Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister's Hunarmand Pakistan Program

"Skills for All"

Course Contents / Lesson Plan
Course Title: AI (Robotics)
Duration: 3 Months

Revised Edition

Trainer Name	
Course Title	**AI (Robotics)**
Objectives and Expectations	**Employable skills and hands-on practice in AI (Robotics)** This is a special course designed to address unemployment in the youth. The course aims to achieve the above objective through hands on practical training delivery by a team of dedicated professionals having rich market/work experience. This course is therefore not just for developing a theoretical understanding/back ground of the trainees. Contrary to that, it is primarily aimed at equipping the trainees to perform commercially in a market space in independent capacity or as a member of a team. The course therefore is designed to impart not only technical skills but also soft skills (i.e. interpersonal/communication skills; personal grooming of the trainees etc.) as well as entrepreneurial skills (i.e. marketing skills; free lancing etc.). The course also seeks to inculcate work ethics to foster better citizenship in general and improve the image of Pakistani work force in particular. **Main Expectations:** In short, the course under reference should be delivered by professional instructors in such a robust hands-on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion. This course thus clearly goes beyond the domain of the traditional training practices in vogue and underscores an expectation that a market-centric approach will be adopted as the main driving force while delivering it. The instructors should therefore be experienced enough to be able to identify the training needs for the possible market roles available out there. Moreover, they should also know the strengths and weaknesses of each trainee to prepare them for such market roles during/after the training. i. Specially designed practical tasks to be performed by the trainees have been included in the Annexure-I to this document. The record of all tasks performed individually or in groups must be preserved by the management of the training Institute clearly labeling name, trade, session, etc. so that these are ready to be physically inspected/verified through monitoring visits from time to time. The weekly distribution of tasks has also been indicated in the weekly lesson plan given in this document. ii. To materialize the main expectations, a special module on **Job Search & Entrepreneurial Skills** has been included in the latter part of this course (5th & 6th month) through which, the trainees will be made aware of the Job search techniques in the local as well as international job markets (Gulf countries). Awareness around the visa process and immigration laws of the most favored labor destination countries also form a part of this module. Moreover, the trainees would also be encouraged to venture into self-employment and exposed to the main requirements in this regard. It is also expected that a sense of civic duties/roles and responsibilities will also be inculcated in the trainees to

make them responsible citizens of the country.

iii.   A module on **Work Place Ethics** has also been included to highlight the importance of good and positive behavior in the workplace in the line with the best practices elsewhere in the world. An outline of such qualities has been given in the Appendix to this document. Its importance should be conveyed in a format that is attractive and interesting for the trainees such as through PPT slides +short video documentaries. Needless to say that if the training provider puts his heart and soul into these otherwise non-technical components, the image of the Pakistani workforce would undergo a positive transformation in the local as well as international job markets.

To maintain interest and motivation of the trainees throughout the course, modern techniques such as:
•   Motivational Lectures
•   Success Stories
•   Case Studies

These techniques would be employed as an additional training tool wherever possible (these are explained in the subsequent section on Training Methodology).

Lastly, evaluation of the competencies acquired by the trainees will be done objectively at various stages of the training and a proper record of the same will be maintained. Suffice to say that for such evaluations, practical tasks would be designed by the training providers to gauge the problem-solving abilities of the trainees.

(i)   Motivational Lectures

The proposed methodology for the training under reference employs motivation as a tool. Hence besides the purely technical content, a trainer is required to include elements of motivation in his/her lecture. To inspire the trainees to utilize the training opportunity to the full and strive towards professional excellence. Motivational lectures may also include general topics such as the importance of moral values and civic role & responsibilities as a Pakistani. A motivational lecture should be delivered with enough zeal to produce a deep impact on the trainees. It may comprise of the following:

* Clear Purpose to convey the message to trainees effectively.
* Personal Story to quote as an example to follow.
* Trainees Fit so that the situation is actionable by trainees and not represent a just idealism.
* Ending Points to persuade the trainees on changing themselves.

  A good motivational lecture should help drive creativity, curiosity, and spark the desire needed for trainees to want to learn more.

The impact of a successful motivational strategy is amongst others commonly visible in increased class participation ratios. It increases the trainees' willingness to be engaged on the practical tasks for a longer time without boredom and loss of interest because they can see in their mind's eye where their hard work would take them in short (1-3 years); medium (3 -10 years) and long term (more than 10 years).

