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# MICHIGAN ACADEMY FOR GREEN MOBILITY

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# Transforming Michigan's Automotive Industry



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# Preparing the Workforce





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## Green Regional Skills Alliances



## Green Sectoral Skills Alliances



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## Galvanizing Issue

The workforce issue or challenge the Skills Alliance will address





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## Identifying Partnerships





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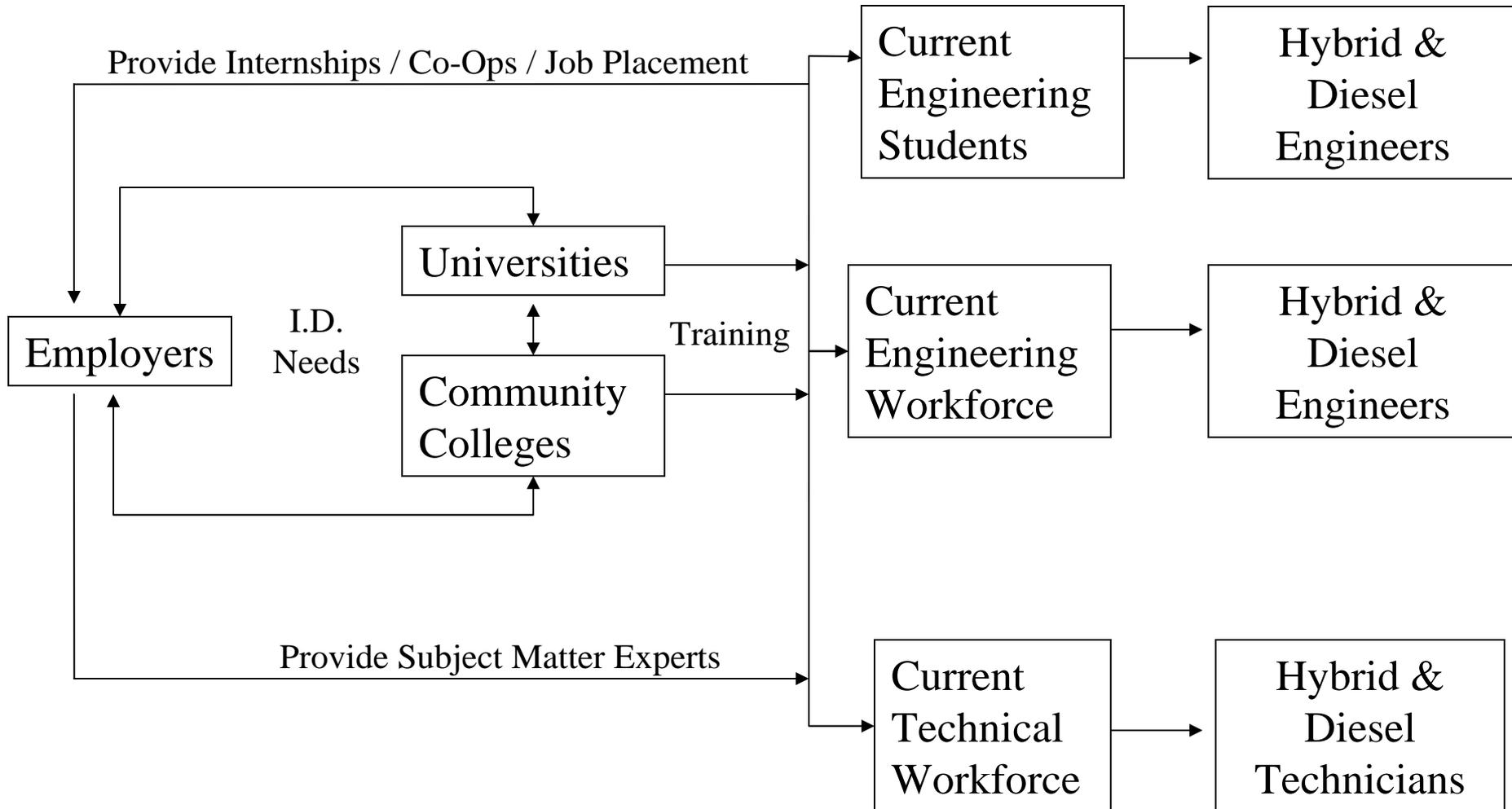
# MICHIGAN ACADEMY FOR GREEN MOBILITY

