Agenda

- Department Update
- Professionalism Thread Update
- ABET Survey
- Prepare for E-Days
- View Projects at E-Days
- Working Lunch
- Breakout Session: K-12 Outreach
- Report Results of Breakout Session
- Election
Welcome Our Guests

• Paul Chase
  Colorado Microcircuits

• Dawn Dupriest
  Preston Middle School

• Allen Hankla
  Peak to Peak Charter School

• Kay Lannen
  Liberty Common High School

• Jesse Oswald
  Fossil Ridge High School
Department Update

Prof. Tony Maciejewski
Department Head
Electrical and Computer Engineering
Colorado State University
View Presentation Online

**URL:**

www.engr.colostate.edu/ece/industry/industrial_advisory_board.php

-or-

www.engr.colostate.edu/ece → Industry → Industrial Advisory Board

**Presentation Location:**

- Related Links → Meeting Presentations → Spring 2018
Service Recognition

• Scott Makinen – 11 years
Congratulations Keysight!

Colorado State University Employer of the Year
2018
IEEE Region Five Awards

Richard Toftness
Outstanding Individual Achievement Award
Celebrate Colorado State Awards

ECE Department for RED Initiative
Davis Instructional Innovation Award
Celebrate Colorado State Awards

Prof. Diego Krapf
Interdisciplinary Scholarship Award
Celebrate Colorado State Awards

Prof. Tony Maciejewski
Oliver P. Pennock
Distinguished Service Award
College of Engineering Annual Award Winners

Prof. “Chandra”
Patent Award from CSU Ventures

Andrea Leland
Outstanding Staff

Ali Pezeshki
Abell Outstanding Teaching and Service
Melanoma Research Alliance

Prof. Jesse Wilson
Young Investigator Award
IEEE-HKN Outstanding Educator Awards

Prof. Sid Suryanarayanan
C. Holmes MacDonald Outstanding Teaching Award
IEEE-CS TCVLSI Awards

Prof. Sudeep Pasricha
Mid-Career Research Achievement Award
Students Compete in Annual Dumpster Dive Competition

Undergraduates transformed old electronics into functioning robots in the span of six hours.
Researchers Demonstrate Micro-Scale Nuclear Fusion with Record Efficiency

Work was published in *Nature Communications*
New Research to Prevent a Terrorist Attack

Prof. Jayasumana is developing a powerful, data driven tool to identify potential threads.
New Alumni-Funded Scholarships

- Susan (BS ‘88) and Randy (BS ‘88) Benzel Scholarship
- John (BS ‘72, MS ‘74) and Betty Becker ECE Scholarship
Upcoming Events

• Annual Best Paper Contest in June
  • Contact Andrea if interested

• Commencement set for Friday, May 11
ECE by the Numbers
# Proposal Activity FY18

## 25 ECE Faculty

<table>
<thead>
<tr>
<th>Proposals submitted</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total amount of proposals</td>
<td><strong>$34.27M</strong></td>
</tr>
<tr>
<td>Highest proposal amount w/ECE PI as lead</td>
<td>$1.2M to National Science Foundation</td>
</tr>
<tr>
<td>Highest proposal amount w/ECE PI as collaborator</td>
<td>$3.7M to HHS-NIH</td>
</tr>
<tr>
<td>Lowest proposal amount</td>
<td>$7,634 to DOD-NAVY</td>
</tr>
<tr>
<td>Primary funding agencies</td>
<td>NSF, DOD, NIH, NASA, DOE, and DHS</td>
</tr>
<tr>
<td>Collaborators (<strong>many new partners this year</strong>)</td>
<td>Mechanical Engineering, Civil &amp; Environmental Engineering, Physics, Statistics, Chemistry, Atmospheric Science, CIRA, Biochemistry &amp; Molecular Biology, and Biomedical Sciences</td>
</tr>
</tbody>
</table>
Teaching Productivity
ECE Student Credit Hours

Undergrad  Grad

COE Student Credit Hours (‘16–’17)

- ME: 38%
- ECE: 19%
- CEE: 27%
- CBE: 11%
- ATS: 4%
- Intra-College: 1%

Colorado State University
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
National Enrollments by Discipline (‘06–’16)

Information retrieved from ASEE Engineering by the Numbers

Data excludes 50 colleges that no longer participate in ASEE survey. Lower totals reflect current data from participating schools.
ECE Spring Enrollment

Undergraduate Primary Majors (incl BME)  Masters  PhD  ME-Online

SP12  SP13  SP14  SP15  SP16  SP17  SP18
Nontraditional Undergrads in ECE

*Does not include Biomed dual majors
First-Generation Undergrads in ECE

*Does not include Biomed dual majors*
## Freshman Admissions Outlook (April)