As this tool is expected that the training providers would make arrangements for regular well planned motivational lectures as part of a coordinated strategy interspersed throughout the training period as suggested in the weekly lesson plans in this document.

Course-related motivational lectures online link is available in **Annexure-II**.

(ii)   Success Stories

Another effective way of motivating the trainees is using Success Stories. Its inclusion in the weekly lesson plan at regular intervals has been recommended till the end of the training.

A success story may be disseminated orally, through a presentation, or using a video/documentary of someone that has risen to fortune, acclaim, or brilliant achievement. A success story shows how a person achieved his goal through hard work, dedication, and devotion. An inspiring success story contains compelling and significant facts articulated clearly and easily comprehendible words. Moreover, it is helpful if it is assumed that the reader/listener knows nothing of what is being revealed. The optimum impact is created when the story is revealed in the form of:-

- Directly in person (At least 2-3 cases must be arranged by the training institute)
- Through an audio/ videotaped message (2-3 high-quality videos must be arranged by the training institute)

It is expected that the training provider would collect relevant high-quality success stories for inclusion in the training as suggested in the weekly lesson plan given in this document.

The suggestive structure and sequence of a sample success story and its various shapes can be seen in **Annexure III**.

(iii)   Case Studies

Where a situation allows, case studies can also be presented to the trainees to widen their understanding of the real-life specific problem/situation and to explore the solutions.

In simple terms, the case study method of teaching uses a real-life case example/a typical case to demonstrate a phenomenon in action and explain theoretical as well as practical aspects of the knowledge related to the same. It is an effective way to help the trainees comprehend in depth both the theoretical and practical aspects of the complex phenomenon in depth with ease. Case teaching can also stimulate the trainees to participate in discussions and thereby boost their confidence. It also makes the classroom atmosphere interesting thus maintaining the trainee interest in training till the end of the course.

Depending on suitability to the trade, the weekly lesson plan in this document may suggest case studies be presented to the trainees. The trainer may adopt a PowerPoint presentation or video format for such case studies whichever is deemed suitable but only those cases must be selected that are relevant and of a learning value.

The Trainees should be required and supervised to carefully analyze the cases.

For this purpose, they must be encouraged to inquire and collect specific information/data, actively participate in the discussions, and intended solutions to the problem/situation.

Case studies can be implemented in the following ways: -

i.   A good quality trade-specific documentary (At least 2-3 documentaries must be arranged by the training institute)

ii.   Health &Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute)

	iii. Field visits(At least one visit to a trade-specific major industry/ site must be arranged by the training institute)
Entry-level of trainees	For an advanced course of AI(Robotics) proposed entry level is minimum bachelors in relevant subject, so expectations from the trainees are: • Have knowledge of Programming Concepts • Have studied languages such as C, C++, Python • Have concept of Computer system • Having a knowledge of basic electronics
Learning Outcomes of the course	By the end of this course, students will be able to: • Design/Development of solutions for different Industrial applications • Understanding of modern tool usage (AI & Robotics) in Industry 4.0 • An ability to work effectively, as an individual and in a team • To start own business and develop pragmatic industrial solutions. • Able to Understand and implement Robotics and AI • Able to design, 3D print and implement an AI based robot to solve a problem • Able to develop and Implement AI based Industrial Robotics applications.
Course Execution Plan	The total duration of the course: **3 months (12 Weeks)** Class hours: **4 hours per day** Theory: **20%** Practical: **80%** Weekly hours: **20 hours per week** Total contact hours: **260 hours**
Companies offering jobs in the respective trade	• Healthcare: The healthcare industry is using AI and Robotics to improve patient care and increase efficiency. Medical device companies, hospitals, and research institutions are all looking for individuals with AI and Robotics skills to help them develop and implement new technologies. • Manufacturing: Robotics is being used in manufacturing to automate processes and increase efficiency. Companies such as Ford, General Motors, and Toyota are investing heavily in robotics and are looking for individuals with the necessary skills to help them develop and maintain their robotic systems. • Finance: The finance industry is using AI to analyze data, identify patterns, and make predictions. Banks, insurance companies, and investment firms are all looking for individuals with AI and Robotics skills to help them improve their services and increase profits. • Agriculture: Robotics is being used in agriculture to automate tasks such as planting, harvesting, and monitoring crops. Companies such as John Deere and Monsanto are investing in robotic technologies and are looking for individuals with the necessary skills to help them develop and implement new systems.