- Collaboration
- Curriculum Enhancement
- Employer Recognized Certificate Programs
- Continuing Education
- Technician Certification
- Shared Knowledge and Resources
- Hands on training and co-op opportunities





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Launching the  
Michigan  
Academy for  
Green Mobility



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## Michigan Academy for Green Mobility



Sean Newell

MAGM Governing Board Chair

Ford Motor Company



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## Academy Mission

Provide rapid skill growth in green technology solutions for advanced mobility to meet industry needs

## Academy Objectives

1. Prepare individuals for emerging technologies in vehicle and vehicle component design, manufacturing, and maintenance
2. Rapid/accelerated training and re-training targeted toward:
  - Incumbent engineers
  - Engineering students
  - Incumbent technicians
  - Technician program students



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## Academy Governing Board

The governing board is the decision-making body for the Michigan Academy for Green Mobility. This responsibility includes, but is not limited to:

- Strategy development
- Contributing to the sustainability of the academy
- Guiding, evaluating, and approving training decisions
- Developing solicitations for academy education and training providers
- Reviewing and approving solicitation responses



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## Governing Board Members (13)

### Employers: (6)

- Don Anderson (Vice Chair, Chrysler)
- Randy Champagne (GM)
- Philip Dingle (Delphi)
- Martin Klein (Compact Power)
- Greg Moss (DENSO)
- Sean Newell (Chair, Ford)

### Education/Training Providers: (4)

- Walt Bryzik (Wayne State University)
- Mohamed El-Sayed (Kettering University)
- Devdas Shetty (Lawrence Technological University)
- Bill Stark (Macomb Community College)

### Government Workforce Development & Non-Profits: (3)

- Marcia Black-Watson (DELEG)
- Pedro Guillen (NextEnergy)
- Greg Pitoniak (Southeast Michigan Community Alliance)

DELEG Staff: Diana Carpenter, Matt Shields, Rick Fisher, Loris Thomas



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## Key Components of MAGM

- Focus on **employer-defined** needs in green mobility
- Provide a menu of training opportunities to meet those needs
- Leading to certificates and degrees



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## Success Stories

### a) MAGM Endorsed Courses

- Engineering graduate-level courses
  1. MTU: Advanced Propulsion for Hybrid Vehicles with Concentration in Battery Engineering
  2. WSU: Advanced Battery Systems for Hybrid Electric Vehicles
- Courses selected based on employer-defined skill gaps
- 270+ incumbent and displaced engineers enrolled (Fall '09/Winter '10 terms)



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## Success Stories

### b) WSU / Ford Electric Vehicle Short Courses

- Relationship built through participation in MAGM was key enabler to developing a \$35K DOL training grant project within 2 weeks
- Nine different courses with multiple sessions offered on-site at Ford by WSU engineering professors (March, 2010)
- Collaborated on course content, length and student feedback with a focus on meeting the engineers' needs
- Response was overwhelming as courses filled up (660 students) within 15 minutes, over 1100 Ford employees responded within 2 hours
- Second program added (April – May, 2010) to meet the strong demand for this training (an additional 1200 students)
- Key Takeaway: Very responsive, efficient, lean, and cost effective training program (\$19 / student) for green mobility upskilling



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## Growth of MAGM

- Expand course offerings, course providers, and increase industry recognition, participation
- Establish MAGM as the “hub” for industry, educational providers, workforce developers and government
- Establish Michigan as the leader in Green Mobility education, training, and employment



