MINOR IN ROBOTICS

INFORMATION BROCHURE

(as approved in the 257th Senate Meeting held on 8th June 2023)

ELIGIBILITY:

The Minor in Robotics is offered to the UG students of the Institute from 2022 batch onwards.

PROGRAM ANCHOR:

While faculty members from several Departments are expected to actively contribute to the success of this Minor, the Mechanical Engg Department will anchor the program and steer it towards smooth launch and implementation.

ACADEMIC REQUIREMENTS TO BE FULFILLED:

- ☐ As per Institute norms, a UG student is required to complete at least 30 credits for the Minor.
- ☐ A student may acquire these credits through all theory courses (for example five theory courses of six credits each) or four courses and a six credit mini-project.
- ☐ The mini-project in robotics may be taken by a single student or a team of students (ideally not more than 3) from same or different Departments/programs. Such a multidisciplinary team may be helpful to implement certain hands-on projects.
- ☐ The theory courses are to be selected from the following baskets (min ONE and max THREE from any basket) which attempt to span the spectrum of fields that constitute Robotics and its applications.
  - Design and Analysis of Mechatronic Systems
  - Guidance, Navigation and Controls
  - Sensors, Actuators and Embedded Systems
- ☐ The list of courses under the three baskets is provided in the Annexure.

POINTS TO NOTE:

1) The Minor in Robotics has a Faculty Advisor. Should the student feel the need for any guidance for the selection of courses/mini-project or more information on the program, (s)he is advised to get in touch with the FacAd.
2) The courses are expected to be offered in their regular slots and a student may choose any of these courses subject to slot availability.

3) Please note that some of these courses may not be offered in a given semester/year. The student is advised to refer to the list of courses being run by a Dept in a given semester/year.
4) Even when a course is offered, please check eligibility as per pre-requisites and/or background knowledge expected in order to be able to successfully complete the course. Please feel free to approach the instructor and/or the FacAd.
5) Please note that some of the courses may have an upper limit on the number of students permitted to register for that course.
6) Credits of a course/project can be counted only once – either for the major degree or any one of the Minor/Honors. Thus, a set of credits counted for this Minor will not be counted for any other Minor/Honor/Major degree and vice versa.
7) From time to time, there may be some changes in the baskets – for example, new courses may be added; some of the courses may be discontinued. While an earnest attempt is always made to keep the information up-to-date, please feel free to discuss with the FacAd.
8) Some of the courses from the baskets may have significant overlap or maybe equivalent to some other courses (a representative example illustration has been provided in the Annexure). Obviously, two such courses which are equivalent or with significant overlap cannot be permitted towards the Minor. Students are advised to consult with the FacAd beforehand if they have any doubt.

Annexure : List of Courses for Robotics Minor

Design and Analysis of Mechatronic Systems
AE 305	Flight Mechanics II
AE 667	Rotary Wing Aerodynamics
EE309*	Microprocessors
ME311*	Microprocessor and Automatic Control
ME 402	Mechatronics II
ME 604	Robotics
ME 6102	Design of Mechatronic Systems
ME 6114	Joint Biomechanics
ME 748	Computer Aided Simulation of Machines
SC 634	Introduction to Mobile Robotics
SC 635	Advanced Topics in Mobile Robotics

(* these are considered equivalent courses; student can do any one of them)

Guidance, Navigation and Controls
AE 308*	Control Theory
AE 410	Navigation and Guidance
AE 666	Adaptive and Learning Control Systems
AE 690	Control System Design Techniques
AE 700	Guidance & Control of UAVs
AE 712	Flight Dynamics and Control
CS 747	Foundations of Intelligent and Learning Agents
EE 302*	Control Systems
EE 622	Optimal Control Systems
ME 639	Linear Systems Theory
ME 779*	Control Systems
SC 618	Geometric and Analytic Dynamics
SC 624	Differential Geometric Techniques in Control
SC 627	Motion Planning & Coordination of Autonomous Vehicles
SC 633	Geometric and Analytical Aspects of Optimal Control
SC 649	Embedded Control & Robotics
SC 651	Estimation on Lie Groups

Sensors, Actuators and Embedded Systems
CS 663	Fundamentals of Digital Image Processing
CS 684*	Embedded Systems
CS 763	Computer Vision
EE 610	Image Processing
EE 617	Sensors In Instrumentation
EE 657	Electric Drives
EE 6104	Internet of Things
EE 712*	Embedded System Design

(* these are considered equivalent courses; student can do any one of them)