CURRICULUM COMMITTEE CHECKLIST

NAME OF PROGRAM: Mechatronics

Date: 4/28/14

Step 1 Reviewed change at division meeting.

YES [X] NO [ ]

Step 2 Presented as informational item at Division Chair Meeting(s) and checked if it affects other departments. Like programs must meet with Division Chairs on all affected campuses (North Mankato and Faribault).

Division Chair’s signature: [Signature]

Step 3 Instructional Dean reviewed and indicated need for Curriculum Committee approval.

Instructional Dean’s signature: [Signature]

Step 4 Advisory Committee approval indicated in meeting minutes if necessary. Minutes provided to Curriculum Committee.

Step 5 Curriculum Committee made recommendations (changes, additional approvals, etc.). If no, skip to Step 7.

Step 6 Committee’s recommendations completed. (Skip if not applicable.)

Step 7 Curriculum Committee approved.

Curriculum Committee Chair’s signature: [Signature]

Step 8 Minutes and necessary materials provided to VP of Academic Affairs.

Step 9 Vice President of Academic Affairs approved.

Vice President of Academic Affairs’ signature: [Signature]

Step 10 New Course Maximum Enrollment to Shared Governance.

Step 11 President’s approval for all changes requiring MnSCU approval.

President’s signature: __________________________
New Program or Program Change Proposal Form

Date of Proposal: May 2014

Authors: David Ewel & Doug Laven

Proposal Type: New Program

Program Name: Mechatronics Industrial Maintenance Certificate of Training

CIP Code: 15.040601

Division in Which Program is Currently or Will Be Held: Technical Careers

Proposal Start (Term/Year): Fall 2014

Program Description: This 19 credit certificate is designed to prepare learners to enter the Industrial Maintenance field in an entry-level position and to enhance the skills of those already employed in the field. This certificate will allow successful learners to be proficient in many different areas including plant safety, reading technical drawings, mechanical drives, bearings, lubrication, alignment, pneumatics, industrial electricity, motor controls, boilers and welding. This stackable certificate allows a pathway for learners to continue their education in Mechatronics.

Degrees Offered: AS AAS AA Diploma Certificate

Program Location: Faribault Campus North Mankato Campus Online

Prerequisites: None

Number of Credits: 19

If There is a Program Change, Summarize Changes to the Program: While credits remained the same, the courses required to complete the program were changed based on industry requests.

Rationale for Program Development or Program Change: As part of the Advanced Manufacturing Partnership (AMP) work being done, an examination was done on the content, structure, and sequence of courses and programming in Mechatronics. Additionally, this program is designed as a Fast Track option in conjunction with Adult Basic Education and needed to be revised to meet those needs.

What Impact Will this New Program or Change Have on Other Programs or Areas? One CIM course was removed in the redesign; otherwise no effect on any programs outside of Mechatronics.

Are There Articulations With Other Colleges? List College(s): No

- Attach Program Design to this Form. Below are Some Recommended Items:
  a. List of program requirements (i.e.: what the catalog page shows for each program).
  b. Cross walk from previous program curriculum to new (how students already started in the old program can finish after this new program begins).
  c. All required course numbers and titles.
  d. Additional supporting information, such as minutes documenting recommendation for proposal.
## NEW
Mechatronics Industrial Maintenance Certificate of Training
- 19 credits

<table>
<thead>
<tr>
<th>1st Year Fall</th>
<th>Course Number and Description</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MATH120 College Algebra or</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH1050 Technical Math</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA1122 Electricity - Devices and Circuits I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA2120 Fluid Power 1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>SEMESTER TOTAL</strong> 9</td>
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<table>
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<th>Course Number and Description</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MECA1223 Mechanical Systems 1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA1240 Quality Concepts in Manufacturing</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MECA1250 Mechatronics System Operations I (PLCs)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA2240 Senior Project</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>SEMESTER TOTAL</strong> 10</td>
</tr>
</tbody>
</table>

**PROGRAM TOTAL** 19

Courses removed: MECA 1140, MECA 1220, CIM 2250

## OLD
Mechatronics Industrial Maintenance Certificate of Training
- 19 credits

**Required Technical Courses (7 Courses)**
Complete the following courses: NOTE: MECA 1150 Boiler Operation Principles may be substituted for 1 credit of MECA 2240. Please see your advisor for assistance.