Job Opportunities	- Robotics Technician - AI Consultant - Autonomous Vehicle Technician - Entry level roles related to ML, NLP and Data Science
No of Students	25
Learning Place	Classroom / Lab
Instructional Resources	1. Introduction to Robotics: https://www.youtube.com/watch?v=onNhwzVyD58 This video provides an overview of robotics, including its history, current state, and potential future applications. 2. Machine Learning Crash Course: https://www.youtube.com/watch?v=_Z9TRANg4c0 This video provides a crash course in machine learning, covering supervised and unsupervised learning, as well as linear regression. 3. Deep Learning Simplified: https://www.youtube.com/watch?v=Z8MvEaq7FNM This video provides an introduction to deep learning and neural networks, including convolutional neural networks (CNNs). 4. Reinforcement Learning with OpenAI Gym: https://www.youtube.com/watch?v=GcSoJFzJZN4 This video provides an introduction to reinforcement learning using OpenAI Gym, including Q-learning and actor-critic methods. 5. Building a Self-Driving Car: https://www.youtube.com/watch?v=itA_LJZGzn0 This video provides an in-depth look at the perception, control, and planning aspects of self-driving cars, including computer vision and SLAM.

MODULES

Scheduled Weeks	Module Title	Days	Hours	Learning Units	Home Assignment
Week 1	**Introduction to AI and Robotics**	**Day 1**	**Hour 1**	Course Introduction and Expectations	
			Hour 2	Intro to AI and Robotics	
			Hour 3	Job Market Overview	
			Hour 4	Work Ethics in Institute	
		Day 2	**Hour 1**	History of AI and Robotics	
			Hour 2	Current State of AI and Robotics	
			Hour 3	Applications of AI and Robotics	• **Task 1**
			Hour 4	Ethical Considerations in AI and Robotics	*Details may be seen at Annexure-I*
		Day 3	**Hour 1**	Introduction to Programming Languages used in AI and Robotics	
			Hour 2	Variables, Data Types, and Operators	
			Hour 3	Control Structures and Functions	
			Hour 4	Hands-on Practice with a Programming Language	
		Day 4	**Hour 1**	Introduction to Machine Learning (ML)	
			Hour 2	Supervised vs. Unsupervised Learning	

			Hour 3	Linear Regression	
			Hour 4	Hands-on Practice with a ML Algorithm	
		Day 5	Hour 1	Introduction to Computer Vision	
			Hour 2	Image Processing Techniques	
			Hour 3	Feature Extraction	
			Hour 4	Hands-on Practice with a Computer Vision Algorithm	
Week 2	Programming Fundamentals	Day 1	Hour 1	Success Stories of AI and Robotics	
			Hour 2	Recap of Programming Concepts	
			Hour 3	Introduction to Object-Oriented Programming (OOP)	
			Hour 4	Hands-on Practice with OOP	• **Task 2** *Details may be seen at Annexure-I*
		Day 2	Hour 1	Data Structures and Algorithms	
			Hour 2	Recursion	
			Hour 3	Big O Notation	
			Hour 4	Hands-on Practice with Data Structures and Algorithms	
		Day 3	Hour 1	Introduction to Version Control Systems (VCS)	

			Hour 2	Git Basics	
			Hour 3	Branching and Merging	
			Hour 4	Hands-on Practice with Git	
		Day 4	Hour 1	Introduction to Web Development	
			Hour 2	HTML, CSS, and JavaScript	
			Hour 3	Web Frameworks	
			Hour 4	Hands-on Practice with Web Development	
		Day 5	Hour 1	Introduction to Cloud Computing	
			Hour 2	Cloud Providers	
			Hour 3	Infrastructure as Code	
			Hour 4	Hands-on Practice with Cloud Computing	
Week 3	Machine Learning Basics	Day 1	Hour 1	Motivational Lecture on AI and Robotics	• **Task 3** *Details may be seen at Annexure-I*
			Hour 2	Multivariate Linear Regression	
			Hour 3	Logistic Regression	
			Hour 4	Hands-on Practice with Regression Algorithms	
		Day 2	Hour 1	Support Vector Machines (SVM)	

