Awarding Physics Credit in CTE Mechatronics Programs

A CTE-Academic Integration Project

Jim Licht, Director
St. Clair County RESA Mathematics and Science Center

Scott Palmer, CTE Regional Administrator
Macomb Intermediate School District

Scott Spry, Mechatronics/Engineering Technology Instructor
Utica Community Schools' Center for Science and Industry

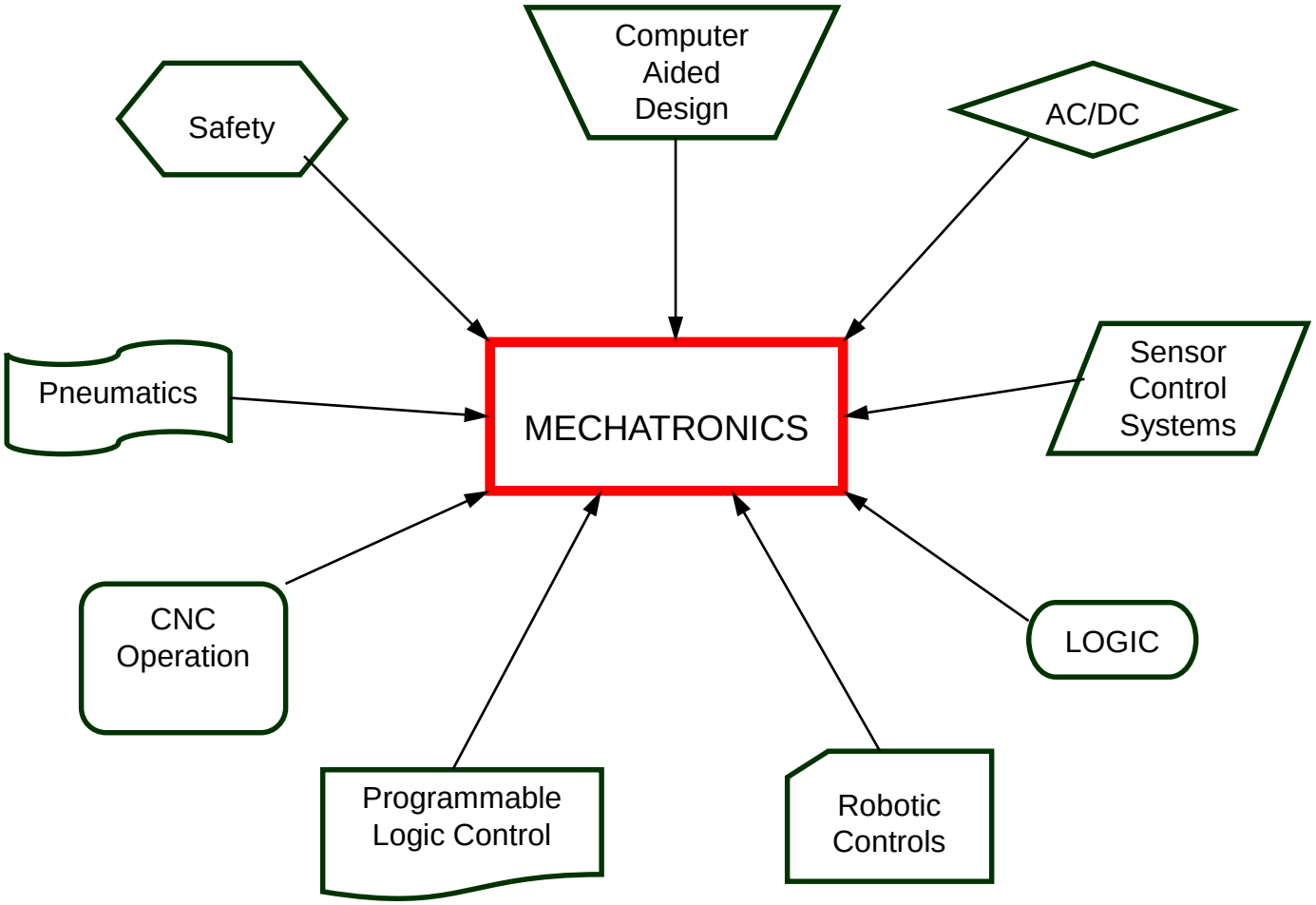
CTE-Academic Integration Grants

- $1,000,000 allocated to OCTE by state legislature in September 2013
- Objective: To increase the number of MMC required core credits awarded in CTE courses
- Macomb-St. Clair (Region 16)
  - Physics in Mechatronics *(plus ELA 12 in two CTE areas)*
  - Macomb-21 districts and 28 high schools
  - St. Clair-7 districts and 9 high schools sending students to St. Clair TEC

Mechatronics in Region 16

- Macomb/St. Clair integral in mechatronics curriculum development and new CIP
- 38% of Mechatronics programs in Michigan (16 total) are in Region 16 (6 programs)
- 20% of Mechatronics students are trained in Region 16

What is Mechatronics?



