National University of Sciences and Technology

Course Description

Course Title	Course Code	Credit Hours
Autonomous Vehicles and Artificial Intelligence	ME-916	3 – 0

Textbook:

- Autonomous Vehicles: Intelligent Transport Systems and Smart Technologies", by Saeed Eshghi and Mohammad Amin Bahmani (2019)

Reference Books:

- Artificial Intelligence for Autonomous Vehicles", by Shaoshan Liu and Haoyong Yu (2021)
- Autonomous Driving: Technical, Legal and Social Aspects", edited by Markus Maurer, J. Christian Gerdes, Barbara Lenz, and Hermann Winner (2016)

Course Objective:

- To introduce students to the field of autonomous vehicles and AI.

Course Outline:

- Introduction to Autonomous Vehicles
- Types of autonomous vehicles
- Applications of autonomous vehicles
- Advantages and disadvantages of autonomous vehicles
- Introduction to Artificial Intelligence
- What is AI? History of AI
- AI techniques used in autonomous vehicles
- Control Systems for Autonomous Vehicles
- Overview of control systems
- PID control
- Model predictive control
- Machine learning-based control
- Localization and Mapping for Autonomous Vehicles
- Types of localization techniques
- Simultaneous Localization and Mapping (SLAM)
- Map-based and mapless navigation. Perception for Autonomous Vehicles
- Computer vision for perception
- LiDAR-based perception
- Sensor fusion for perception
- Decision Making for Autonomous Vehicles
- Decision-making techniques for autonomous vehicles
- Obstacle avoidance
- Route planning
- Challenges and Limitations of Autonomous Vehicles
- Technical challenges
- Legal and ethical challenges
- Public perception and acceptance

ASSESSMENTS

Description	Percentage Weightage (%)
Assignments	05-10%
Quizzes	10-15%
Mid Semester Exams	30-40%
End Semester Exam	40-50%