- MECA1122 Electricity - Devices and Circuits I (3 Credits)
- MECA1140 Introduction to Geometric Dimensioning & Tolerancing (1 Credit)
- MECA1220 Mechanical Systems (3 Credits)
- MECA1240 Quality Concepts in Manufacturing (2 Credits)
- MECA2120 Pneumatics Systems (3 Credits)
- MECA2240 Senior Project (5 Credits)
- CIM 2250 Applied Welding (2 Credits)
New Program or Program Change Proposal Form

Date of Proposal: May 2014
Authors: David Ewel & Doug Laven

Proposal Type: New Program
Contact for the Program: Dave Ewel or Doug Laven

Program Name: Intermediate Mechatronics Engineering Technology – Diploma of Occupational Proficiency
CIP Code: 15.040600

Division in Which Program is Currently or Will Be Held: Technical Careers

Proposal Start (Term/Year): Fall 2014

Program Description: Mechatronics is a relatively new and rapidly growing field that integrates electronics, mechanics, pneumatics, hydraulics, and computer control systems to create new and improved automated manufacturing production systems. This program is designed for people who are interested in plant maintenance, set up, installation, and assembly. These jobs are found in medical, electronics, agriculture, biotechnology, and automotive industries.

Degrees Offered: AS AAS AA Diploma [✓] Certificate
Program Location: Faribault Campus [✓] North Mankato Campus [✓] Online

Prerequisites: None

Number of Credits: 39

If There is a Program Change, Summarize Changes to the Program: The courses required to complete the program were changed based on industry requests, and set up to create stackable credentials from the Certificate to the Diploma to the AAS Degree.

Rationale for Program Development or Program Change: As part of the Advanced Manufacturing Partnership (AMP) work being done, an examination was done on the content, structure, and sequence of courses and programming in Mechatronics. This is one component of the changes desired by industry.

What Impact Will this New Program or Change Have on Other Programs or Areas? None

Are There Articulations With Other Colleges? List College(s): No

Attach Program Design to this Form. Below are Some Recommended Items:
- List of program requirements (i.e.: what the catalog page shows for each program).
- Cross walk from previous program curriculum to new (how students already started in the old program can finish after this new program begins).
- All required course numbers and titles.
- Additional supporting information, such as minutes documenting recommendation for proposal.
**NEW**
Intermediate Mechatronics Engineering Technology – Diploma of Occupational Proficiency
- 39 Credits

<table>
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<tr>
<th>1st Year Fall</th>
<th>Course Number and Description</th>
<th>Diploma</th>
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</thead>
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<tr>
<td></td>
<td>MATH120 College Algebra (4) or</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH1050 Technical Math</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS101 Introductory Physics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA1122 Electricity - Devices and Circuits 1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA1000 Introduction to Mechatronics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MECA2120 Fluid Power 1</td>
<td>3</td>
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**SEMMESTER TOTAL** 15

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<th>Diploma</th>
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</thead>
<tbody>
<tr>
<td>MECA1223 Mechanical Systems 1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA1240 Quality Concepts in Manufacturing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MECA1222 Electricity - Devices and Circuits 2</td>
<td>3</td>
<td></td>
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<tr>
<td>MECA1250 Mechatronics System Operations 1 (PLCs)</td>
<td>3</td>
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</tr>
<tr>
<td>MECA2130 Hydraulics</td>
<td>3</td>
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**SEMMESTER TOTAL** 14

