Welcome

Introducing today’s new members and guests…

- Darren Buck, Western Area Power Administration
- Barthold Lichtenbelt, NVIDIA
- Scott Skrine, Swisslog Healthcare
Agenda

- Department Update & Spring Action Items
- The Power Behind Renewable Energy
- Industry Spotlight: National Renewable Energy Laboratory
- Break
- Systems Engineering Program Overview
- Breakout Session I
- Break
- Working Lunch and Breakout Session II
- Next Steps & Closing Thoughts
Department News

- ECE mourns loss of emeritus faculty member Dr. Derek Lile (1943-2008)

- Department welcomes two new faculty members:
  - Ali Pezeshki, Assistant Professor
  - Sudeep Pasricha, Assistant Professor
Department News

- ECE researchers share “Oscar of Invention” for Nano-Scale Imaging Microscope
  - The tabletop microscope was recognized by *R&D Magazine* as one of the Top 100 most significant technological advances for 2008
Department News

- ECE signs IMOU with University of Luxembourg

- ECE secures National Academy of Engineering grant for recruitment and retention of women

- Prof. Peter Young is the CSU P.I. of the DOE-sponsored Integrid Project with City of Fort Collins
  - Young also received a grant to support a project with NREL and Excel Energy

- Prof. Randy Bartels wins National Science Foundation MRI grant to develop a unique, stable mid-infrared laser source
Department News

- ECE in the Media:
  - CASA featured on ABC Nightly News, Popular Mechanics, and Rocky Mountain News
  - Senior Design Gaming Controller Team on MSNBC
  - Kinematically Redundant Robotics on EngineeringTV

- Best Paper Contest Winner Announced in May
  - Mehdi Mehrpartou, “Design of an Embedded Controller for a Radiometer.”

- PSD for PLI credits program
CSU research expenditures reach all-time high
  - ECE expenditures also at highest level in history

Four ECE alumni serve on Phoenix Mars Lander team, which recently confirmed the presence of water on the Red Planet
  - Ed Sedivy, EE ’79, recently won a Breakthrough Innovator Award by *Popular Mechanics*
Department News

Upcoming Events:

- IS&T Day for High School Students: October 31
- ECE Emeritus Faculty Luncheon: November 12
- Engineering Internship Fair: February 26, 2009
- College of Engineering Alumni Awards Dinner: March 28, 2009

- Still accepting nominations for ECE Distinguished Alumnus
- ECE Centennial Celebration in 2010
Distribution of Engineering Faculty

**CSU**
- CEE: 40%
- ME: 23%
- ECE: 26%
- CBE: 11%

**Nationwide**
- CEE: 21%
- ME: 27%
- ECE: 38%
- CBE: 14%
Distribution of COE Research Expenditures

- CIRA: 28%
- ECE: 18%
- CEE: 16%
- ME: 8%
- AS: 28%
- CBE: 2%
COE Research Expenditures
ECE Research Expenditures

Fiscal Year

$0 $2,000,000 $4,000,000 $6,000,000 $8,000,000 $10,000,000 $12,000,000

2001 2002 2003 2004 2005 2006 2007 2008
Research Funding Sources

- NSF: 80%
- DOE: 6%
- NASA: 3%
- University Subcontract: 2%
- Other: 3%
- Industry: 3%
IEEE Fellows at “Top-Ten” ECE Depts & Colo. Universities

University (EE,CE) USNWR rank

- Percentage of Fellows
- Total Faculty
Undergraduate Degrees Awarded
Freshmen Enrollment Trends

- Freshmen CpE
- Freshmen EE
Enrollment Trends by Class
Colorado State University

CCHE Index of Incoming Freshman

2008 Avg
ACT=26.6, GPA=3.78
Freshman Quality Trends
CCHE Index: COE vs. All CSU Freshmen

College of Engineering Freshmen

All CSU Freshmen
Women in COE

Undergraduate

Graduate

CEE
38%
CBE
22%
ME
24%
Engr. Sci.
6%
ECE
10%
CEE
38%
ECE
16%
AS
31%
ME
10%
CBE
5%
Women in ECE

<table>
<thead>
<tr>
<th>Year</th>
<th>Number UG Women</th>
<th>Percent UG Women</th>
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Graduate Degrees Awarded
% of Grad Degrees Awarded to Int’l Students

- ME
- MS
- PhD
- Total

Academic Year:
- AY 00-01
- AY 01-02
- AY 02-03
- AY 03-04
- AY 04-05
- AY 05-06
- AY 06-07
- AY 07-08
Spring Action Items

- Discuss new Systems Engineering program under way.
  - **Status:** Included in today’s presentation.

- Work with IAB to update science and technical electives for specific career fields.
  - **Status:** Breakout session dedicated to this subject.

- Provide students with breadth in other areas besides ECE - facilitate exposure to other disciplines such as atmospheric science, mechanical engineering, business, etc.
  - **Status:** We are providing more emphasis on our multi/interdisciplinary programs such as systems engineering and biomedical engineering. The department/curriculum committee is signing off on technical electives outside of ECE.
Spring Action Items

Create a “green” curriculum. Offer additional green-related courses from other disciplines as electives. Conduct a competitive analysis of Colorado research universities to identify weaknesses (opportunities) related to renewable energy.