			Hour 2	Kernel Tricks	
			Hour 3	Hands-on Practice with SVM	
			Hour 4	Hands-on Practice with SVM	
		Day 3	Hour 1	Decision Trees and Random Forests	
			Hour 2	Ensemble Methods	
			Hour 3	Hands-on Practice with Decision Trees and Random Forests	
			Hour 4	Decision Trees and Random Forests	
		Day 4	Hour 1	Introduction to Neural Networks	
			Hour 2	Perceptron	
			Hour 3	Multi-Layer Perceptron (MLP)	
			Hour 4	Hands-on Practice with Neural Networks	
		Day 5	Hour 1	Introduction to Deep Learning	
			Hour 2	Convolutional Neural Networks (CNNs)	
			Hour 3	Recurrent Neural Networks (RNNs)	
			Hour 4	Hands-on Practice with CNNs and RNNs	

Week 4	Computer Vision	Day 1	Hour 1	Success Stories of AI and Robotics	
			Hour 2	Introduction to Image Processing	
			Hour 3	Image Filtering	
			Hour 4	Hands-on Practice with Image Filtering	
		Day 2	Hour 1	Edge Detection	
			Hour 2	Feature Extraction Techniques	
			Hour 3	Hands-on Practice with Feature Extraction	
			Hour 4	Hands-on Practice with Feature Extraction	• **Task 4** *Details may be seen at Annexure-I*
		Day 3	Hour 1	Object Recognition	
			Hour 2	Object Tracking	
			Hour 3	Hands-on Practice with Object Recognition and Tracking	
			Hour 4	Hands-on Practice with Object Recognition and Tracking	
		Day 4	Hour 1	Semantic Segmentation	
			Hour 2	Instance Segmentation	
			Hour 3	Hands-on Practice with Segmentation	

			Hour 4	Hands-on Practice with Segmentation	
		Day 5	Hour 1	Introduction to 3D Computer Vision	
			Hour 2	Stereo Vision	
			Hour 3	Depth Estimation	
			Hour 4	Hands-on Practice with 3D Computer Vision	
Week 5	Natural Language Processing	Day 1	Hour 1	Introduction to Natural Language Processing (NLP)	
			Hour 2	Text preprocessing and cleaning	
			Hour 3	Tokenization and stemming	
			Hour 4	Part-of-speech tagging	
		Day 2	Hour 1	Named Entity Recognition (NER)	• **Task 5** *Details may be seen at Annexure-I*
			Hour 2	Chunking and parsing	
			Hour 3	Word embeddings	
			Hour 4	Language modeling	
		Day 3	Hour 1	Sentiment analysis	
			Hour 2	Topic modeling	

			Hour 3	Text classification	
			Hour 4	Information retrieval	
		Day 4	Hour 1	Machine translation	
			Hour 2	Dialogue systems	
			Hour 3	Text summarization	
			Hour 4	Natural Language Generation (NLG)	
		Day 5	Hour 1	Ethical considerations in NLP	
			Hour 2	Emerging trends in NLP	
			Hour 3	Practical applications of NLP	
			Hour 4	Hands-on NLP project	
Week 6	Reinforcement Learning	Day 1	Hour 1	Introduction to Reinforcement Learning (RL)	
			Hour 2	Markov Decision Processes (MDPs)	• **Task 6**
			Hour 3	Value iteration and policy iteration	*Details may be seen at Annexure-I*
			Hour 4	Monte Carlo methods	
		Day 2	Hour 1	Temporal Difference (TD) learning	

			Hour 2	SARSA algorithm	
			Hour 3	Q-Learning	
			Hour 4	Deep Q-Learning	
		Day 3	Hour 1	Exploration vs exploitation trade-off	
			Hour 2	Multi-armed bandits	
			Hour 3	Upper Confidence Bound (UCB) algorithm	
			Hour 4	Thompson Sampling	
		Day 4	Hour 1	Policy Gradient Methods	
			Hour 2	REINFORCE algorithm	
			Hour 3	Actor-Critic methods	
			Hour 4	Asynchronous Advantage Actor-Critic (A3C) algorithm	
		Day 5	Hour 1	Multi-Agent RL	
			Hour 2	Cooperative and competitive scenarios	
			Hour 3	Multi-Agent Deep RL	
			Hour 4	Applications of RL in robotics	
Week 7	Deep Learning Basics	Day 1	Hour 1	Introduction to Deep Learning (DL)	• Task 7

