospectus
(ii) Vocational Courses to be offered in combination with Academic subjects at Senior Secondary level (Subject code – 864 & 862)
Fee: Fee will be paid as per Academic Prospectus
- (c) **Exam fee.** All candidates have to pay the examination fee. Payment for examination fee is to be paid at NIOS portal as per NIOS norms

5. Instructional Time:– 240 hours per subject (including self-study, Personal Contact Programme (PCP), audio- video, teleconferencing and practical).

6. Scheme of Studies:

- (i) For In combination with Academic Subjects: Theory weightage 40% and Practical or hands- on training 60%.
- (ii) For Certificate programme: Theory weightage 50% and Practical or hands- on training 50%

7. Offering of Courses/Programmes: The course will be offered through Accredited Institute (AI) in combination with academic subjects. However, the independent vocational certificate programme will be offered in Accredited Vocational Institute (AVI).

8. Instructional Strategy: The course will be disseminated through a variety of approaches comprising the following:

- Self- instructional online material, face to face counselling
- Hands- on Experience/ Practical facilities at the Study centre
- Project work, on the job training/ internship
- Assignment, Portfolio development.



9. Medium of Instruction: The medium of instruction is English.

10. Other Support Material: Other support materials for teacher and student are:

- (i) Faculty resource materials.
- (ii) Teacher Handbooks.
- (iii) Student Handbooks.

11. Syllabus: The detailed syllabus (course-wise) is given below.



SYLLABUS

1. Coding

Introduction to Coding:

Table of contents

Ethical practices in coding

CONDITIONALS IN DETAILS

- What will you learn in this chapter?
- Types of Control Structures
- Understanding IF-ELSE and ELSE-IF statements
- Logical Operators
- Precedence of Logical Operators
- Activity: Display if a number is odd or even
- Nested Conditional statement
- Activity: The nested division problem
- Quiz time
- What you have learned in this chapter

GET CREATIVE WITH LOOPS

- What will you learn in this chapter?
- What are Loops?
- Exit Criteria
- Activity: Cat Rain
- Activity: Create a staircase using for loop
- Activity: Create a staircase using while loop
- Activity: Raining pigs and pandas
- Quiz time
- What have you learnt in this chapter?

FUNCTIONS IN DEPTH

- What will you learn in this chapter?
- Recap of functions
- Function Parameters
- Activity: Calculating Volume of Cuboid
- Returning value from a function
- Quiz time
- What have you learnt in this chapter?

PROGRAMMING WITH ARRAYS

- What will you learn in this chapter?
- What are Arrays?
- Activity: Playing with colors
- Sorting an Array



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- Searching in an array
 - Using Python to arrange an array in ascending order using bubble sort in Make Code
 - Activity: Fun in Mine craft using arrays
 - Activity: Building stairs
 - Quiz time
 - What have you learnt in this chapter?

ADVANCED SEQUENCING

- What will you learnt in this chapter?
- What is a Sequence?
- Sequencing with Loops and Conditions
- Activity: Print number divisible by 3 from 1 to 100
- Quiz time
- What have you learnt in this chapter?
- References



2. Artificial Intelligence(Secondary Level)

Artificial Intelligence, Data Analytics and Machine Learning

Student learning approach

Module 1: Artificial Intelligence and its Utility

Lesson 1: AI and its Applications

- Natural language generation (NLG)
- Exposure to AI and its Applications across industry
- Conversational AI
- Machine learning and intelligent edge
- Assess your Knowledge
 - Questions for assessment
 - Fill in the Blanks
 - Questions to ponder upon
 - Links for further reading
- Reference link

Module 2: Building foundations of python

- Python – Basic syntax
- Python – Variable Types
- Assigning Values to Variables
- Python – Basic Operators
- Assess Your Knowledge
 - Practical Assignment and lab work
 - Questions to ponder upon
 - Links for further reading
- Reference link

Module 3: Overview of Azure

Lesson 3: Overview of Azure

- Introduction to the lab
- Set up your Azure Subscription
- Install project template in Visual Studio
- Download the lab materials
- Install Bot framework Emulator
- Create a BOT Resource in Azure
- Assess your Knowledge
 - Practical Assignment and Lab Work
- Reference Links