Status: We’ve identified smart grid and wind energy technologies as our opportunity to lead. Department is packaging existing courses that relate to renewable energy and green engineering. For example:

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<tr>
<td>ECE 461: Power Systems</td>
<td>MECH 676: Building Energy Design</td>
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<tr>
<td>ECE 562: Power Electronics I</td>
<td>MECH 695B: Energy Conversion</td>
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<tr>
<td>ECE 563: Power Electronics II</td>
<td>MECH 575: Solar &amp; Alternative Energies</td>
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<tr>
<td>ECE 611: Nonlinear Control Systems</td>
<td>CHEM 537: Electrochemical Methods</td>
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<td>ECE 612: Robust Control Systems</td>
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Spring Action Items

- Figure out a way to better connect faculty with students.
  - **Status:** ECE Facebook page created to connect students and faculty through a popular medium among students. New Freshmen Handbook provides useful info for new students and faculty contact information. Department is hosting more student-centered events, such as an ice cream social and Degree Exploration Day with HKN. ECE Forums held to answer students’ questions.

- Provide more opportunities for faculty to gain industry experience, e.g., encourage industry interaction through sabbaticals.
  - **Status:** Tom Chen currently is on an “extended” sabbatical at Intel. Dr. Pasricha, who accepted his faculty position because of our industry ties, is working to strengthen partnerships. How might we connect our faculty with your companies for sabbaticals?
Spring Action Items

- Hire more adjunct faculty with industry experience. Target senior professionals.
  - **Status:** ECE’s current adjunct faculty members bring years of industry experience to the classroom, e.g., Bill Eads. The department is continuously looking to identify seasoned professionals with a passion for teaching, e.g., Don Van Zyl with AE hired to teach ECE 580 this spring.

- Review and consider implementation of recommended curriculum changes: analog IC design, additional 400 level courses, systems engineering courses, power engineering courses, and bio tech courses.
  - **Status:** Systems and power engineering courses under way, including two new courses this spring. Dr. Krapf is teaching new bio tech courses and Dr. Pasricha is planning new courses that include power aware computing.
Spring Action Items

- Address concern that recent grads aren’t as “high tech” as they should be and aren’t able to properly use lab equipment.
  - **Status:** New engineering building will include rooms that better integrate lab equipment with teaching. Cutting-edge facilities at Academic Village available to residents, upperclassmen, and open any time to senior design teams. You can help: we’re always seeking support for new equipment from industry.

- Review and consider implementation of research recommendations: post-silicon technology, software systems/firmware, bio tech, and reassess current research strengths.
  - **Status:** Drs. Pasricha and Krapf are leading new research in the areas of software systems/firmware and bio tech. Department’s record research funding affirms our current strengths and priorities.
Honors Program at Colorado State University

CARMEN S. MENONI
Honors’ Adviser Electrical and Computer Engineering
and Honors Council Representative College of Engineering
Colorado State University

The University Honors Program offers students a challenging and enriching program of studies, personalized attention and support. Students receive a world class rounded education, have ample opportunities for enrichment and for developing strong leadership skills.

Hallmark of the program:
• excellent students
• small classes
• interdisciplinary seminars
TRACK I: University Honors Scholar

1. Integrated Core of Four Interdisciplinary Honors Seminars
   - HONR 192, First-Year Seminar 4 credits
   - HONR 193, Seminar 3 credits
   - HONR 392, Seminar 3 credits
   - HONR 492, Senior Seminar 3 credits
   13 credits total
   Fulfills All-University Core Curriculum Requirements

2. Two Honors Courses in the Department, College, and/or Major
   - A sophomore-level course, (200-300 level) 3 credits
   - An upper division course, (300-400 level) 3 credits

3. Honors Thesis or Project
   - HONR 399, Honors Pre-Thesis 1 credit
   - HONR 499, Senior Honors Thesis 3 credits

Total 23 credits

GPA = 3.5 or above cumulative
Designation of University Honors Scholar on diploma and transcripts
TRACK II: Discipline Honors Scholar

1. IU 193H, Freshman Seminar (Honors) 1 credit
2. 3-4 Honors courses in the major/discipline 12 credits
3. Honors Thesis or Project
   - HONR 399, Honors Pre-Thesis 1 credit
   - HONR 499, Senior Honors Thesis 3 credits
Total 17 credits

Each department defines the Discipline Honors Scholar requirements for students following this track in their major

HONORS COURSES ARE SMALL (not more than 20 students)

Honors Program recommend that when space is available, good students (3.0 < GPa < 3.5) be also allowed to register in the honors session of a class.

GPA = 3.5 or above cumulative

Designation of Discipline Honors Scholar on diploma and transcripts
What does ECE need to provide to Honors Students?