			Hour 2	Artificial Neural Networks (ANNs)	*Details may be seen at Annexure-I*
			Hour 3	Activation functions	
			Hour 4	Forward and backward propagation	
		Day 2	Hour 1	Convolutional Neural Networks (CNNs)	
			Hour 2	Pooling layers	
			Hour 3	Convolutional layers	
			Hour 4	Batch Normalization	
		Day 3	Hour 1	Recurrent Neural Networks (RNNs)	
			Hour 2	Long Short-Term Memory (LSTM) networks	
			Hour 3	Gated Recurrent Units (GRUs)	
			Hour 4	Word-level language modeling	
		Day 4	Hour 1	Autoencoders	
			Hour 2	Variational Autoencoders (VAEs)	
			Hour 3	Generative Adversarial Networks (GANs)	
			Hour 4	Deep Reinforcement Learning (DRL) with DL	
		Day 5	Hour 1	Transfer Learning	

			Hour 2	Fine-tuning and feature extraction	
			Hour 3	Domain adaptation	
			Hour 4	Practical applications of DL	
Week 8	**Robotics Control**	**Day 1**	**Hour 1**	Introduction to Robotics Control	
			Hour 2	Degrees of freedom and joint types	
			Hour 3	Forward kinematics	
			Hour 4	Inverse kinematics	
		Day 2	**Hour 1**	Differential kinematics	
			Hour 2	Jacobians and manipulability	• **Task 8** *Details may be seen at Annexure-I*
			Hour 3	Control of robot arms	
			Hour 4	Inverse dynamics	
		Day 3	**Hour 1**	Robot dynamics	
			Hour 2	Lagrangian dynamics	
			Hour 3	Newton-Euler equations	
			Hour 4	Robust control of robots	
		Day 4	**Hour 1**	Trajectory planning and control	

			Hour 2	Motion planning algorithms	
			Hour 3	Path following control	
			Hour 4	Feedback linearization	
		Day 5	Hour 1	Practical applications of robotics control	
			Hour 2	Emerging trends in robotics control	
			Hour 3	Robotics control	
			Hour 4	Revision of complete topic	
Week 9	Reinforcement Learning for Robotics	Day 1	Hour 1	Introduction to Reinforcement Learning for Robotics	
			Hour 2	Robotics Applications of RL	
			Hour 3	Markov Decision Processes (MDPs)	
			Hour 4	Markov Decision Processes (MDPs)	• **Task 9** *Details may be seen at Annexure-I*
		Day 2	Hour 1	Q-Learning	
			Hour 2	Deep Q-Learning	
			Hour 3	Experience Replay	
			Hour 4	Discussion session	

		Day 3	Hour 1	Policy Gradient Methods	
			Hour 2	Actor-Critic Methods	
			Hour 3	Proximal Policy Optimization (PPO)	
			Hour 4	Proximal Policy Optimization (PPO)	
		Day 4	Hour 1	Multi-Agent RL	
			Hour 2	Decentralized and Centralized RL	
			Hour 3	Cooperative and Competitive RL	
			Hour 4	Discussion	
		Day 5	Hour 1	RL for Robotics Case Studies	
			Hour 2	Industrial Automation	
			Hour 3	Industrial Automation	
			Hour 4	Autonomous Driving	
Week 10	Advanced Computer Vision	Day 1	Hour 1	Introduction to Advanced Computer Vision	• **Task 10** *Details may be seen at Annexure-I*
			Hour 2	Object Detection	
			Hour 3	Object Tracking	
			Hour 4	Discussion	

		Day 2	Hour 1	Semantic Segmentation	
			Hour 2	Instance Segmentation	
			Hour 3	Mask R-CNN	
			Hour 4	Discussion	
		Day 3	Hour 1	Generative Models	
			Hour 2	Variational Autoencoders	
			Hour 3	Generative Adversarial Networks (GANs)	
			Hour 4	Discussion	
		Day 4	Hour 1	Video Understanding	
			Hour 2	Optical Flow	
			Hour 3	Action Recognition	
			Hour 4	Action Recognition	
		Day 5	Hour 1	3D Computer Vision	
			Hour 2	Monocular Depth Estimation	
			Hour 3	RGB-D Reconstruction	
			Hour 4	Complete topic revision	

