

# New Course Form

MET 230 Integrated Manufacturing Systems 3

**Originator:** Kenny Keith      **Status:** Approved      **Date Created:** 02/04/2013

**Department:** MET: Mechatronics      **Submitted:** 02/05/2013      **Completed:** 02/27/2013

**To ACETS:**

**Course Prefix:** MET

**Course Number:** 230

**Course Title:** Integrated Manufacturing Systems

**Cross-listing:** No

**Cross-listing  
information:**

**Semester for  
Implementation:** Fall

**Year of  
Implementation:** 2013

**Course Type:** Required Transfer Vocational

**Credit Hours:** 3

**Transfer Course:** BAS-articulation discussions are underway

**Course Catalog Description:** This course guides the student through the processes of interfacing and integrating manufacturing components and unit operations into useful systems.

**Rationale:** Mechatronics is about the synergistic integration of the multiple disciplines of mechanical, electrical/electronic, computer and process control engineering to improve manufacturing machines and processes. Mechatronic technicians will routinely work with systems that utilize unit operations that have been integrated horizontally through mechanical, electrical, electronic, and computer techniques and integrated vertically through software to form functional automatic systems and processes. This course guides the student through the process of creating simple integrated systems that are of a type that he or she is likely to encounter in the workplace.

**Total Lecture  
Contact Hours** 2  
**per Week:**

**Total Lab  
Contact Hours** 3  
**per Week:**

**Total Contact  
Hours:** 75

**Load Factor:** 4.1

**Requisites:** Yes

**Prerequisites:** MET 200 Robotics and Motion Control MET 220 Advanced PLC's CIS 141  
Managing and Maintaining Your PC I

**Co-requisites:**

**Mode of Instructional Delivery:** (1) Traditional classroom instruction (3) Hybrid: internet with live lab (5) Laboratory

**If "other" mode of instruction, specify:**

**Library Resources:** N/A

**Assessment of Student Learning - Methods:** (1) Written Examinations (3) Oral Presentations (5) Demonstration of Skills

**IF "other" assessment, specify:**

**Recommend Course Enrollment:** 15

**Credit by Examination:** No

**Literacy/ Critical Inquiry Component:** N/A

**Ethnic/ Gender Awareness:** N/A

**Sustainability:** No

**Sustainability (explanation):**

**COURSE TOPICS:** The student will work with conveyors, robots, PLCs, workstations, a CNC machine, and a bar code reader to create a pallet transfer system, a flexible manufacturing work cell, a robot-based inventory storage and retrieval system and a barcode pallet tracking system. System integration will be accomplished using digital I/O, ASCII RS-232 and RS-485 serial communications, and TCP/IP Ethernet networking. The course includes working with a Manufacturing Execution System (MES) and an Enterprise Resource Planning System (ERP) to implement Computer Integrated Manufacturing (CIM). The instructor will also assign integration and troubleshooting tasks to the student to be completed independently or with a team mate.

**COURSE OUTCOMES:** 1. Operate a PLC controlled flexible manufacturing system pallet transfer conveyor  
2. Design a PLC program to create sequential material flow on a pallet transfer

conveyor

3. Develop a PLC program to create sequential material flow on a pallet transfer conveyor

4. Implement a PLC program to create sequential material flow on a pallet transfer conveyor

5. Design wiring diagrams and programs to interface a PLC based pallet transfer system, a robot and a CNC machine to automatically supply parts and load a CNC machine

6. Develop wiring diagrams and programs to interface a PLC based pallet transfer system, a robot and a CNC machine to automatically supply parts and load a CNC machine

7. Implement wiring diagrams and programs to interface a PLC based pallet transfer system, a robot and a CNC machine to automatically supply parts and load a CNC machine

8. Operate an Automatic Storage and Retrieval System (ASRS)

9. Design PLC and robot programs and interfaces to an ASRS system to transfer raw and finished material between a conveyor and the ASRS

10. Develop PLC and robot programs and interfaces to an ASRS system to transfer raw and finished material between a conveyor and the ASRS

11. Implement PLC and robot programs and interfaces to an ASRS system to transfer raw and finished material between a conveyor and the ASRS

12. Design a robot program that exchanges data with a bar code reader using RS-232 serial communications

13. Develop a robot program that exchanges data with a bar code reader using RS-232 serial communications

14. Implement a robot program that exchanges data with a bar code reader using RS-232 serial communications

15. Configure multi-drop and point to point serial communications modules for a PLC

16. Design ASCII communications through a PLC communications channel

17. Develop ASCII communications through a PLC communications channel

18. Configure ASCII communications through a PLC communications channel

19. Implement ASCII communications through a PLC communications channel

20. Operate a bar code reader

21. Design a barcode tracking system using a PLC compare and sequencer compare instructions, an RS-485 communications network and a bar code scanner

22. Develop a barcode tracking system using a PLC compare and sequencer compare instructions, an RS-485 communications network and a bar code scanner

23. Configure a barcode tracking system using a PLC compare and sequencer compare instructions, an RS-485 communications network and a bar code scanner

24. Implement a barcode tracking system using a PLC compare and sequencer compare instructions, an RS-485 communications network and a bar code scanner

25. Describe Computer Integrated Manufacturing (CIM), Enterprise Resource Planning (ERP), Material Requirements Planning, Capacity Requirements Planning, Manufacturing Resource Planning, Inventory Management, Item

- Master, Storage Locations, Bill of Material, Manufacturing Execution System, Process Planning, Routing Sheet, Product Cost, Work Center, Work Center Cost, Product Cost, Manufacturing Order Management, Production Planning, Master Production Schedule, Work Center Capacity, and Contingency
26. Using an ERP system; create inventory locations, stock balances a bill of material, a routing sheet a product cost estimate, a work center cost database a product routing a manufacturing order, and a work center capacities entry to release, hold and close a manufacturing order
  27. Create a human machine interface of a computer integrated manufacturing process to simulate the production of a manufacturing order with enterprise requirements planning software
  28. Describe the functions, topologies, components, media, and operation of Ethernet local area networks (LAN)
  29. Describe the function operation and structure of TCP/IP
  30. Draw an Ethernet LAN using a wired hub and TCP/IP
  31. Configure an Ethernet LAN using a wired hub and TCP/IP
  32. Connect an Ethernet LAN using a wired hub and TCP/IP
  33. Test an Ethernet LAN using a wired hub and TCP/IP
  34. Transfer files, programs and messages between computers, a robot and an ASRS system.
  35. Use Ethernet to manually call inventory from an ASRS system
  36. Control a pallet transfer conveyor using ERP CIM software  
Monitor a pallet transfer conveyor using ERP CIM software
  37. Design a product using CIMSOFT to run the actual manufacturing process
  38. Build a product using CIMSOFT to run the actual manufacturing process
  39. Troubleshoot an integrated manufacturing process

**Proposer:** Kenny Keith