<table>
<thead>
<tr>
<th>TRACK I</th>
<th>TRACK II</th>
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<tbody>
<tr>
<td>3 credits – 200-300 level</td>
<td>12 credits – 200, 300, 400 level</td>
</tr>
<tr>
<td>3 credits – 300-400 level</td>
<td>1 credit – Honors Pre-thesis</td>
</tr>
<tr>
<td>1 credit – Honors Pre-thesis</td>
<td>3 credits – Honors Thesis</td>
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<tr>
<td>3 credits – Honors Thesis</td>
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</table>

**TRACK I – 6 CREDITS OF REQUIRED DISCIPLINE COURSES ARE NOT DEFINED.**

**TRACK II - IS NOT DEFINED IN ECE –**

*Work in progress*
The Power Behind Renewable and Distributed Energy

Sunil Cherian, Founder and CEO of Spirae, Inc.
Industry Spotlight: National Renewable Energy Laboratory

Michael Coddington, Senior Engineer
Break
ME Systems Engineering Program

Core courses:
- Foundations of Systems Engineering
- Information Technology and Project Management
- Overview of Systems Engineering Processes
- Engineering Risk Analysis

Select 3 of 5 (add two for a total of 7):
- Linear Programming and Network Flows
- Engineering Decision Support/Expert Systems
- Simulation Fundamentals
- Software Development Methodology
- Dynamics of Complex Engineering Systems

Electives:
- With advisor approval, any 400 Level or above regular course credits course consistent with the student’s program of study.

Capstone Course:
- Group Study in Systems Engineering
Proposed MS/PhD in Energy Systems Engineering

- In the planning stages of development
- Optimize alignment with:
  - Faculty interests
  - Global trends/needs
  - Clean Energy Supercluster strengths in “Energy Systems”
  - Collaboratory “Energy Systems” strengths
  - Industry partner interests
  - Government Interests
- Write Phase I and Phase II Proposals by January 2009
# Proposed MS/PhD in Energy Systems Engineering

## M.E.
- **Core Courses (12h)**
  - ENGR/ECE 501
  - ENGR/ECE 530
  - ENGR/ECE 531
  - CIS 600
- **Choose 3 of 7 (9h)**
  - ENGR/MATH 510
  - ENGR 610
  - MECH 513
  - CIS 610
  - ECE 532
  - New – Systems Architecture
  - New – Power Engineering
- **Electives (6h)**
- **Capstone Course (3h)**
- **ENGR 597**

## M.S.
- **Choose 5 of 7 (15h)**
  - ENGR/MATH 510
  - ENGR 610
  - MECH 513
  - CIS 610
  - MECH 513
  - *New – Systems Architecture*
  - *New – Power Engineering*
- **Electives (6h)**
- **Thesis (Plan A – 9h)**
- **Capstone Course (3h)**
- **ENGR 597**

## Ph.D.
- **Choose 7 of 9 (21h)**
  - ENGR/MATH 510
  - ENGR 610
  - MECH 513
  - CIS 610
  - MECH 513
  - *New – Systems Architecture*
  - *New – Power Engineering*
  - *New – Energy Networks*
  - *New – Energy Systems*
- **Additional Courses (15-18h)**
- **Dissertation (27h min.)**
### Required New Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ENGR 5XX (M.S.)</td>
<td>Systems Architecture</td>
</tr>
<tr>
<td>ENGR 5YY (M.S.)</td>
<td>Power Engineering</td>
</tr>
<tr>
<td>ENGR 6XX (Ph.D.)</td>
<td>Energy Networks</td>
</tr>
<tr>
<td>ENGR 6YY (Ph.D.)</td>
<td>Energy Systems</td>
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### Relevant Existing Courses

<table>
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<tbody>
<tr>
<td>ECE 411</td>
<td>Control Systems</td>
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<td>ECE 461</td>
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<td>ECE 562</td>
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<td>ECE 563</td>
<td>Power Electronics II</td>
</tr>
<tr>
<td>ECE 512</td>
<td>Digital Signal Processing</td>
</tr>
<tr>
<td>ECE 611</td>
<td>Nonlinear Control Systems</td>
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<tr>
<td>ECE 612</td>
<td>Robust Control Systems</td>
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<tr>
<td>ECE 656</td>
<td>Neural Networks and Adaptive Sys</td>
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<tr>
<td>MECH 463</td>
<td>Building Energy Systems</td>
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<tr>
<td>MECH 468</td>
<td>Space Propulsion and Power Eng</td>
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<tr>
<td>MECH 580</td>
<td>Renewable Energy</td>
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<td>MECH 676</td>
<td>Building Energy Design</td>
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</table>
Breakout Session I:

Facilitator:
Alvin Loke, IAB VP
Considerations

- What do you think of the current Systems Engineering Program?

- How do we integrate an energy systems component into the Systems Engineering Program?

- What other ways can we incorporate renewable energy into the curriculum?
Discuss Results of Break Session I

Facilitator: Alvin Loke
Break
Working Lunch and Breakout Session II

Facilitator: John Nichols, IAB President
Breakout Groups

- Analog/RF Circuit Design
- ASIC Design
- Systems Engineering
- Controls/Embedded Systems
- Power
- Engineering Management
- Software/Networking
- Lasers and Optical Engineering
- Other?
Discuss Results of Breakout Session II

Facilitator: John Nichols
Next Steps and Closing Thoughts

Tony Maciejewski