COURSE DESCRIPTION:
CIP Code: 14.4201

The KCTC Advanced Mechatronics program is designed to meet the growing needs of our local manufacturing industries. The second year will build off the current first year curriculum while focusing on college and career readiness during first semester and work-based learning in the second semester. The Advanced Mechatronics class will only be offered during third session where six spots are available. Students will deepen their knowledge of Robotics and Programmable Logic Controllers (PLC). This knowledge will prepare them for a successful future working with automation and manufacturing industries.

PREREQUISITE:
• KCTC Mechatronics (first year)

CORE SKILLS NEED BY EVERY WORKER
• Problem Solving
• Personal Management

• Career Planning
• Teamwork

CAREER PREPARATION EXPERIENCES
• College Expo
• Business and Industry Expo

• Field Trips
• Practice Presentations and Interviews with business and industry members
• Work Based Learning

COURSE STANDARDS
• SAFETY AND HEALTH
• INSTRUMENTATION AND MEASUREMENT
• MECHANICAL COMPONENTS AND SYSTEMS
• COMPUTER AND CONTROL SYSTEMS
• EQUIPMENT CONTROLS AND SENSORS
• COMPUTER AIDED DESIGN (CAD)
• BASIC MACHINING/ CNC EQUIPMENT
• MECHATRONICS CONCEPTS AND PRINCIPLES
• ELECTRICAL COMPONENTS & SYSTEMS
• HYDRAULIC/PNEUMATIC COMPONENTS & SYSTEMS
• DIGITAL ELECTRONICS FUNDAMENTALS AND PLC’S
• BLUE PRINT READING / SCHEMATICS
• ROBOTICS
• CAREER AND EMPLOYABILITY

CLASSROOM PROCEDURES:
➢ A code of conduct (cooperation) is created by each class.
➢ Students will participate and cooperate in class activities.
➢ Students must treat self, others, and equipment with respect.
➢ Students need to request permission from instructor and sign out before leaving classroom. Only one person may be gone at a time.
➢ KC/TC Responsible Thinking Process is utilized in classroom management.
ATTENDANCE:
The Tech Center mimics the world of work. Students are asked to call or email their teacher for themselves in absence situations. Parents may see absences through PowerSchool and will be notified of excessive absences.

LATE WORK AND MAKEUP WORK:
Late work will be handled using through communication with student, parent, and teacher while following the guidelines of the RTC process. All assignments must be turned in prior to the end of the quarter in which they were assigned. A final due date for each quarter will be set by the Instructor. Any assignments that are not completed by this date will be marked 0 (E). The instructor will set due dates for some assignments during the quarter. Assignments turned in after the set due date, but before the end of the quarter due date, will be marked down 15% from the graded score.

Students who need to makeup work must communicate with the instructor to setup a plan.

ASSESSMENT/TESTING:
Students will be provided every reasonable opportunity to show their best work on assessments. Students may retake tests as necessary to demonstrate their competency. Students may be required to stay after class or come back to KCTC to retake tests under certain circumstances.

Performance Assessments will be given from the student's employer for the Work Based Learning experience during second semester.

RESOURCES:
Power School: powerschool.kentisd.org/public
Mind Sight: kctcmechatronics.labvoltelelearning.com
G-mail: (firstname.lastname)@kentisd.net
Moodle: www.moodle.kentisd.net

GRADING:
KCTC supports grading practices that are consistent, accurate, meaningful and supportive of learning.

KCTC grades are reported in two ways – Semester grades (A, B, C, D, E) and a year-end Certificate identifying a proficiency level on each course standard.

KCTC issues grades on a quarterly (9 week) basis. This quarter grade is composed of 70% Technical skills and 30% Career and Employability skills.

The semester grade is determined by combining the two quarterly grades, the semester industry evaluation, and the embedded academic content within a course. Each quarter counts for 42% of the grade, the industry evaluation counts for 10% of the grade, and the academic content counts for 6% of the grade. When viewing grades on PowerSchool, it is always important to look at the S1 or S2 grade as the overall in-progress grade for the course.

Technical skill grades are issued on assignments and assessments which represent a total number of points earned. This total number determines a percentage of points earned and a letter grade is assigned accordingly. Assignments and assessments in this type of grading are categorized as either formative or summative. Formative work guides learning. Summative work measures how well something has been learned. Summative work is weighted more than formative work. Students may earn the opportunity to redo or retake summative assignments and assessments. These retakes must be completed by the end of each quarter.

Students will be issued Career and Employability summative scores at least twice per quarter to provide feedback on the skills of Teamwork, Problem Solving, and Personal Management. Students will also
earn scores in Career Planning. The combination of these scores will determine the Career and Employability skills grade.

Pre and Post Testing – at times, students will be asked to complete pre-instruction assessments to aid the teacher in designing learning. These pre-assessments will be scored, but they will not affect the student grade. It is important for a student to make their best attempt on a pre-instruction assessment to help the teacher design appropriate instruction. After instruction the student will complete a post-instruction assessment to determine how well they learned the skill. This will be scored and will affect the student grade.

