WILLIAM D. FORD
CAREER-TECHNICAL CENTER
Wayne-Westland Community Schools

2024-2025

Robotics, Electronics, and Manufacturing (Mechatronics) 2024-25

COURSE SYLLABUS-Year 2

Instructor: Stacey Barnard
Location: 36455 Marquette, Westland, MI 48185
Office Telephone Number: (734) 419-2059
AM Shift: 7:20 am - 10:05 am
PM Shift: 11:05 am - 1:50 pm

Google Classroom: Robotics, Electronics, & Engineering 2024-25
Class code:
Link:

School Year: 2024/2025
CIP: 14.4201 - Mechatronics
PSN:
Course Number: V7210EM, V7210, V2610, and V2620

Main Areas of Focus:
Workplace Safety
Employability Skills (Soft Skills)
Engineering Principles
Electronics
Robotics and Programming
Equipment Controls/Sensors
Additive and Subtractive Manufacturing
LEAN & 6 Sigma Processes
CAD/CAM
CNC and Metal Manufacturing

Course Description: The focus of this class is the multidisciplinary field of science called Mechatronics, which includes a combination of engineering, electronics, computer systems, & manufacturing. This includes robotics, 3D and digital design, logic controller languages, CNC, additive and subtractive manufacturing, LEAN and 6 Sigma Processes, workplace safety. The goal of this course is to provide a solid background in these different areas of engineering and manufacturing, giving the student the ability to enter the workforce or college with valuable skills. Jobs in this field are expected to grow rapidly in the next 10 years. With advancements in AI, robotics, electric vehicles, and engineering, there is a high demand in all industries for highly skilled workers who can develop, run, and troubleshoot these systems for industrial production and services.

Course Prerequisites: An interest in the Electronics, Robotics, Automation Engineering and Manufacturing Career Paths

Course Objectives:

•To enable the student to understand the modern mechatronics components;

•To present the working principles and alternatives for mechatronics systems design;

•To provide the student with the opportunity for hands-on experience with the related components of the technology in mechatronics;

•To develop the student's ability to evaluate appropriate technology, create and run workable industrial systems, and troubleshoot issues with design and equipment.

•To develop good engineering habits, along with fostering employability skills.

Course Textbooks/Materials:

- Delmar's Standard Textbook of Electricity 7th Edition - Stephen L. Herman
- Electrical Motor Controls for Integrated Systems 5th Edition - Rockis/Mazur
- Fanuc LR Mate R30iB & CRX-5iA R30iB Mate Plus Robot Controller Curriculums
- HAAS Manufacturing Curriculum Materials
- Starrett/Snap-On PMI Course Materials
- Tooling-U Online Courses

Grading and Evaluation: Grades will be based on the following:

- Competency Goals, such as hands-on practical learning through projects; these are matched to the state standards for competency.
- Academic Goals, such as written & digital assignments, along with quizzes & exams;
- Employability Goals, such as problem solving, teamwork, and responsibility;
- Attendance Goals, which include being in class and on time daily, ready to work;
- Other Goals, such as certification, etc.

A Weekly Goal Sheet will contain the plan/assignments/goals for each week, and the student will keep track of their progress in class. A sample copy is attached to this document. The weekly grades will be averaged from progress documented on the Weekly Goal Sheet and based on the work completed during the class.

Letter Grade	Percent Grade		Letter Grade	Percent Grade	
A+	99+		C+	79–77	
A	98–93		C	76–73	
A-	92–90		C-	70–72	
B+	89–87		D+	69–67	These grades
B	86–83		D	66–60	are considered not
B-	82–80		F	Below 60	passing @ Career Tech.

End of Program Assessment:
There will be an end of semester program assessment for both Semester One and Semester Two. Each assessment will include a test and/or a comprehensive project. There are also Precision Exams for Industry Credentials which will be given each semester.