<table>
<thead>
<tr>
<th></th>
<th>Computer Engineering</th>
<th></th>
<th>Electrical Engineering</th>
<th></th>
<th>Freshmen Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Confirms 4/2/18</td>
<td>42</td>
<td>Confirms 4/2/18</td>
<td>24</td>
<td>April 2018</td>
<td>66</td>
</tr>
<tr>
<td>Confirms 4/3/17</td>
<td>45</td>
<td></td>
<td>Confirms 4/3/17</td>
<td>37</td>
<td>April 2017</td>
<td>82</td>
</tr>
<tr>
<td>Freshmen Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>April 2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82</td>
<td></td>
</tr>
</tbody>
</table>
ECE Freshman Retention to 2\textsuperscript{nd} Fall

Cohort Size of First-Year ECE Students

Persistence Rates of First-Year ECE Students Through 2\textsuperscript{nd} Fall

Persistence Rates Within Department by Cohort Department and Cohort Term

Dot com bubble

“The World is Flat”

The Great Recession
ECE Freshman Retention to 6th Fall

Cohort Size of First-Year ECE Students

Persistence Rates of First-Year ECE Students through the 6th Fall

Persistence Rates Within Department by Cohort Department and Cohort Term
Women’s Share of S&E Bachelor’s Degrees (2000-2015)

Percent


- Physical sciences
- Biological and agricultural sciences
- Mathematics and statistics
- Computer sciences
- Psychology
- Social sciences
- Engineering
Women in Engineering (FA17)

Undergraduate
- CEE, 29%
- ME, 15%
- Intra-College (includes BME), 35%
- CBE, 15%
- ECE, 8%

Graduate
- CEE, 34%
- BME, 8%
- ME, 8%
- ECE, 20%
- Intra-College, 8%
- AS, 17%
- CBE, 5%

Includes:
- AS
- CBE
- CEE
- ECE
- ME
- Intra-College
- BME
- ECE
Undergraduate Degrees in S&E by Country (2000-2014)
Undergraduate Degrees Awarded

Calendar Year

Number

BSEE  BSCpE  BioEE

Graduate Degrees Awarded

- MS
- Ph.D.
- ME

Calendar Year

Number

Percent of International Degrees Awarded

- ME
- Ph.D.
- MS
- Total

Calendar Year

- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
Career Outlook for ECE Majors

• Among the **top 10 majors in demand** for B.S., M.S., and Ph.D. degrees

• Hottest employment field in 2017

• Average starting salaries:
  - Electrical engineering – $75,000
  - College average – $58,441
  - CSU average - $47,948

*National Association of Colleges and Employers Annual Job Outlook Reports
**IEEE Spectrum – Employment Outlook, July 2017
***CSU First Destination Study, 2016
Histograms do not display states with extreme values. Please consult the data tables for exact indicator values for each state. State positions on the histogram are based on unrounded values of the indicator and may not always match the rounded values displayed in the table.
Update on Fall Action Items

- **Action item:** Share mechanical engineering persistence with the board.
  - **Status:** Data to follow.
ME Freshman Retention to 2\textsuperscript{nd} Fall

Cohort Size of First-Year ME Students

Persistence Rates of First-Year ME Students Through 2\textsuperscript{nd} Fall

Persistence Rates Within Department by Cohort Department and Cohort Term
ME Freshman Retention to 6th Fall

Cohort Size of First-Year ME Students

Persistence Rates of First-Year ME students through the 6th Fall

Persistence Rates Within Department by Cohort Department and Cohort Term
Update on Fall Action Items

• **Action item:** Explore strategies from other cultures to gain insights into effective female recruitment.

  – **Status:** Key factors in other countries: cultural perceptions about engineering, wealth of the country, and family influence.

    ➢ 70% of STEM graduates from Iranian universities are women*

    ➢ Wealth may be related to gender discrepancy – in wealthy countries, people have “luxury” to pursue liberal arts

*The Iranian, Science and Tech, March 2018
Update on Fall Action Items

• **Action item:** Share first-generation stats from other schools, if available.
  