Week 11	Deep Reinforcement Learning	Day 1	Hour 1	Introduction to Deep Reinforcement Learning (DRL)	
			Hour 2	DRL Frameworks	
			Hour 3	DRL Frameworks	
			Hour 4	DQN Revisited	
		Day 2	Hour 1	Deep Policy Gradient Methods	
			Hour 2	REINFORCE	
			Hour 3	Actor-Critic Methods	• **Task 11** _Details may be seen at Annexure-I_
			Hour 4	Discussion	
		Day 3	Hour 1	Asynchronous RL	
			Hour 2	Asynchronous RL	
			Hour 3	A3C	
			Hour 4	Distributed RL	
		Day 4	Hour 1	Exploration Strategies	
			Hour 2	Epsilon Greedy	
			Hour 3	Boltzmann Exploration	

			Hour 4	Discussion	
		Day 5	Hour 1	RL for Games	
			Hour 2	Atari Games	
			Hour 3	AlphaGo and AlphaZero	
			Hour 4	Complete topic revision	
Week 12	Robotics Perception	Day 1	Hour 1	Introduction to Robotics Perception	• **Task 12** *Details may be seen at Annexure-I* **Final Project**
			Hour 2	Sensors in Robotics	
			Hour 3	Sensors in Robotics	
			Hour 4	Cameras	
		Day 2	Hour 1	Depth Perception	
			Hour 2	Stereo Vision	
			Hour 3	Time of Flight (ToF)	
			Hour 4	Time of Flight (ToF)	
		Day 3	Hour 1	LiDAR	
			Hour 2	Types of LiDAR	
			Hour 3	Point Cloud Processing	

			Hour 4	Point Cloud Processing	
		Day 4	**Hour 1**	Simultaneous Localization and Mapping (SLAM)	
			Hour 2	Types of SLAM	
			Hour 3	Visual SLAM	
			Hour 4	Discussion	
		Day 5	**Hour 1**	Robotics Perception Case Studies	
			Hour 2	Self-Driving Cars	
			Hour 3	Autonomous Drones	
			Hour 4	Applications in daily life	

Tasks for Certificate in AI (Robotics)

Task No.	Task	Description	Week
1.	**Simple robot**	Build a simple robot using a kit	**Week 1**
2.	**Basic coding**	Write a program to control the robot built in Week 1	**Week 2**
3.	**Machine Learning implementation**	Implement a simple ML model to make the robot move based on data from its sensors	**Week 3**
4.	**Computer Vision Implementation**	Build a program to detect and track objects using a camera	**Week 4**
5.	**Chatbot**	Build a chatbot that can answer simple questions	**Week 5**
6.	**Robot (RL technique)**	Building a robot that can navigate through a maze using RL techniques	**Week 6**
7.	**Implement DL model**	Implement a simple DL model to recognize objects in images	**Week 7**
8.	**Robotic Arm**	Build a program to control a robot arm	**Week 8**
9.	**Building a robot that can learn to perform tasks through RL**	Build a robot that can learn to perform tasks through RL	**Week 9**
10.	**Computer Vision**	Build a program to detect and track objects in real-time using a camera	**Week10**
11.	**DRL Techniques**	Build a robot that can learn to perform complex tasks using DRL techniques	**Week11**
12.	**LiDAR and SLAM**	Building a program to map a room using LiDAR and SLAM techniques	**Week12**
13.	**Final Project**	Combining all the topics covered in the course to build a complete AI-driven robot that can perform tasks autonomously.	**Week12**

Motivational Lectures
AI (Robotics)

The Rise of AI: https://www.youtube.com/watch?v=5J5bDQHQR1g

This video provides an overview of the impact that AI is having on various industries and highlights some of the breakthroughs that have been made in recent years.

How Robotics Will Change the World: https://www.youtube.com/watch?v=UwsrzCVZAb8

This video provides an overview of the impact that robotics is having on society, including in fields such as healthcare, manufacturing, and agriculture.