Student Leadership
All students will apply their knowledge and leadership skills through classroom opportunities. The goal is for students to develop workplace competencies, such as teamwork, leadership, communication, critical thinking, and academic proficiency that are aligned with industry standards and expectations. Leadership skills are fostered by encouraging students to develop and participate in planning and decision-making, as well as executing "job" positions within the classroom. Students may also participate in individual contests with other Career Tech Centers and post-secondary institutions.

Absences and Make Up:

- Students will be awarded points weekly for attendance. There are 15 points available each week. Students are allowed 10 excused absences per semester with no consequences to their grade. Absences and tardies will affect the point total in the weekly grades. Absences for school related events do not count against this total.

- Students should contact Ms. Barnard by email (barnards@wwcsd.net) if they are going to be absent. Students should also inform Ms. Barnard ahead of time if there is a school-related function that they will be attending.

- Students will be allowed to make up all possible work. It is the responsibility of the student to obtain and complete all missed assignments, and Ms. Barnard will be available to assist the student to understand the missed material. On occasion, certain kinds of school work such as labs or skill practice sessions cannot be made up and, as a result, may negatively impact a student's grade. However, all efforts will be made to assist students in keeping up with and making up classwork/experiences.

- Long term/major projects/paperwork assigned prior to an absence – Work is due on the day the student returns to class.

- Daily work is given a one-day grace period for each day missed (Ex. If a student is absent on Monday, make-up work is provided on Tuesday, and would be due on Wednesday.)

- Test/quiz dates will be announced no less than one week prior to test day. Review sheets for these assessments will be given days ahead of the test. If a student is absent on test/quiz day, they will be expected to take the test on the day that they return.

- Students who are out for 3 or more days in a row will need to make arrangements with Ms. Barnard concerning the due dates and course of action for catching up in the program.

Late Work:

- Assignments turned in after the due date may have points deducted for each day late.
- No late work will be accepted after a card marking or semester ends.

Progress and Help

- Grades will be updated weekly on Student Connect. It is your responsibility to check and make sure you are on track for the grade you want. Checking grades is also part of the Weekly Goal Sheet. No special extra credit assignments will be available to "fix" your grade at the end of the marking period.

- I am available to answer questions via EMAIL most days after school until 7:00 p.m. After 7, you will receive a reply the next day. My school email is: barnards@wwcsd.net.

Course Policies & Expectations

- Each shift has a scheduled 15-minute break period. Break periods will be taken in a designated area of the room, due to safety protocols. (*Please note: Breaks are optional; instructor may decide to waive break time if they deem necessary.)*

- Breakfast/Lunch cannot be eaten during class time. Snacks can be eaten during break time. This is for safety reasons. **CAPPED containers of WATER** are ok at the electronic tables, the machine shop, or when working with robots. Soda and other sticky liquids ARE NOT permitted when working with anything electronic/mechanical.

- Bathroom passes are on an as needed basis. As long as this policy is respected, students will not have restrictions placed on bathroom usage.

- Cell phone use is not allowed while class is in progress at any time. Cell phones may be used during the 15-minute break only. Earbuds and headphones are **NEVER** allowed in the machine shop or while using any machine in the classroom. **THIS IS A SAFETY ISSUE!!**

- Students will be required to wear long pants and closed toe shoes when working on projects with ANY machines and tools in the classroom. There are no exceptions to this, as it is a safety rule and the industry expectation.

- Please use appropriate language in the classroom. Swearing, slurs, derogatory slang, etc. are not allowed here.

- Understand that there are places in the room that are off limits to students, like my desk and my office. If you need something, please ask--I am willing to share anything you need.

- A Student Center is provided at the front of the room with supplies for student use. If supplies need to be replenished, let Ms. Barnard know.

- This is a **One Year Program**, with the possibility of a 2nd year program for 11th graders wishing to return. Students who are not participating in class or are unable to grasp the material will be asked not to return. You must maintain a C or better during the first year to be considered for a 2nd year in the program.

- AII students are expected to follow all policies and procedures in the William D Ford Career Technical Student Handbook.