Module 4: Quickly Create a Basic BOT

Lesson 4: Overview of Basic BOT

- Create a Project



- Debugging with Bot framework Emulator
- Update welcome message
- Assess your knowledge
 - Practical Assignment and lab work
- Reference link

Module 5: Adding LUIS to your BOT

Lesson 5: Overview of LUIS

- Introduction to LUIS
- Create a LUIS Subscription
- Import and Extend the LUIS model
- Install LUIS Package
- Add the LUIS recognizer to your BOT
- Adjust your BOT to process LUIS results
- Test LUIS Configuration
- Assess your Questions
 - Practical Assignment and lab work
- Reference link

Module 6: Adding advanced Conversational features to your BOT

Lesson 6: Overview of BOT framework emulator

- Add a visual response to your BOT: Carousel
- Test the Visual Response
- Install and Set Up Dialogs Package
- Set up the conversation flow
- Test the conversation flow
- Assess your knowledge
 - Practical Assignment and lab work
- Reference link

Module 7: Adding knowledge to your BOT Using QnA Maker

Lesson 7: Overview of QnA maker

- Introduction to QnA maker
- Set up QnA maker
- Set up your QnA maker instance
- Install QnA maker package
- Assess your knowledge
 - Practical Assignment and lab work
- Reference link

Lesson 8: Integration of QnA Maker in BOT

- Add QnA maker to the BOT
- Test QnA maker in Bot Emulator
- Assess your knowledge
 - Practical Assignment and lab work
- Reference link



Module 8: Implementing Personality Chat**Lesson 9:** Overview of Personality Chat

- Overview
- Add project Personality Chat to the Bot
- Test Personality Chat in Bot Emulator
- Assess your knowledge
 - Practical Assignment and lab work
- Reference link

Lesson 10: Adding Speech Support

- Overview
- Create a Speech Subscription
- Set up web chat
- Add text to speech to BOT
- Deploy to Azure from visual studio
- Test in web Chat

Lesson 11: Overview of custom Speech Model

- Overview
- Speech customisation: using custom Speech
- Customise language model and pronunciation
- Create custom Speech – to – Text endpoint
- Modify chat bot to support custom Speech
- Test Custom Speech in web chat

Lesson 12: Adding Speech Translation to your BOT

- Overview
- Create a translator text subscription
- Add translation support to the BOT
- Test the Speech Translation

Lesson 13: Adding a BOT to Web Application

- Add the web chat libraries
- Add the web chat widget
- Add the initialisation script
- Test the BOT using the web chat widget

Lesson 14: Consuming a Custom Voice

- Create a Voice font
- Add the Voice font to your BOT

Module 9: Create LUIS app without coding**Lesson 15:** Web – based LUIS

- Introduction to LUIS
- Define your App
- Train and test the model
- Publish the app and generated JSON code



- Assess your knowledge
 - Practical Assignment and lab work
- Reference link

Module 10: Project work

- Practical Assignment/ Project work
- Glossary



Artificial Intelligence, Machine Learning and Deep Learning (Senior Secondary Level)

- Introduction
- Student learning approach
- Pretext

Unit 1: Recap – Building foundations of python

Lesson 1: Understanding python

- Python – Basic syntax
- Python – Variable type
- Assigning values to Variable
- Python – Basic Operators
- Assess your knowledge
 - Practical Assignment and lab work
 - Questions to ponder upon
 - Link for further reading
 - Reference link

Unit 2: Conversational AI for Smart Cites

Lesson 2: Web BOT and Customisations

Lesson 3: Multi – Channel BOT

Lesson 4: Introduction

- Create Azure Resource
- Create a Cognitive Service Unified Resource
- Adding a Custom skill: Translation
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 3: Responsible Conversational AI

Lesson 5: Introduction to Responsible Conversational AI



- Background
- Responsibility Imperatives While Using Conversational AI
- Build a Transparent and Trustworthy BOT
- Ensure your BOT is Reliable
- Make your BOT Accessible

Lesson 6: Considering Consequential use Cases

- Ensuring your BOT is Respectful and protects Against Misuse
- Fairness and Diversity