Why Mechatronics?

- Mechatronics was derived from the need of technological competence and flexibility in the existing workforce
- Employers are looking for employees that are broadly trained
- Troubleshooting, installation, repair and maintenance
  - Problem-solving and critical thinking skills are crucial

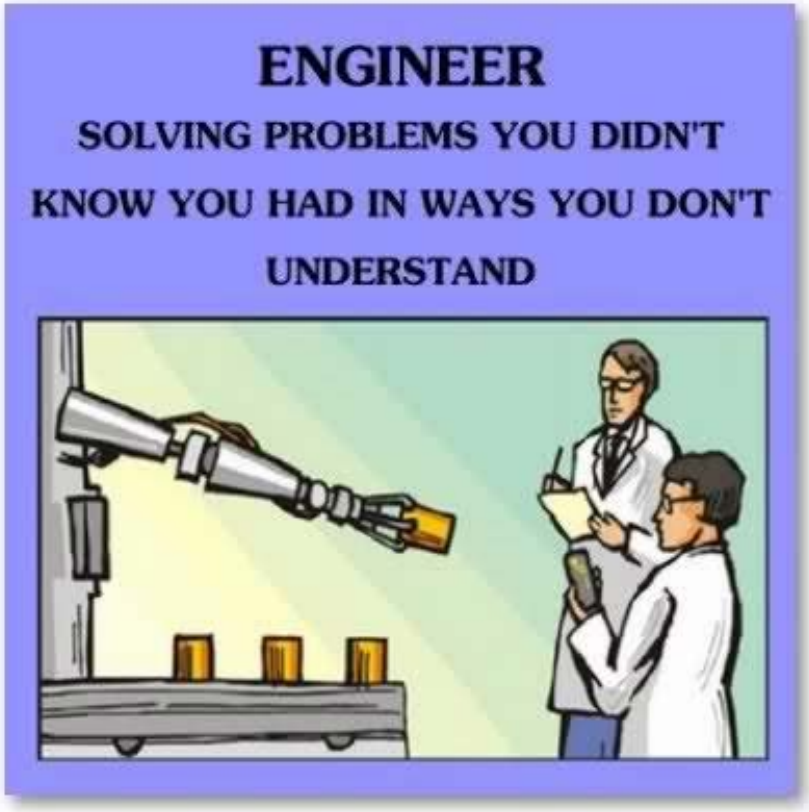
How To Train Your Mechatronics Technician/Engineer

- Industrial trainers and curriculum
  - Hands-on and virtual simulation

- Individual/Group Projects
  - •Circuit Design
  - •PLC Programming
  - •Presentations

Developing the Engineering Mindset

- Capstone Project
- Open-ended but with parameters
  - Simulate industrial program requirements and processes
- Chinook
- RC Boats
- Remote Lawn Mower
- Automated Nacho Maker
- Automated Pop Dispenser
- Drone Technology
- Automated Grilled Cheese Maker
- Interactive Games