<table>
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<th>2nd Year Fall</th>
<th>Course Number and Description</th>
<th>Diploma</th>
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<tbody>
<tr>
<td>MECA2123 Mechanical Systems 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA2150 Mechatronics System Operations 2</td>
<td>3</td>
<td></td>
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<tr>
<td>ENGL100 Composition</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**SEMMESTER TOTAL** 10

**PROGRAM TOTAL** 39

Courses removed: MECA 1131, MECA 1220
OLD
Intermediate Mechatronics Engineering Technology – Diploma of Occupational Proficiency
• 39 credits

Required Technical Courses (11 Courses)
Complete the following courses:

MECA1000Introduction to Mechatronics (3 Credits)
MECA1122Electricity - Devices and Circuits I (3 Credits)
MECA1131Computer Applications (3 Credits)
MECA1222Electricity - Devices and Circuits II (3 Credits)
MECA1223Mechanical Systems 1 (3 Credits)
MECA1240Quality Concepts in Manufacturing (2 Credits)
MECA1250Mechatronics Systems Operations I (3 Credits)
MECA2120Pneumatics Systems (3 Credits)
MECA2123Mechanical Systems 2 (3 Credits)
MECA2130Hydraulics (3 Credits)
MECA2150Mechatronics Systems Operations II (3 Credits)

Required Liberal Arts and Sciences (2 Courses)
Choose the following courses:

ENGL100Composition (4 Credits)
PHYS101Introductory Physics (3 Credits)
New Program or Program Change Proposal Form

Date of Proposal: May 2014
Authors: David Ewel & Doug Laven

<table>
<thead>
<tr>
<th>Proposal Type:</th>
<th>New Program</th>
<th>Program Redesign</th>
<th>Suspend Program</th>
<th>Reinstall Program</th>
<th>Add Emphasis</th>
<th>Delete Emphasis</th>
</tr>
</thead>
</table>

Contact for the Program: Dave Ewel or Doug Laven

Program Name: Mechatronics Engineering Technology AAS Degree
CIP Code: 15.040600

Division in Which Program is Currently or Will Be Held: Technical Careers

Proposal Start (Term/Year): Fall 2014

Program Description: Mechatronics is a relatively new and rapidly growing field that integrates electronics, mechanics, pneumatics, hydraulics, and computer control systems to create new and improved automated manufacturing production systems. This program is designed for people who are interested in plant maintenance, set up, installation, and assembly. These jobs are found in medical, electronics, agriculture, biotechnology, and automotive industries.

<table>
<thead>
<tr>
<th>Degrees Offered:</th>
<th>AS</th>
<th>AAS</th>
<th>AA</th>
<th>Diploma</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Location:</td>
<td>Faribault Campus</td>
<td>✔️</td>
<td>North Mankato Campus</td>
<td>✔️</td>
<td>Online</td>
</tr>
</tbody>
</table>

Prerequisites: None

Number of Credits: 60

If There is a Program Change, Summarize Changes to the Program: The courses required to complete the program were changed based on industry requests, and set up to create stackable credentials from the Certificate to the Diploma to the AAS Degree.

Rationale for Program Development or Program Change: As part of the Advanced Manufacturing Partnership (AMP) work being done, an examination was done on the content, structure, and sequence of courses and programming in Mechatronics. This is one component of the changes desired by industry.

What Impact Will this New Program or Change Have on Other Programs or Areas? None

Are There Articulations With Other Colleges? List College(s):

- Attach Program Design to this Form. Below are Some Recommended Items:
  a. List of program requirements (i.e.: what the catalog page shows for each program).
  b. Cross walk from previous program curriculum to new (how students already started in the old program can finish after this new program begins).
  c. All required course numbers and titles.
  d. Additional supporting information, such as minutes documenting recommendation for proposal.
NEW
Mechatronics Engineering Technology – Associate of Applied Science Degree
- 60 credits