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## Plan for Growth

- To help achieve this growth, MAGM established five subcommittees:
  1. Funding (\$ sources, path to sustainability)
  2. Curriculum Expansion (for all key upskilling areas)
  3. Evaluation (assess the learning effectiveness, OTJ impact)
  4. Competencies & Skills (new)
  5. Communication (new)



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# Training in Advanced Technologies

Dr. C.P. Yeh

Director of Engineering Technology  
Wayne State University



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## Training Requested (2009):

Hybrid Electric Vehicle (HEV) Battery Engineering

## Target Audience:

Engineers transitioning from traditional vehicle design and manufacturing to hybrid electric vehicle battery applications. Training for HEV Battery Engineering should be structured for bachelor or master degreed engineers entering Hybrid Electric Vehicle design and manufacturing



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## Learning Objectives:

- Overview of powertrain systems requirements, design, implementation, calibration, and validation and verification
- Energy storage system principles including cells, batteries, and preferred chemistries
- Batteries and application to hybrid electric vehicles
- Hybrid vehicle battery systems development
- Hybrid vehicle battery cell behavior
- High voltage electrical systems
- Thermal management
- Control systems, Matlab/Simulink environment
- Diagnostics and limp-in strategies



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## The First Two MAGM Courses:

- Advanced Propulsion for Hybrid Vehicles with Concentration in Battery Engineering
  - Michigan Tech University
  - 3 credit hours graduate level course
  - Distance learning (ESD)
- Advanced Battery Systems for Hybrid Electric Vehicles
  - Wayne State University
  - 4 credit hours graduate level course
  - Face-to-face lecture + distance learning



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## Advanced Battery Systems for Hybrid Electric Vehicles

### Partnership:

- Wayne State University – College of Engineering
- Macomb Community College
- Ovonic Battery Company
- A&D Technology Inc.
- AVL



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## Advanced Battery Systems for Hybrid Electric Vehicles

### Credit Hours:

- 4 Credit Hours (Lec 3; Lab 1)
- Credits can be applied for MS Degree or Graduate Certificate

### Prerequisite:

- Bachelor of Science in Engineering or similar physical sciences area



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## Advanced Battery Systems for Hybrid Electric Vehicles

- Lecture: 10 Weeks
  - Face-to-face: WSU Main Campus
  - Distance learning: WSU Oakland Center  
Macomb M-TEC
- Laboratory Experiences: 4 Weeks
  - Lab 1: WSU
  - Lab 2: Ovonic Battery
  - Lab 3: Macomb Community College
  - Lab 4: A&D Technology (F2009) / AVL (W2010)



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## Advanced Battery Systems for Hybrid Electric Vehicles

### Course Description:

1. Overview of EV/HEV/PHEV (3 weeks)
  - Vehicle performance, powertrain requirements
  - Lab 1 - Computer simulation of hybrid powertrain (WSU)
2. Fundamentals of Advanced Battery Systems (5 weeks)
  - Electrochemistry, battery cell, NiMH battery, Li-Ion battery
  - Lab 2 - Battery cell development & test (Ovonic)
3. Battery Management Systems (6 weeks)
  - Battery pack, peripheral systems, control systems, testing, validation and verification, On-Board Diagnostics (OBD)
  - Lab 3 – HEV battery OBD and safety (MCC)
  - Lab 4 – Battery pack development & testing (A&D, AVL)



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## Advanced Battery Systems for Hybrid Electric Vehicles

### Participants:

- Fall 2009 -- Incumbent engineers
- Winter 2010 – Incumbent engineers and dislocated workers



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## Achieving MAGM Objectives:

- Response to specific knowledge and skill demands of employers
- Provide rapid/accelerated training to meet industry needs
- Strengthen academia-Industry collaboration and partnership
- Establish Michigan as the leader in Green Mobility education
- Advanced Electric Drive Vehicle Educational Programs (DOE)  
WSU, MTU, UM
- ATE Center for Advanced Automotive Technology (NSF)  
MCC, WSU
- Attract national attention



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## Contact Information

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