What is Deep Learning and How Does it Work? :
https://www.youtube.com/watch?v=aircAruvnKk

This video provides a motivational introduction to deep learning, explaining what it is and how it works, as well as some of the applications of deep learning.

The Promise and Peril of Our Machine Learning Future:
https://www.youtube.com/watch?v=l-JfN9HNmV4

This video provides an overview of the potential benefits and risks of machine learning, and how it will impact the future of society.

The Future of Robotics: https://www.youtube.com/watch?v=w22b-E_qP5o

This video provides an exciting look at the future of robotics, including how robots will impact various industries and the potential for robots to become a part of our daily lives.

Annexure-II

SUGGESTIVE FORMAT AND SEQUENCE ORDER OF MOTIVATIONAL LECTURE.

Mentor

Mentors are provided an observation checklist form to evaluate and share their observational feedback on how students within each team engage and collaborate in a learning environment. The checklist is provided at two different points: Once towards the end of the course. The checklists are an opportunity for mentors to share their unique perspective on group dynamics based on various team activities, gameplay sessions, pitch preparation, and other sessions, giving insights on the nature of communication and teamwork taking place and how both learning outcomes and the student experience can be improved in the future.

Session- 1 (Communication):

Please find below an overview of the activities taking place Session plan that will support your delivery and an overview of this session's activity.

Session- 1 OVERVIEW
Aims and Objectives:
- To introduce the communication skills and how it will work   - Get to know mentor and team - build rapport and develop a strong sense of a team   - Provide an introduction to communication skills   - Team to collaborate on an activity sheet developing their communication, teamwork, and problem-solving   - Gain an understanding of participants' own communication skills rating at the start of the program

Activity:	Participant Time	Teacher Time	Mentor Time
Intro Attend and contribute to the scheduled.			
Understand good communication skills and how it works.			
Understand what good communication skills mean			
Understand what skills are important for good communication skills			
Key learning outcomes:	**Resources:**		**Enterprise skills developed:**
Understand the communication skills and how it works.	- Podium - Projector - Computer		- Communication - Self Confidence - Teamwork

	Flip Chart	
• Understand what communication skills mean • Understand what skills are important for communication skills	• Flip Chart • Marker	

Schedule	Mentor Should do
Welcome: **5 min**	Short welcome and ask the **Mentor** to introduce him/herself. Provide a brief welcome to the qualification for the class. Note for Instructor: Throughout this session, please monitor the session to ensure nothing inappropriate is being happened.
Icebreaker: **10 min**	Start your session by delivering an icebreaker, this will enable you and your team to start to build rapport and create a team presentation for the tasks ahead. The icebreaker below should work well at introductions and encouraging communication, but feel free to use others if you think they are more appropriate. It is important to encourage young people to get to know each other and build strong team links during the first hour; this will help to increase their motivation and communication throughout the sessions.
Introduction & Onboarding: **20mins**	Provide a brief introduction of the qualification to the class and play the "Onboarding Video or Presentation". In your introduction cover the following: 1. Explanation of the program and structure. 2. How you will use your communication skills in your professional life. 3. Key contacts and key information – e.g. role of teacher, mentor, and SEED. Policies and procedures (user agreements and "contact us" section). Everyone to go to the Group Rules tab at the top of their screen, read out the rules, and ask everyone to verbally agree. Ensure that the consequences are clear for using the platform outside of hours. (9am-8pm) 4. What is up next for the next 2 weeks ahead so young people know what to expect (see pages 5-7 for an overview of the challenge). Allow young people to ask any questions about the session topic.
Team Activity Planning: **30 minutes**	MENTOR: Explain to the whole team that you will now be planning how to collaborate for the first and second collaborative Team Activities that will take place outside of the session. There will not be another session until the next session so this step is required because communicating and making decisions outside of a session requires a different strategy that must be agreed upon so that everyone knows what they are doing for this activity and how. • "IDENTIFY ENTREPRENEURS" TEAM ACTIVITY • "BRAINSTORMING SOCIAL PROBLEMS" TEAM ACTIVITY"

	As a team, collaborate on a creative brainstorm on social problems in your community. Vote on the areas you feel most passionate about as a team, then write down what change you would like to see happen. Make sure the teams have the opportunity to talk about how they want to work as a team through the activities e.g. when they want to complete the activities, how to communicate, the role of the project manager, etc. Make sure you allocate each young person a specific week that they are the project manager for the weekly activities and make a note of this. Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.
Session Close: **5 minutes**	**MENTOR:** Close the session with the opportunity for anyone to ask any remaining questions. **Instructor:** Facilitate the wrap-up of the session. A quick reminder of what is coming up next and when the next session will be.