Miniature Gondola

Practical Experience

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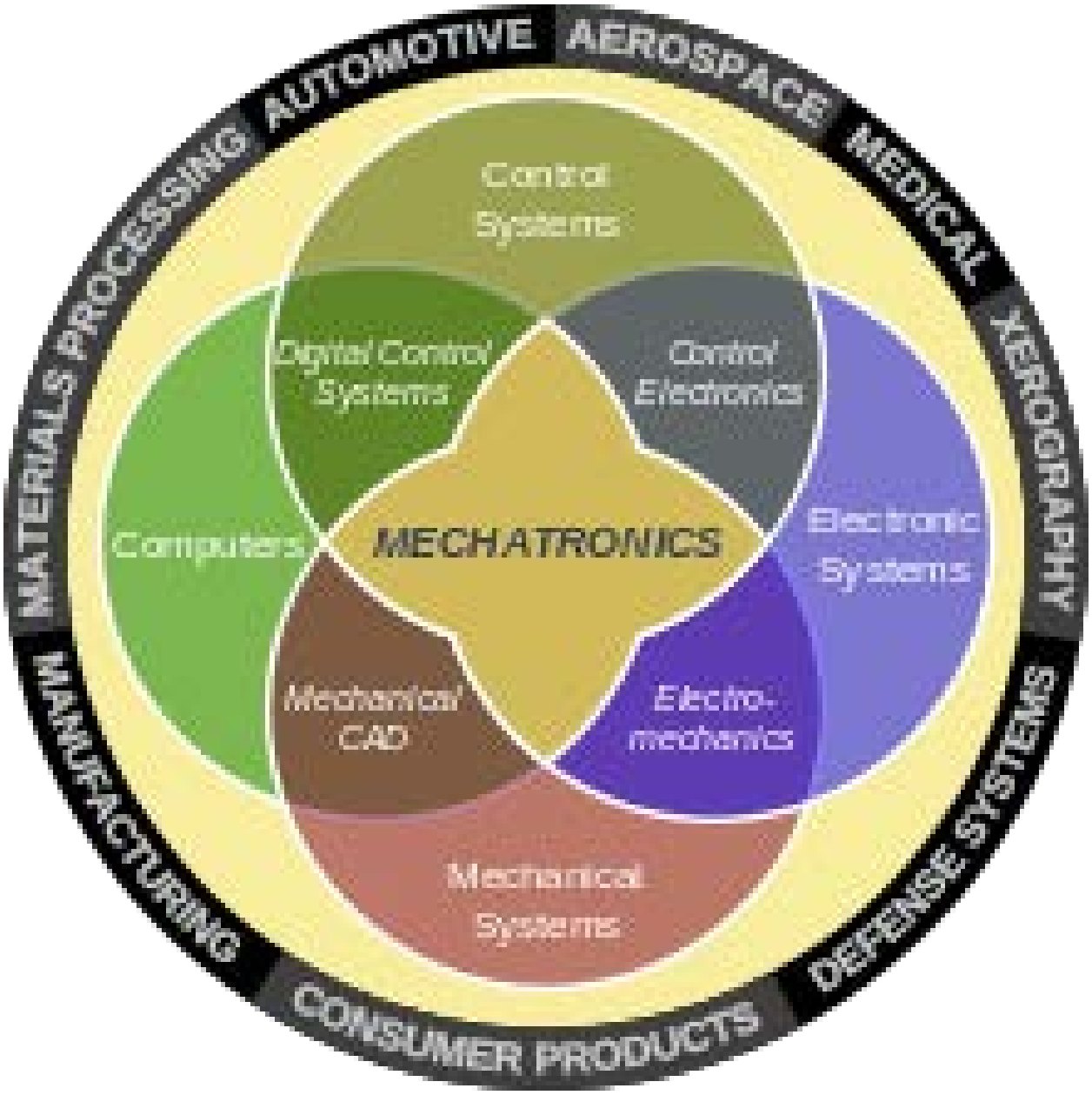
- Mini IVD
- Electric Go-Kart
- ROV (Submarine)
- Project “Bid”

Automated Assembly


AUTOMOTIVE
AEROSPACE
MEDICAL
XEROGRAPHY
DEFENSE SYSTEMS
CONSUMER PRODUCTS
MANUFACTURING
MATERIALS PROCESSING
Control Systems
Digital Control Systems
Control Electronics
Computers
MECHATRONICS
Electronic Systems
Mechanical CAD
Electro-mechanics
Mechanical Systems

Video

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St. Clair County TEC

St. Clair Technical Education Center
Alignment with Michigan Merit Curriculum*

12/09/2014

TEC Program	Math-Related	Online Experience	VPAA	Applied Science	ELA	World Language
Automotive Technology						
Collision Repair	½ credit					
Construction Trades						
Cosmetology	½ credit			½ credit		
Culinary Arts						
Digital Media Technology						
Health Careers						
Information Technology						
Metal Machining Technology						
Mechatronics						
Teacher Exploration						
Welding Technology	½ credit					

Meets Requirements **Substitute for World Language Credit** **Substitute for 3rd Science Credit**

***Credit is awarded by the local school district.**
Students should check with their local district counselor to confirm credit.

