Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IND337	Computer Aided Manufacturing and Industry 4.0	5	3	0	0	5	5

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Compulsory
Course Level	Bachelor Degree
Objective	The main objective of this course is to educate students about the transformative impact of digital technologies and Industry 4.0 principles on modern manufacturing practices. This course aims to equip students with the knowledge and skills necessary to integrate computer systems, automation, data analytics and cyber-physical systems into manufacturing processes, increasing efficiency, productivity, sustainability and competitiveness in the evolving industrial environment. Students learn to leverage advanced technologies to optimize manufacturing operations, make data-driven decisions and understand the broader implications of the fourth industrial revolution on the manufacturing industry.
Content	Introduction to Industry 4.0: Defining Industry 4.0; Technologies underpinning Industry 4.0; Industry 4.0 challenges; Quality 4.0; Supply Chain 4.0; Data standardization; Internet and Ethernet; Internet of Things; Industrial control systems and IoT; Big Data; Automation and software technologies; VR, AR and AI; Maintenance 4.0; Flexible production; Maturity models for Industry 4.0. Introduction to Advanced Manufacturing for Industry 4.0: Careers in Manufacturing; Finding a Career in Manufacturing; Manufacturing Companies; Planning and Staffing a Manufacturing Company; Manufacturing Processes; Computers in Manufacturing; Automation in Manufacturing. Computer-integrated manufacturing: Introduction to CIM; Overview of OpenCIM software; Parts and production flow; Storage configuration; Production planning; Process and machine definition; Part definition; Product part definition; Producing a new part; Timing and optimization; Viewing production details in the machine view; Viewing production details in the storage view; Defining part production in the lathe; Integrated production; Monitoring integrated production. Fundamentals of robotics for SCORBOT-ER4u: Introduction to robotics; Using robotic control software; Recording robot positions; Programming a simple pick-and-place task; Absolute and relative positions; Basic robotic programming tools; Block alignment project; Feeders and jigs; Peripherals; Linear wheelbase project; Encoders; Rolling and pitching; Programming the robot to perform linear movements; Programming the robot to perform circular movements. CNC milling technology: Introduction and safety; CNCMotion control software; Part set-up; Tooling; Reference positions; Program verification; Program execution; Basic principles of NC programming; Tool offset theory; Arc programming. CNC turning technology: Introduction and safety; CNCMotion Control software; Workpiece fixture; Tooling; Reference positions; Checking a program; Machining a workpiece; Introduction to NC programming; Taper programming; Taper machining; Arc programming; Machining with multiple tools.
References	Course resources will be available online.

Theory Topics

Week	Weekly Contents
1	Introduction to Industry 4.0
2	Introduction to Industry 4.0
3	Introduction to advanced manufacturing systems for Industry 4.0
4	Introduction to advanced manufacturing systems for Industry 4.0
5	Computer integrated manufacturing

Week	Weekly Contents
6	Computer integrated manufacturing
7	Computer integrated manufacturing
8	Midterm Exam
9	Robotics Basics
10	Robotics Basics
11	CNC milling technology
12	CNC milling technology
13	CNC lathe technology
14	CNC lathe technology