

ATHEENAPANDIAN'S



INTERNATIONAL CERTIFICATE COURSE

Certificate Course on Medical Robots

COURSE

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of healthcare with
robotic
technology.

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CERTIFICATE COURSE ON MEDICAL ROBOTICS

Course Name: MEDICAL ROBOTICS

Course Duration: 30 Hours

Course Eligibility:

- This course is eligibility for Students, Faculty, Biomedical Professionals and Other Professional.

Course Fee: Rs 999/11.9 USD

Course Objectives:

- Understand the Fundamentals of Medical Robotics:
- Analyze the Components and Mechanisms of Medical Robots
- Explore Advanced Robotic Systems for Surgery
- Apply Knowledge of Robotics in Rehabilitation and Assistive Care
- Incorporate AI and Machine Learning in Medical Robotics
- Assess the Role of Robotics in Image-Guided Procedures
- Evaluate Safety, Ethical, and Regulatory Aspects
- Identify Emerging Trends and Future Directions in Medical Robotics

Course Benefits:

- Understanding of the principles and operations of medical robotics in various healthcare applications.
- Stay updated with the latest advancements in robotic technology and their implications in medicine.
- Integrate knowledge from engineering, medicine, and ethics to understand the multifaceted role of robotics in healthcare.
- Develop critical thinking and problem-solving skills specific to robotic applications in clinical settings.

Course Coverage:

1. Introduction to Medical Robotics

- Overview of Medical Robotics
- Types of Medical Robots:
- Benefits and Challenges in Medical Robotics
- Role of Robotics in the Healthcare Industry

2. Anatomy of Medical Robots

Robotic Components:

- Actuators and Sensors
- Controllers and Software
- End-effectors and Manipulators

Kinematics and Dynamics

1. Human-Robot Interaction

Surgical Robotics

Minimally Invasive Surgery (MIS) and Robotic-Assisted Surgery:

Key Surgical Robotic Systems:

- Da Vinci Surgical System
- Mako Surgical System
- ROSA Robotics for neurosurgery

Robotics in Laparoscopy and Orthopedics

Future of Surgical Robotics

Robotics in Rehabilitation and Therapy

Assistive Robots in Healthcare

2. AI and Machine Learning in Medical Robotics

Role of AI in Enhancing Medical Robots:

- Machine learning for precision
- AI algorithms for robotic surgery

Real-time Data Processing

Image-guided Robotics

3. Medical Imaging and Robotics Integration

Robotics in Image-Guided Interventions:

- Ultrasound-guided robots
- MRI-compatible robots
- X-ray/CT integration

Applications in Biopsy and Tumor Removal

Challenges in Medical Imaging Robotics.

Regulatory, Ethical, and Safety Aspects

- Safety Standards in Medical Robotics:
- Ethical Implications:
- Regulatory Frameworks

Sl.No	Date	Day	Topic
1	04.11.2024	MONDAY	Introduction to Medical Robotics (2 hours)
			Objective: Provide a foundational understanding of medical robotics, its evolution, and current landscape.
			Topics:
			Overview of Medical Robotics
			Types of Medical Robots
			Benefits and Challenges in Medical Robotics
			Role of Robotics in the Healthcare Industry
			Activities: Group discussion about Impact of robotics in healthcare.
Assessment : MCQ type test			
2	05.11.2024	TUESDAY	Anatomy of Medical Robots - Part 1 (2 hours)
			Objective: Understand the mechanical and electronic components of medical robots.
			Topics:
			Robotic Components: Actuators and Sensors
			Controllers and Software
Activities: Hands-on activity about Introduction to basic sensors and actuators			
Assessment : Quiz			
3	06.11.2024	WEDNESDAY	Anatomy of Medical Robots - Part 2 (2 hours)
			Objective: Explore robotic end-effectors and manipulators.
			Topics:
			End-effectors and Manipulators
			Kinematics and Dynamics
			Activities : Visualization of robotic arm kinematics
Assessment : MCQ type test			
4	07.11.2024	THURSDAY	Human-Robot Interaction - Part 1 (2 hours)
			Objective: Learn about surgical robotics and minimally invasive surgery (MIS).
			Topics:
			Surgical Robotics
			Minimally Invasive Surgery (MIS) and Robotic-Assisted Surgery
			Activities : Video demonstration on Robotic surgery in action (Da Vinci system).
Assessment : Quiz			
5	08.11.2024	FRIDAY	Human-Robot Interaction - Part 2 (2 hours)
			Objective: Familiarize with key surgical robotic systems and robotics in other areas.
			Topics:
			Key Surgical Robotic Systems
			Activities : Robotics in Laparoscopy and Orthopedics
Assessment : MCQ type test			
6	11.11.2024	MONDAY	Human-Robot Interaction - Part 3 (2 hours)
			Objective: Explore future trends and applications in rehabilitation and therapy robotics.
			Topics:
			Future of Surgical Robotics
			Robotics in Rehabilitation and Therapy
			Assistive Robots in Healthcare
Activities : Design a basic assistive robot concept.			
Assessment : Quiz			