STEM by the Numbers

- The U.S. Bureau of Labor Statistics estimates that at least 8,654,000 U.S. STEM jobs will exist in 2018

- A report by StemConnector.org estimates 274,000 STEM jobs in Michigan by 2018.

Skilled Trades & Manufacturing

- Gap between STEM job openings and employees with needed knowledge and skills
  - Especially in the manufacturing sector

- StemConnector.org notes that 600,000 manufacturing jobs are going unfilled
  - skills gap
  - lagging interest in pursuing careers in manufacturing

Awarding Physics Credit in Mechatronics

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Goal:

To create a template that can be replicated across the state that will provide a means for students in the Mechatronics program to receive an academic credit in Physics at their local districts

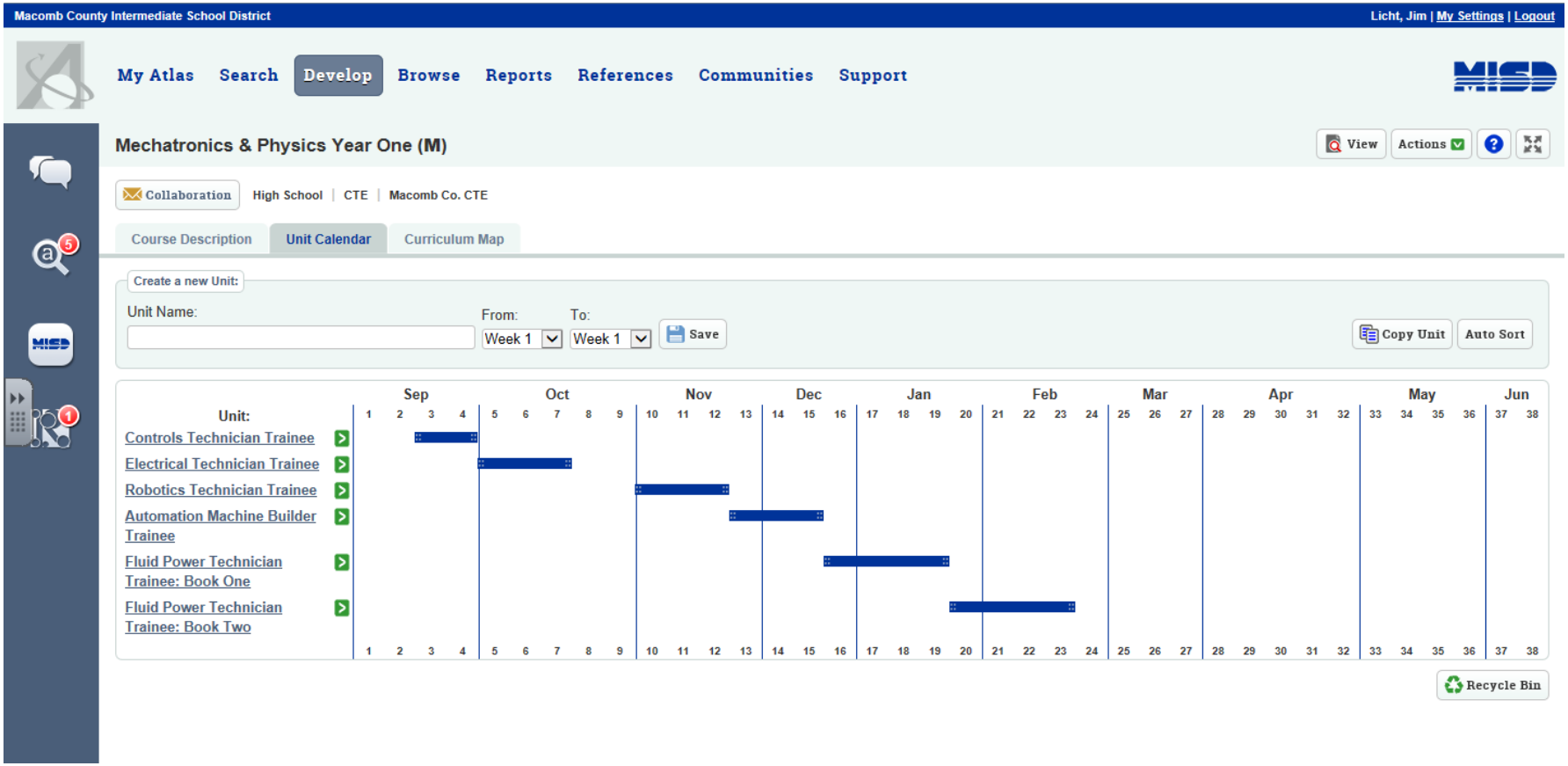
Process:

1) Conduct alignment between Mechatronics and Physics
   - Identify Physics objectives naturally embedded in the Mechatronics curriculum

2) Identify gaps

3) Create additional activities to address some of the gaps

4) Contract with MVU to create a course that creates a wrap-around physics course to combine with Amatrol or other Mechatronics content



[Atlas Rubicon:]

What did we find?