Additionally, scores are issued to students to reflect the proficiency level they have achieved on particular Industry Standards. The Standards scoring scale: 0 – Not attempted or Minimal Knowledge, 1 – Beginning Proficiency, 2 – Developing Proficiency, 3 – Proficient (meets industry standard), and 4 – Advanced Proficient. Students will also be issued a quarterly Standards score (0 – 4) in the Career and Employability skill areas of Teamwork, Problem Solving, Personal Management, and Career Planning. At the end of each year, students will be issued a Standards score (0 – 4) in the area of career writing proficiency and math proficiency as well. These scores are reported on the year-end Certificate which is used by employers to assess industry skill levels.

### NINE WEEK GRADING POLICY:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>*Foundation / technical Skills</td>
<td>70%</td>
</tr>
<tr>
<td>Career and Employability Skills</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

### SEMESTER GRADING POLICY

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First Nine Weeks</td>
<td>42%</td>
</tr>
<tr>
<td>Second Nine Weeks</td>
<td>42%</td>
</tr>
<tr>
<td>Embedded Math Credit</td>
<td>6%</td>
</tr>
<tr>
<td>Evaluation (interview or project presentation)</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

*70% Foundation / Technical Skill is broken into two areas: Assessments =50%, Homework = 20%
**Grading Scale:**

<table>
<thead>
<tr>
<th>Rubric Average Range*</th>
<th>Score out of 100 to enter into Gradebook</th>
<th>Description</th>
<th>Standard Score</th>
<th>Letter grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.50</td>
<td>4.00</td>
<td>Advanced</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>3.25</td>
<td>3.49</td>
<td>Proficient</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>3.00</td>
<td>3.24</td>
<td>Proficient</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>2.80</td>
<td>2.99</td>
<td>Proficient</td>
<td>3</td>
<td>A-</td>
</tr>
<tr>
<td>2.51</td>
<td>2.79</td>
<td>Proficient</td>
<td>3</td>
<td>B+</td>
</tr>
<tr>
<td>2.31</td>
<td>2.50</td>
<td>Proficient</td>
<td>3</td>
<td>B</td>
</tr>
<tr>
<td>2.11</td>
<td>2.30</td>
<td>Proficient</td>
<td>3</td>
<td>B-</td>
</tr>
<tr>
<td>1.91</td>
<td>2.10</td>
<td>Developing</td>
<td>2</td>
<td>C+</td>
</tr>
<tr>
<td>1.71</td>
<td>1.90</td>
<td>Developing</td>
<td>2</td>
<td>C</td>
</tr>
<tr>
<td>1.50</td>
<td>1.70</td>
<td>Developing</td>
<td>2</td>
<td>C-</td>
</tr>
<tr>
<td>1.25</td>
<td>1.49</td>
<td>Beginning</td>
<td>1</td>
<td>D+</td>
</tr>
<tr>
<td>1.00</td>
<td>1.24</td>
<td>Beginning</td>
<td>1</td>
<td>D</td>
</tr>
<tr>
<td>0.75</td>
<td>0.99</td>
<td>Beginning</td>
<td>1</td>
<td>D-</td>
</tr>
<tr>
<td>0.50</td>
<td>0.74</td>
<td>Minimal knowledge</td>
<td>0</td>
<td>E</td>
</tr>
<tr>
<td>0.01</td>
<td>0.49</td>
<td>Minimal knowledge</td>
<td>0</td>
<td>E</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Minimal knowledge</td>
<td>0</td>
<td>E</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>Student did not Attempt</td>
<td>0</td>
<td>E</td>
</tr>
</tbody>
</table>

**Tardy Procedure:**

To gain the most from this course and encourage good employability readiness, it is strongly recommended that daily attendance and timeliness be observed. If a student’s tardiness becomes chronic, the RTC process will be used to resolve the problem.

**Internships and Job Shadows:**

Students may have the opportunity to complete an internship or a job shadow during the course. In addition, job recommendations and placement through student services are possible.

**Work Based Learning:**

Students are expected to participate in Work Based Learning during the second semester. Students will be expected to transport themselves to the place of employment either by driving or a ride from their parents.

**Articulation:**

College credit may be offered to students who complete the program with a grade of 84% or higher. Please speak with your instructor about your plans for college and career.
DIRECT CREDIT:
Ferris State University--Concurrent Enrollment--MECH 250 (2 cr.)
Mechatronics students can apply to be concurrently enrolled during 2nd semester in MECH 250--Fluid Power with Controls. (See KCTC MECH 250 Spring 2015 Syllabus for details).

HIGH SCHOOL CORE CREDIT:
Students who complete the Mechatronics program may be eligible to receive high school credit in Mathematics and Science. For more information on the eligibility requirements and application process, talk to your KCTC or high school counselor.

CERTIFICATIONS:
Fanuc Robotics

STUDENT ORGANIZATIONS:
Students may choose to participate in:
- Skills USA
- National Technical Honors Society (NTHS)

Topics:

Robotics:
- Develop further programming skills
- Frames -
- Fundamentals

PLCs:
- Inputs and outputs (How to work in program)
- Trouble shooting
- Ethernet
- Introduction to HMI
- Vision Systems

Other:
- Servos - Drives
  - Steppers
  - Linear Actuators
- Arc Flash - Safety
- Lean (certs)
- Schematics & Technical Documents
- Access “Call” Tech Support