General Motivation Lectures Links:

TOPIC	SPEAKER	LINK
How to Face Problems In Life	Qasim Ali Shah	https://www.youtube.com/watch?v=OrQte08Ml90
Just Control Your Emotions	Qasim Ali Shah	https://www.youtube.com/watch?v=JzFs__yJt-w
How to Communicate Effectively	Qasim Ali Shah	https://www.youtube.com/watch?v=PhHAQEGehKc
Your ATTITUDE is Everything	Tony Robbins Les Brown David Goggins Jocko Willink Wayne Dyer Eckart Tolle	https://www.youtube.com/watch?v=5fS3rj6eIFg
Control Your EMOTIONS	Jim Rohn Les Brown TD Jakes Tony Robbins	https://www.youtube.com/watch?v=chn86sH0O5U
Defeat Fear, Build Confidence	Shaykh Atif Ahmed	https://www.youtube.com/watch?v=s10dzfbozd4
Wisdom of the Eagle	Learn Kurooji	https://www.youtube.com/watch?v=bEU7V5rJTtw
The Power of ATTITUDE	Titan Man	https://www.youtube.com/watch?v=r8LJ5X2ejqU
STOP WASTING TIME	Arnold Schwarzenegger	https://www.youtube.com/watch?v=kzSBrJmXqdg
Risk of Success	Denzel Washington	https://www.youtube.com/watch?v=tbnzAVRZ9Xc

SUCCESS STORY

S. No	Key Information	Detail/Description
1.	**Self & Family background**	Ali was born in a small town in Pakistan. His father worked as a laborer and his mother was a homemaker. Ali was the youngest of five children and had always been interested in science and technology. However, his family could not afford to send him to a good school or pay for expensive courses.
2.	**How he came on board NAVTTC Training/ or got trained through any other source**	One day, Ali heard about the NAVTTC program offering free training in AI and Robotics. He applied immediately and was accepted into the program. The training was intense and challenging, but Ali was determined to learn as much as he could.
3.	**Post-training activities**	After completing the course, Ali began applying for jobs in the field of AI and Robotics. He applied to several companies and finally landed a job at a tech startup that was developing autonomous drones for package delivery. Ali was assigned to work on the drone's computer vision system, which allowed the drone to detect and avoid obstacles. His skills in AI and Robotics were a perfect fit for the job, and he quickly became an integral part of the team.
4.	**Message to others** **(under training)**	Ali's message to others who are currently in training is to never give up on their dreams. He knows firsthand the struggles that come with limited resources, but he also knows that hard work and dedication can lead to success. He encourages others to take advantage of training opportunities like the one he received from NAVTTC, and to keep learning and growing in their chosen field.

Note: Success story is a source of motivation for the trainees and can be presented in several ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful trainee of the institute. He will narrate his success story to the trainees in his own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio-video recording that has to cover the above-mentioned points.*

3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning, etc) and narrates his/her story in the teacher's own motivational words.

* *The online success stories of renowned professional can also be obtained from **Annex-II***

Workplace/Institute Ethics Guide

Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue, or value to strengthen character and individual abilities. It is a set of values-centered on the importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

1. **Attendance:**

   Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.

2. **Character:**

   Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.

3. **Team Work:**

   The ability to get along with others including those you don't necessarily like. The ability to carry your weight and help others who are struggling. Recognize when to speak up with an idea and when to compromise by blend ideas together.

4. **Appearance:**

   Dress for success set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a lifetime

5. **Attitude:**

   Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems, and procedures in light of changing responsibilities.

6. **Productivity:**

   Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your work, do things the best you know-how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.

7. **Organizational Skills:**

Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Take an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

8. **Communication:**

   Written communication, being able to correctly write reports and memos. Verbal communications, being able to communicate one on one or to a group.

9. **Cooperation:**

   Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing work situations and the application of new or different skills.

10. **Respect:**

    Work hard, work to the best of your ability. Carry out orders, do what's asked the first time. Show respect, accept, and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions, and suggestions.