<table>
<thead>
<tr>
<th>1st Year Fall</th>
<th>Course Number and Description</th>
<th>A.A.S.</th>
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</thead>
<tbody>
<tr>
<td>MATH 120 College Algebra</td>
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<td></td>
</tr>
<tr>
<td>PHYS101 Introductory Physics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA1122 Electricity - Devices and Circuits I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA1000 Introduction to Mechatronics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA2120 Fluid Power 1</td>
<td>3</td>
<td>Name changed</td>
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<td><strong>SEMSETER TOTAL</strong></td>
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<table>
<thead>
<tr>
<th>1st Year Spring</th>
<th>Course Number and Description</th>
<th>A.A.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECA1223 Mechanical Systems 1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA1240 Quality Concepts in Manufacturing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MECA1222 Electricity - Devices and Circuits 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA1250 Mechatronics System Operations I (PLCs)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA2130 Hydraulics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>SEMSETER TOTAL</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>2nd Year Fall</th>
<th>Course Number and Description</th>
<th>A.A.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECA2123 Mechanical Systems 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA2150 Mechatronics System Operations 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGL100 Composition</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MECA2235 Robotics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MECA2110 Sensors and Controls</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>SEMSETER TOTAL</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd Year Spring</th>
<th>Course Number and Description</th>
<th>A.A.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECA2250 Mechatronics System Operations III</td>
<td>3</td>
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</tr>
<tr>
<td>MECA2115 SolidWorks 2</td>
<td>3</td>
<td>Course added</td>
</tr>
<tr>
<td>MECA2240 Senior Project</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ENGL240 Technical Writing</td>
<td>4</td>
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</tr>
<tr>
<td><strong>SEMSETER TOTAL</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
</tbody>
</table>

**PROGRAM TOTAL**  60

Liberal Arts and Science Total  15

Courses removed: MECA 1131
OLD
Mechatronics Engineering Technology – Associate of Applied Science Degree
- 60 credits

Required Technical Courses (15 Courses)
Select the following courses:

MECA1000 Introduction to Mechatronics (3 Credits)
MECA1122 Electricity - Devices and Circuits I (3 Credits)
MECA1131 Computer Applications (3 Credits)
MECA1222 Electricity - Devices and Circuits II (3 Credits)
MECA1223 Mechanical Systems 1 (3 Credits)
MECA1240 Quality Concepts in Manufacturing (2 Credits)
MECA1250 Mechatronics Systems Operations I (3 Credits)
MECA2110 Sensors and Control (3 Credits)
MECA2120 Pneumatics Systems (3 Credits)
MECA2123 Mechanical Systems 2 (3 Credits)
MECA2130 Hydraulics (3 Credits)
MECA2150 Mechatronics Systems Operations II (3 Credits)
MECA2235 Robotics & Industrial Automation (3 Credits)
MECA2240 Senior Project (1 - 5 Credits)
MECA2250 Mechatronics Systems Operations III (3 Credits)

Required Liberal Arts and Sciences (4 Courses)
To earn an AAS degree, students must complete 15 MNTC credits in 3 of the 10 MNTC goal areas.
The following courses are required:
ENGL100 Composition (4 Credits)
ENGL240 Technical Communication (4 Credits)
PHYS101 Introductory Physics (3 Credits)
MATH120 College Algebra (4 Credits)
Appendix B

Course Change Proposal Form

Date of Proposal: April 22, 2014
Author: David Ewel

Proposal Type: New-Course
(=*Modify Course   Delete Course
Contact for the Course: David Ewel

Course Designator, Number and Title (i.e.: ACCT 1800, Business Law): MECA2120 Pneumatics Systems

Number of Credits: 3

Prerequisites: None.