Certificates that may be awarded:

- Precision Measurement Instrument Certification (Snap-On) - 6 certificates available
- Certificate of Completion from Tooling-U - multiple certificates are available for a variety of disciplines and learning objectives
- OSHA-10 Certification
- FANUC Robotics Certification
- Precision Exams for various competencies (Engineering, Electronics, Robotics, Manufacturing)
- Other Certifications as they become available
- **Students who are not participating in class/are unable to keep a C average in class will not be eligible for certification tests.**

Work Based Learning:
Work Based Learning is a valuable experience in which every student in Career Technical Education is required to participate. Students will be given opportunities to attend a minimum of one field experience each school year. Those students who do not attend the scheduled experience(s) will be required to find a site where they will spend a minimum of one class period in a business related to their program of study. The student will be required to get the teacher's signed permission, the parent/guardian's signed permission, fill out a training agreement to be signed by the site supervisor, and provide their own transportation to and from the site. Upon completion of the field experience, the student will turn in a question and answer assignment provided by the teacher regarding the experience.

CTSO or Leadership Expectations:
SME affords us opportunities to compete with other schools in the Student Summit in October. Students are also encouraged to participate in our FIRST Robotics Chapter.

Post-Secondary Articulated Credit:
Students may be eligible to receive free college credit for William D. Ford courses they have successfully completed. The qualifications and number of college credit hours available varies by program and the college with which it is affiliated.

Topics To Be Covered

Semester 1:
1. Safety Training & Skills
2. Engineering Principles in Mechatronics Concepts and Processes
3. Blueprints/Schematics/Drafting
4. Precision Measurement Training & Certification (Snap-On) - Gage, Dial Gage, Angle Msmt.
5. AC/DC Electronics and Magnetism - Advanced
6. Electrical Troubleshooting and Repair
7. Prototype and Design Circuits from Scratch
8. CAD (Computer Aided Design) and Programming

(Competencies A1, A2, A4, A5, B1, B2, C2, C3, D1, D3)

Semester 2:

1. Programming/Coding Industrial Robots (FANUC)
2. Logic Controllers & Axis Theory
3. Electronics/Sensors for Industrial Robots
4. Fluid Power/Pneumatics & Hydraulics (using the Amatrol Trainers)
5. Material Science
6. Manufacturing Engineering
7. PLC/Manufacturing technology
8. Setup/Program/Troubleshoot/Operate CNC Machinery
9. LEAN and 6 Sigma Manufacturing Processes
10. CAD (Computer Aided Design) and Programming/3-D Printing

(Competencies A3, C1, C4, C5, D2, D4)

Ongoing/Employability Skills to be Practiced:

1. Communication (Speaking and Written)
2. Teamwork and Collaboration
3. Critical Thinking and Problem Solving
4. Leadership Initiative and Enterprise
5. Perseverance and Strong Positive Attitude
6. Self-Management and Flexibility
7. Professionalism and Strong Work Ethic
8. Technology and Information Use
9. Time Management, Planning and Organization
10. Instruction, using Expertise on Specific Topics

Mechatronics I & II - 2024-25

PLEASE FILL IN AND RETURN THIS PAGE TO MS. BARNARD ASAP.

I periodically send out informational or reminder emails or text messages to students and parents. Please supply your best contact information below. Thank you for your assistance.

Students Name (first and last): _____

Student cell phone number (if available): _____

Student email address: _____

FOR THE STUDENT--Which form of communication would you prefer? (check one):

☐Cell Phone ☐Email ☐Both

Parent/Guardian Name (first and last): _____

Best parent phone number to call: _____

Parent email address: _____

FOR THE PARENT--Which form of communication would you prefer? (check one):

☐Cell Phone ☐Email ☐Both

I, _____, have read and understand the Course
(student name)
Syllabus and Course Policies and Expectations for my William D Ford Technology Center course. I understand that it is expected that I follow all class and school policies listed herein. If I choose not to follow all class and/or school policies, I will be held accountable for my actions.

_____ _____
Student Signature Date

_____ _____
Parent/Guardian Signature Date