  – **Status:** Challenging to collect consistent data from other ECE programs; CSU among best for first-generation students

<table>
<thead>
<tr>
<th>Top-Ranked Schools for First-Generation Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornell University</td>
</tr>
<tr>
<td>Trinity University</td>
</tr>
<tr>
<td>Yale University</td>
</tr>
<tr>
<td>Texas Tech University</td>
</tr>
<tr>
<td>Colorado State University</td>
</tr>
<tr>
<td>California State University San Marcos</td>
</tr>
</tbody>
</table>
Update on Fall Action Items

• **Action item:** Share update on ECEDHA branding project.
  – **Status:** Branding unveiled at ECEDHA meeting in March – highlights to follow.
brand strategy summary
our charge…

WE NEED TO POWERFULLY TELL OUR STORY AND MAKE ECE COOL AGAIN
by the numbers – primary research

20 phone interviews
7 online surveys
4 focus groups

<table>
<thead>
<tr>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Students</td>
</tr>
<tr>
<td>Faculty &amp; Staff</td>
</tr>
<tr>
<td>Alumni</td>
</tr>
<tr>
<td>Prospects: Undeclared</td>
</tr>
<tr>
<td>Engineering Majors</td>
</tr>
<tr>
<td>Prospects: High School Students</td>
</tr>
<tr>
<td>Corporate Partners</td>
</tr>
<tr>
<td>ECEDHA Members</td>
</tr>
</tbody>
</table>

48.1k Total participants
Creative Northstar:
the future is what we do
FUELING TOMORROW’S RENEWABLE FUELS

The systems, power and controls behind alternative energy – Brought to you by ECE

Ah, the promise of cleaner, more renewable energy. It’s finally here, but who will be able to take it from technological marvel to everyday life? We will. Because Electrical and Computer Engineers love to harness the power of bold thinking and dedicated ingenuity to see the promise of tomorrow actually happen today. That’s just how we roll. More at umich.com.

ECE - THE FUTURE IS WHAT WE DO.
THE SMART THINKING INSIDE YOUR SMART SPEAKER

Voice-activated controls – Brought to you by ECE

"What's the weather outside?" "Play my reggae mix." "Call me a ride." Just a few years ago, shouting to a speaker across the room might have seemed pretty strange. But not to us. To us, it sounded...cool. So, we went to work. Electrical and Computer Engineers use a powerful mix of curiosity, smarts and daring to turn science fiction into the technology that changes how the world connects. Sometimes with the power of a single voice. More at url.com.

ECE - THE FUTURE IS WHAT WE DO.
THE ELECTRIFYING IDEAS BEHIND ELECTRIC TRANSPORTATION

The systems, power and controls that drive Electric Vehicles – Brought to you by ECE

We’ve all seen the promise of cleaner, quieter and more efficient electric vehicles. But who’s electrifying all those trains, cranes and automobiles? We are. Electrical and Computer Engineers harness the power of bold thinking and tenacious ingenuity to create the wired brains, power trains and driving controls that make electric transportation go. That’s just how we roll. More at umich.com.

ECE – THE FUTURE IS WHAT WE DO.
BUILDING THE BRAINS INSIDE YOUR SMART HOME

Internet connected living – Brought to you by ECE

Four walls and a roof. Add some pipes and wires, some furniture and fixtures, and you have a home. But without a brain, today's home feels pretty dim. We decided to brighten things up around the house. Electrical and Computer Engineers use inspired thinking and technological tenacity to make any house your home smart home. More at uri.com.

ECE – THE FUTURE IS WHAT WE DO.
Better medical imaging solutions
- Brought to you by ECE

X-Rays, CAT Scans, MRIs. People don’t usually spend too much time thinking about the technologies that give us these magical images. We think about it a lot. Electrical and Computer Engineers use inspired thinking and technological tenacity to make something as radical as taking a picture from inside our bodies seem like standard operating procedure. More at umich.com.

ECE - THE FUTURE IS WHAT WE DO.
OUT OF THE JUKEBOX THINKING

The history of music, now digitized and completely portable - Brought to you by ECE

Walls of LPs, boxes of cassettes and stacks of CDs. Keeping up with the massive expense of the musical landscape used to take a ton of storage. Until we did something to change that. Electrical and Computer Engineers harness the power of bold thinking and tenacious ingenuity to create concepts and devices as magical as music itself, from digital players that can play a symphony on your watch to the streaming services that put the entire history of music just a play-button away. Technology has never sounded so sweet. More at uri.com.

ECE – THE FUTURE IS WHAT WE DO.
OUT OF THE JUKEBOX THINKING

The history of music, now digitized and completely portable - Brought to you by ECE

Walls of LPs, boxes of cassettes and stacks of CDs. Keeping up with the massive expense of the musical landscape used to take a ton of storage. Until we did something to change that. Electrical and Computer Engineers harness the power of bold thinking and tenacious ingenuity to create concepts and devices as magical as music itself, from digital players that can play a symphony on your watch to the streaming services that puts the entire history of music just a play-button away. Technology has never sounded so sweet. More at uri.com.