Course Description: This course provides the basics of pneumatically operated devices and the systems found in modern industrial machinery and automation. Topics include proper safety procedures, basic laws of fluid mechanics, standard symbols, pumps, control valves, control assemblies, actuators, maintenance procedures, and switching and control devices. At the completion of this course, the student will be able to apply basic laws of fluid mechanics to design and specify characteristics of a pneumatic system; select and size actuators and control valves, and match the pneumatic components with its ANSI symbol. Upon completion of this course, the student should be able to identify long-term symptoms associated with a lack of preventive maintenance of pneumatic components while demonstrating good safety practices including lock out procedures. Technical writing skills and safety procedures will be implemented throughout the course. (Prerequisites: None)

Grading Method: Grade Pass/Fail
Scheduling: Fall Spring Summer Alternate Years Variable On-Demand
Instructional Type: Lecture (2) Lab (1) Lecture/Lab Internship Seminar

(=*Class Maximum: (For New Courses Only) / All Unlimited faculty members of a program or discipline must sign.

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Faculty Signature</th>
<th>Class Max</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>48 Lecture</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>24 Lab</td>
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<td></td>
<td></td>
<td>48 Lecture</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 Lab</td>
<td></td>
</tr>
</tbody>
</table>

Dean's Name: Dean's Signature Date

If there is not enough space provided, please use the back of this form for additional signatures or click on a row with the right button of the mouse, select insert and then select insert rows below to add rows to the table.

Is this Course Proposed as a Liberal Arts Course: Yes No

If Yes, Which MnTC Area/Areas Will it Fulfill (http://www.mntransfer.org)?

Is This Course a Requirement/Elective for a Specific Program or Programs? Yes No

If Yes, Which Program(s)? Mechatronics Engineering Technician Program
Describe What is Changing/Being Added, and the Rationale:

Change Name:

Was: MECA2120 Pneumatics Systems
Now: MECA2120 Fluid Power 1

What Impact Will This New Course or Change Have on Other Programs or Areas? None.

> Attach Common Course Outline to this Form.
New Course or Course Change Proposal Form

Date of Proposal: May 2, 2014
Author: David Ewel & Doug Laven
Proposal Type: (*)New Course Modify Course ☒ Delete Course
Contact for the Course: David Ewel or Doug Laven
Course Designator, Number and Title (i.e.: ACCT 1800, Business Law): MECA 2115 – SolidWorks II
Number of Credits: 3
Prerequisites: None

Course Description: Student will advance their SolidWorks skills beyond core concepts of parts, assemblies and drawings. Learning outcomes are designed to prepare students in the more advanced concepts evaluated in the Certified SolidWorks Associate Exam in areas such as: Advanced Parts, Advanced Assemblies, Advanced Surfacing, Sheet Metal, Routing and Simulation. (Prerequisite: None)

Grading Method: Grade ☒ Pass/Fail
Scheduling: Fall Spring ☒ Summer Alternate Years Variable On Demand
Instructional Type: Lecture ☒ Lab Lecture/Lab Internship Seminar

(*)Class Maximum: (For New Courses Only) / All Unlimited faculty members of a program or discipline must sign.

<table>
<thead>
<tr>
<th>Faculty Name</th>
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<th>Date</th>
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<table>
<thead>
<tr>
<th>Dean's Name</th>
<th>Dean's Signature</th>
<th>Date</th>
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</table>

If there is not enough space provided, please use the back of this form for additional signatures or click on a row with the right button of the mouse, select insert and then select insert rows below to add rows to the table.

Is this Course Proposed as a Liberal Arts Course: Yes ☒ No ☒

If Yes, Which MnTC Area/Areas Will it Fulfill (http://www.mntransfer.org)?

Is This Course a Requirement/Elective for a Specific Program or Programs? Yes ☒ No

If Yes, Which Program(s)? Mechatronics – Diploma and AAS

Describe What is Changing/Being Added, and the Rationale: Prerequisite change due to a program redesign that affects what needs to be completed prior to this course.

What Impact Will This New Course or Change Have on Other Programs or Areas? None

▶ Attach Common Course Outline to this Form.