Manufacturing Education Program at Georgia Tech

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Outline

• Manufacturing Education Program (MEP)
  – Graduate Certificate in Manufacturing

• Other Efforts
  – Collaborative Aerospace Lifecycle Systems Engineering Program (CALSEMP)
Georgia Tech
Manufacturing Research Center

Dr. Shreyes Melkote
Interim Director

http://www.marc.gatech.edu/
Manufacturing Research Center

- Multidisciplinary research center focusing on the next generation manufacturing technologies
- World-class facility in manufacturing processes, applications, and technological solutions to manufacturing problems
Center Objectives

- Maintain state-of-the-art laboratory facilities to support research, education, and technology transfer
- Partner with companies, industry consortia, and other external organizations to advance the state-of-the-art in manufacturing
- Provide a neutral site for the development and demonstration of novel processing techniques and application-specific tools for manufacturing
- Produce engineering graduates with substantial hands-on experience in hardware, software, and systems-level aspects of manufacturing
- Provide continuing education opportunities by administering short courses and workshops focused on areas of interest in manufacturing
Manufacturing Research Center

Technical Programs

Facilities & Capabilities

Education Program

Research Partnerships
Georgia Tech Manufacturing Education Program

- Manufacturing Scholarships
- International Option
- Manufacturing Education Program (MEP)

- Engineering Disciplinary Schools
- Graduate Certificate in Manufacturing
- Industry
- Overseas Partner Institutions

Manufacturing Research Center (MARC)
Graduate Certificate in Manufacturing

Objectives

• To provide high quality educational experience in manufacturing as part of our student’s M.S. or Ph.D. programs.
• To develop human resources in the area of manufacturing and to better prepare engineers in meeting today’s manufacturing challenges.
Graduate Certificate in Manufacturing

• Started in 1989 as Computer Integrated Manufacturing Systems (CIMS) Program
• Currently over 25 graduate students enrolled in the program from ME, ISYE, ECE, AE, and CHBE
• Awarded over 104 Certificates in the last 12 years
Academic Requirements

Course Areas:
- Manufacturing Processes
- Industrial Automation
- Production Systems
- Manufacturing Enterprise
Program Details

• Must be enrolled in a graduate engineering degree program at GT
• Must take 12 semester hours of key courses in at least two different engineering schools (from ME, ECE, or ISYE programs).
• Must enroll in manufacturing seminar series (ECE/ISYE/ME 6792) consisting of at least 8 seminars. One credit hour.
### Key Courses

<table>
<thead>
<tr>
<th>Course Group 1: Electrical &amp; Computer Engineering (ECE)</th>
<th>Course Group 2: Industrial &amp; Systems Engineering (ISyE)</th>
<th>Course Group 3: Mechanical Engineering (ME)</th>
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</thead>
<tbody>
<tr>
<td><em>ECE 4761: Industrial Controls and Manufacturing</em></td>
<td>ISyE 6201: Manufacturing Systems</td>
<td>**ME 4210: Manufacturing Processes and Engineering</td>
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<tr>
<td>ECE 6450: Introduction to Microelectronics Technology</td>
<td>ISyE 6202: Warehousing Systems</td>
<td>ME 6222: Manufacturing Processes and Systems</td>
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<tr>
<td>ECE 6460: Microelectromechanical Devices</td>
<td>ISyE 6203: Transportation and Supply Chain Systems</td>
<td>ME 6223: Automated Manufacturing Process Planning</td>
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<tr>
<td>ECE 6556: Intelligent Control</td>
<td>ISyE 6405: Statistical Methods for Manufacturing Design/Improvement</td>
<td>ME 6224: Machine Tool Analysis and Control</td>
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<td>ECE 6557: Manufacturing Systems Design</td>
<td>ISyE 6413: Design and Analysis of Experiments</td>
<td>ME 6405: Introduction to Mechatronics</td>
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<tr>
<td>ECE 6759: Plasma Processing of Electronic Materials and Devices</td>
<td>ISyE 6414: Statistical Modeling and Regression Analysis</td>
<td>ME 6407: Robotics</td>
</tr>
<tr>
<td>ECE 6569: Deterministic Optimization</td>
<td>ISyE 6669: Deterministic Optimization</td>
<td>ME 7227: Rapid Prototyping in Engineering</td>
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</tbody>
</table>

* ECE students cannot count this course (ECE 4761) toward their Certificate requirement.

** ME students cannot count this course (ME 4210) toward their Certificate requirement.
International Option

Georgia Tech Lorraine
SUPELEC
ENSAM
The Logistics Institute - Asia Pacific
NUS
Since 1999, MEP has awarded 34 scholarships/fellowships to Certificate program students
- Scholarship/fellowship awards require students to complete the MEP Certificate

Funding for scholarships/fellowships provided by industry partners in manufacturing (e.g. GM)
CALSEMP & AMMEP Programs

The Collaborative Aerospace Lifecycle Systems Engineering Masters Program (CALSEMP)
An Advanced Materials & Manufacturing Engineering Partnership (AMMEP)

Dr. Dan Schrage
Professor and Director IPLE Lab Lifecycle Engineering (IPLE) Laboratory, Georgia Tech
Dr. Al Sanders
Chair, NDIA Advanced Manufacturing Engineering Capabilities (AMEC) Committee, Honeywell
CALSEMP Program

- CALSEMP – Collaborative Aerospace Lifecycle Systems Engineering Masters Program
  - A Masters program initially formulated at the first Advanced Materials & Manufacturing Engineering Partnership (AMMEP) Workshop held at Georgia Tech in 2011.
  - Builds off the GT Aerospace Systems Design (ASD) graduate program & the Focus Areas from the National Defense Industrial Association (NDIA) Advanced Manufacturing Engineering Capabilities Committee.
How is CALSEMP Being Created?

• The GT graduate masters program in ASD will be extended, with industry, university, and government support, to include more emphasis on manufacturing, producibility and downstream lifecycle support educational activities.
• The NDIA AMEC Committee is providing the customer focus through its identification and roadmap preparation in 6 identified Focus Areas for research and education for manufacturing and producibility.
• Industry and government sponsorship support is sought for development of the CALSEMP over the next 9 months for implementation in Fall 2012.
Why is CALSEMP Being Created?

• The A&S sector is heavily dependent on Advanced Materials development and rapid integration to stay competitive for next generation vehicles.

• The A&S sector is made up of “Systems Integrators” who provide a multiplier flow-down of manufacturing jobs throughout the Supply Chain.

• Job creation, extension and workforce development in the A&S sector must be achieved through a “hands on,” experiential learning approach along a student’s life cycle.
Issues and Challenges

• Student interest in manufacturing education is on the decline

• Perception that “manufacturing is dead in the US” and is not “high tech”
  – Not supported by companies looking for qualified graduates

• Lack of resources to develop and/or maintain state-of-the-art infrastructure to support manufacturing education
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Questions?