Code	INI385	Prerequisites	INE-354, INE-354L, ING-215, INM-377, INM-377L
Name	Process Automation	Co-requisites	INI-385L

Credits	Contact Hours
4	44
Categorization of credits	
Math and basic science	
Engineering topic	X
Other	

Coordinator's name	Prof. José Rafael Silva Archetti

Text book
Training, F., (2015), Installation of equipment and elements of industrial automation systems, IC Editorial. Perez et al, (2018), Automation systems and programmable automata 3rd edition, Marcombo. Piedrafita, R., (2004), Industrial automation engineering (2nd edition extended and updated), Spain, Ra-ma.
Other supplemental materials
Alvarez, D., (2015), Manual of hydraulics, pneumatics and PLC programming: Industrial automation, Mexico, Mexican Robotics and Mechatronics Association. D'Addario, M., (2017), Industrial Automation - Technology, Representation and Functions - Volume I, Createspace. Manufactured by: Made In Spain [TV series] (2013) Spain: Mediapro, Radiotelevisión Española.

Description	
Process automation is a project-oriented subject, where students will learn to develop control systems for the automation of industrial processes or improve existing ones. The student must employ design and troubleshooting methods to create or improve a small-scale industrial process that meets the needs, in order to manufacture a product automatically. It is important to know that the development of the project is carried out in different stages (mechanical, electrical and programming), which allows the student to develop technical skills such as: production line elaboration, design and installation of control systems, elaboration of ladder diagram and mnemonic code based on Programmable Logical Controllers (PLC) in order to automate a process.	
Type of course	Required ☒ Elective ☐

Specific goals for the course	
Outcomes of instruction	1. It defines the problem by identifying all the key internal aspects of it: objectives, metrics, flow of the process containing the

	problem, inputs and outputs of each stage of the process, among others. 2. It identifies all causes of the problem using complex techniques to find the causes of the problems or to validate them. 3. Select the best solution using complex methods (as needed), according to the problem definition and within multiple previously identified alternatives. 4. It elaborates sufficient arguments to justify the selected solution where a strong correlation between the arguments and the criteria established in the definition of the problem is evidenced. 5. Identifies production needs and transforms them into objectives, criteria and constraints with a high level of compatibility, making use of engineering tools, methods and/or systems. 6. It generates sufficient alternatives with a high level of correlation with established criteria and restrictions, in conformity with engineering sciences and taking into account health, welfare and safety. 7. Select the best alternative by effectively applying decision-making methodologies and based on established design constraints. 8. Create drawings, procedures, specifications, as well as other means of design communication, following general engineering standards or norms.
Student outcomes	SO1. Identifies, formulates and solves complex Engineering problems through the application of Engineering, Science and Mathematics principles. SO2. Apply and use the engineering design process to produce solutions that meet specific needs, taking into consideration public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics
Unit I. Introduction to Automation Unit II. Industrial Sensors Unit III. Industrial actuators Unit IV. Introduction to Pneumatics and Hydraulics V. PLC Based Control Unit