Philadelphia University, Faculty of Engineering and Technology

Mechatronics Engineering Department

Course Description Ms.c Program- Mechatronics Engineering

Course number	Course name	Credit hours	Description
0640711	Advanced Engineering Mathematics	3	Build on the undergraduate students' math knowledge in order to provide the necessary skills in analytical and computational mathematical methods to work in a scientific environment and solve engineering problems in research and development projects.
0640721	Industrial Mechatronics and Robotic Systems	3	The main objectives of this course are to introduce: 1. The different automation systems used in modern industry and the use of robots in soft automation ones. 2. The fundamental transformation techniques from different frames of reference and kinematic analysis of robots. 3. Robot dynamics. 4. Machine vision.
0640722	Mechatronics Systems Modeling and Simulation	3	This course covers three main areas: modelling, simulation, and identification. It presents several modelling methodologies that can be used for mechatronics systems. This will cover mathematical and graph models. Software tools, such as MATLAB/Simulink and/or LABVIEW, will be used to simulate the systems and analyze the responses. Also, an introduction to system identification will be provided

0640731	Advanced Control Theory	3	The course introduces advanced concepts in the theory, analysis and design of control systems.
0640732	Advanced Measurement Systems and Sensors	3	The course is based on mechatronic philosophy, regarding mechanic, electronic and informatics as a whole. After finishing the course the student should be able to: Analyze measurement- and control problems; Design and/or select the best suited sensors for a specified problem, regarding range, accuracy, dynamic behavior, environment requirements etc. ; Perform all necessary calculations regarding the sensor implementation and the analog and digital signal processing required.
0640751	Distributed and Embedded Real time Systems	3	Mechatronics is the merger of mechanics, electronics and computer concepts (interfacing and programming). This course involves computer interfacing and programming to control mechanical objects. In this course we will use a microcontroller or a field programmable chip (computer-on-a-chip) to interface with Mechatronics components such as switches, LED's, DC motors, stepper motors, relays, remote controls, and others. It will also present Personal Computers Interface (PCI) through Data Acquisition Cards (DAQ).

0640752	Advanced programming	3	Motivate Students' knowledge of Object Oriented Concepts (OOP). Teaching the knowledge and skills needed to develop reusable, quality programs. Using OOP to design and implement complex and realtime systems and to increase their proficiency in programming using available software Packages.
0640770	Research Methodology	3	The main aim of this course is to teach the students how to write thesis/research proposals. Therefore, the course provides the students with an opportunity to engage in research activities such as literature reviews, research planning, data analysis and reporting (written and oral) using a chosen mechatronics engineering research topic.
0640771	Master Thesis (Part 1)	6	The Master's thesis consists of the independent processing of a relevant engineering-based task from the field of mechatronics and the written representation of applied scientific methods and results. It should demonstrate that the candidate is able to work within a given period to such a task independently and that he or she can present the results clearly and understandably

0640772	Master Thesis (Part 2)	3	This is a research-oriented work that builds on Thesis I: The candidate is required to extend his Thesis I work (that was carried at a partner institution) and continue at his original institution. The type of research extension will be setup by the department and agreed upon at the end of Thesis I. This extension might include further analysis of results, modified algorithms with new simulation runs, and/or laboratory/industry application of developed work. The candidate will present his Thesis work to an examination committee selected by the department. The presentation should explain the research work and analyze its results. The candidate will then go through an oral examination regarding his work.