Lesson 7: Make sure your BOT Respects Users' Privacy

- BOT Security
- You are Responsible for you BOT
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 4: Web Chat Handoff

Lesson 8: Developing interface Between Humans & Bots

- Run and Test your BOT
- Modify BOT to include hand off implementation
- Finish implementation to hand off the conversation to the agent
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 5: Build an Insurance BOT

Lesson 9: Build an Insurance BOT

- Introduction Video
- Getting Started
- BOTs
- Language
- Knowledge
- Vision
- Web chat with speech
- Conclusion
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 6: Build a retail BOT

Lesson 10: Using BOT framework to create a retail BOT

- Getting Started
- Quickly create a basic BOT

Lesson 11: Adding advanced features to BOT

- Adding the language understanding service to your BOT



- Adding advanced conversational features to your BOT
- Add custom vision support
 - Created a custom vision project
 - Tag Images
 - Train and test the model
 - Adjust your BOT to use custom vision
- Schedule an appointment
- Add speech support
- Use the BOT in a simple web app
- Advanced visual features
- Use eye tracking to improve on – site experience
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 7: Introduction to robotics

Lesson 12: Getting started with language understanding

- Set up language understanding
- Set up computer vision resources
- Get ubuntu 16.04 64 bit image
- Run installation script on VM
- Set up and launch the simulator

Lesson 13: Bringing your robot to life

- Making your robot intelligent with Microsoft AI
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 8: Immersive reader using python sample project

Lesson 13: Building accessibility through immersive reader

- Overview
- Prerequisites
- Configure Authentication Credentials
- Create a python web app on windows
- Create a python web app on OSX
- Start the immersive reader with sample content
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 9: Build custom model for translation

Lesson 14: Custom Translator

- Overview



- Prerequisites
- Create a workshop
- Create a project
- Upload documents

Lesson 15: Creation of custom translator model

- Create a model
- Analyse your model
- Deploy a trained model
- Use a deployed mode
- Assess your knowledge
 - Questions for Assessment
- Reference link

Unit 10: Group Assignment

Lesson 16: Project Work



3. Data Science (Secondary Level)

Use of statistics in data science

- Introduction
- What are subsets
- Two – way frequency table
- Interpreting two –way tables
- Two – way relative frequency table
- Meaning of mean
- Median
- Mean absolute deviation
- What is standard deviation
- Activity

Exercises

Distributions in Data Science

- Introduction
- What is distribution in data science
- What are different types of distributions?
- Statistical Problem Solving Process
- Activity-Choosing groups for school dance program

Exercises

Identifying Patterns

- What is partiality, preference and prejudice?
- How to identify the partiality, preference and prejudice?
- Probability for Statistics
- The Central Limit Theorem
- Why is the Central Limit Theorem important?

Exercises

Data Merging

- Overview of Data Merging
- What is Z-Score?
- How to calculate a Z-score?
- How to interpret Z-score?
- Why is a Z-score so important?
- Concept of percentiles
- Quartiles
- Deciles

Exercises

Ethics in Data Science

- Note about data governance framework
- Ethical guidelines around data analysis
- Discarding the Data

References



Data Science (Senior Secondary Level)

Data Governance

- What is Data Governance
- Ethical Guidelines
- Data privacy

Exploratory Data Analysis

- Introduction
- Univariate analysis
- Multivariate analysis
- Data Clearing

Classification Algorithms I

- Introduction
- Introduction to decision trees
- Applications of decision trees
- Creating a decision tree

Classification Algorithms II

- Introduction
- Introduction to K – Nearest Neighbors
- Pros and cons of using K – NN
- Cross Validation

Regression Algorithms I

- Introduction
- Introduction to linear regression
- Mean absolute error
- Root mean square deviation

Regression Algorithms II

- Introduction
- Multiple linear regression
- Non - linear regression

Unsupervised Learning

- Introduction
- Introduction to unsupervised learning
- Real world applications of unsupervised learning
- Introduction to clustering
- K – Means clustering

Final Project I

- Introduction
- Introduction to the project
- Setup visual studio code and python
- Gather data for the meteor showers
- Cleanse meteor data
- Wright the predictor function



Final Project II

- Introduction
- Introduction to the project
- References