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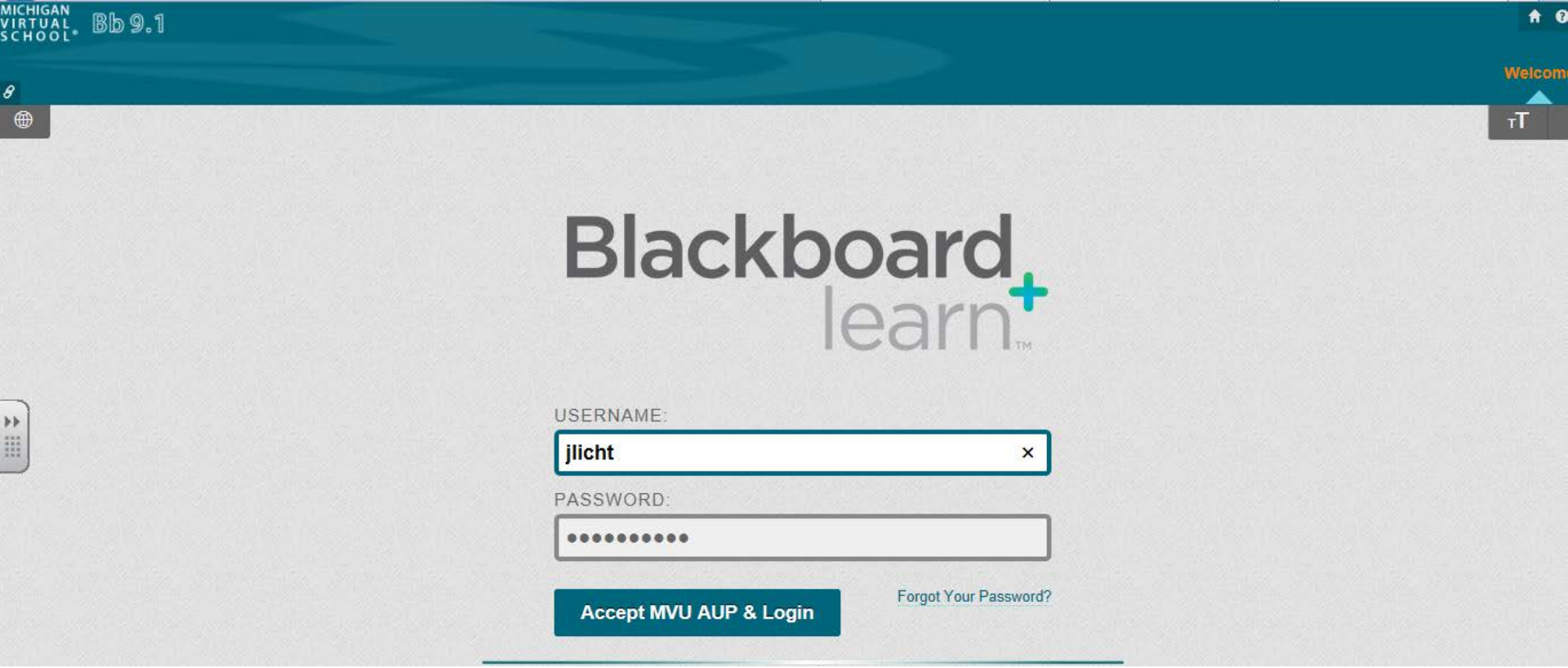
All Physics Objectives

Mechatronics addresses 51 of the 124 physics objectives or about 41%

Essential Physics Objectives

Mechatronics addresses 32 of the 63 essential physics objectives or about 51%



- Online component will help deliver physics content not embedded in the Mechatronics curriculum in fashion respected by “science traditionalists”
- Can be offered anywhere in Michigan using Amatrol virtual simulators and related content