7	12.11.2024	TUESDAY	AI and Machine Learning in Medical Robotics - Part 1 (2 hours)
			Objective: Understand the role of AI and machine learning in advancing medical robotics.
			Topics:
			Role of AI in Enhancing Medical Robots
			Machine Learning for Precision
			Activities : Ethical implications of AI in surgery.
			Assessment : MCQ type test
8	13.11.2024	WEDNESDAY	AI and Machine Learning in Medical Robotics - Part 2 (2 hours)
			Objective: Dive into real-time data processing and image-guided robotics.
			Topics:
			AI Algorithms for Robotic Surgery
			Real-time Data Processing
			Image-Guided Robotics
			Activities : AI in real time processing
Assessment : Quiz			
9	14.11.2024	THURSDAY	Medical Imaging and Robotics Integration - Part 1 (2 hours)
			Objective: Explore robotics in image-guided interventions.
			Topics:
			Robotics in Image-Guided Interventions
			Ultrasound-guided Robots
			Activities : Ultrasound-guided robotic interventions
			Assessment : MCQ type test
10	15.11.2024	FRIDAY	Medical Imaging and Robotics Integration - Part 2 (2 hours)
			Objective: Understand integration with other imaging modalities.
			Topics:
			MRI-Compatible Robots
			X-ray/CT Integration
			Activities : Challenges of integrating robots with medical imaging
			Assessment : Quiz
11	18.11.2024	MONDAY	Medical Imaging and Robotics Integration - Part 3 (2 hours)
			Objective: Analyze applications and challenges in biopsy and tumor removal.
			Topics:
			Applications in Biopsy and Tumor Removal
			Challenges in Medical Imaging Robotics
			Activities : Case study of Robotic biopsy procedures
			Assessment : MCQ type test
12	19.11.2024	TUESDAY	Regulatory, Ethical, and Safety Aspects (2 hours)
			Objective: Examine the ethical, safety, and regulatory standards in medical robotics.
			Topics:
			Safety Standards in Medical Robotics
			Ethical Implication
			Regulatory Frameworks
			Activities : Ethics of AI in surgical decision making
Assessment : Quiz			

13	20.11.2024	WEDNESDAY	Future of Medical Robotics - Part 1 (2 hours)
			Objective: Learn about cutting-edge advancements in medical robotics.
			Topics:
			Advances in Nanorobotics for Medicine
			Tissue Engineering and 3D Bioprinting with Robotics
			Activities : Current nanorobotic innovations in healthcare
			Assessment : MCQ type test
14	21.11.2024	THURSDAY	Future of Medical Robotics - Part 2 (2 hours)
			Objective: Discuss the role of robotics in personalized medicine.
			Topics:
			Robotics in Personalized Medicine
			Career Pathways and Research Opportunities in Medical Robotics
			Activities : Discussion about Current nanorobotic innovations in healthcare
			Assessment : Quiz
15	22.11.2024	FRIDAY	Review and Final Assessment (2 hours)
			Objective: Assess overall understanding of robotics in medicine
			Activity:
			Review key concepts from all modules.
			Written assessment covering all modules mentioned above