ECE – THE FUTURE IS WHAT WE DO.
The networks and hardware that power mobile technology – Brought to you by ECE

It’s your 24/7 entertainer, connector and security blanket. It’s your GPS, your camera, your jukebox, and yes, sometimes it’s even your phone. But who’s making all those devices, networks and connections ring in perfect harmony? We are. Electrical and Computer Engineers use bold thinking and tenacious ingenuity to cram a world of information and a universe of connections into the palm of your hand. All so you never miss a call, pic or post. More at url.com.

ECE – THE FUTURE IS WHAT WE DO.
THE SMART PEOPLE BEHIND YOUR SMART PHONE

The networks and hardware that power mobile technology – Brought to you by ECE

It’s your 24/7 entertainer, connector and security blanket. It’s your GPS, your camera, your jukebox, and yes, sometimes it’s even your phone. But who’s making all those devices, networks and connections ring in perfect harmony? We are. Electrical and Computer Engineers use bold thinking and tenacious ingenuity to cram a world of information and a universe of connections into the palm of your hand. All so you never miss a call, pic or post. More at url.com.

ECE - THE FUTURE IS WHAT WE DO.
framework intro

We typically use a print ad as a foundation for creative work – knowing we can translate many components to other formats and channels. This particular framework is composed of 7 key elements.

- Impact image
- Duality headline
- Punch bar
- Support copy
- Logo
- Call to Action Area (can vary by school or a campaign URL can be created)
- Universal Tagline
Professional Formation Thread Update
Overview of Professionalism Thread

• Critical component of NSF RED project

• Primary goal: Help students develop professional skills more meaningfully and effectively
Objectives of Professionalism Thread

• Create meaningful experiences that mimic eventual working environment

• Embed professionalism throughout the curriculum

• Put professional learning in context and show societal relevance

• Teach skills and mindset to facilitate transition into profession
Evolution of Professionalism Thread

2015
Alma Rosales named Thread Champion

IAB provided input to determine focus areas

Industry task force created to drive thread

Numerous initiatives launched with mixed success

2018
Tom Siller becomes Thread Champion

Advisory Committee reorganized to refine thread
Professional Formation Advisory Committee

Industry Professionals
- Susan Benzel (HPE)
- Jim Greener (HPE)
- Richard Toftness (Tasterra Consulting, EiR Lead)
- Alan Wang (Pelco by Schneider Electric)

Colorado State
- Karen Falkenberg (TILT)
- Andrea Leland
- Tony Maciejewski
- Courtney Ngai (TILT)
- Tom Siller
Successes and Lessons Learned

- Engineer in Residence program a huge success
- Virtual internship program shows great promise
- Initiatives to teach communications and ethics have been effective
- Artificial experiences are not effective, especially when it comes to teamwork
Fine-Tuning the Professionalism Thread

Initial Focus Areas

- Communication
- Cultural Adaptability
- Ethics
- Leadership
- Teamwork

Refined Topics

- Communication
- Leadership/Strategic Thinking
- Continual Self-Development
- Understanding Organizational Culture
- Project Management
- Teamwork
Primary Focus for 2018: Teamwork

- Proposed mechanism for embedding teamwork throughout the curriculum
- Approaches designed to help students develop skills for thriving in a team
Next Steps

• Implement proposed teamwork plans in academic year 2018/2019

• Develop assessments to test the efficacy of our plans

• Deepen industry involvement in thread
  ➢ Increase student-industry interactions
  ➢ Contact me or Andrea to get involved

• Continue to evaluate and refine thread
ABET Survey
Prepare for E-Days
E-Days Considerations

• How are we doing overall?
  – Can you see the impact of your previous suggestions?

• What are the strengths and weaknesses of the senior design program?

• What changes/improvements would you recommend?

• Which projects stand out, and what makes them great?
Assessing Professionalism in Projects

- Complete enclosed rubric to build on SP16, SP17
- Acceptable to use “n/a” or “.5” in your ratings

Focus Areas
Communication
Cultural Adaptability
Ethics
Leadership
Teamwork
Results of SP17 Assessment of Professionalism in Senior Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global And Cultural Awareness</td>
<td>0.9</td>
</tr>
<tr>
<td>Ethics &amp; Professional Responsibility</td>
<td>1.4</td>
</tr>
<tr>
<td>Leadership and team leader</td>
<td>1.8</td>
</tr>
<tr>
<td>Teamwork</td>
<td>2.0</td>
</tr>
<tr>
<td>Communication</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Averages per category

0 - Unacceptable
1 - Developing
2 - Exceptional
Lunch, E-Days Feedback
E-Days Feedback

• How are we doing overall?
  – Can you see the impact of your previous suggestions?

• What are the strengths and weaknesses of the senior design program?

• What changes/improvements would you recommend?

• Which projects stand out, and what makes them great?
Background on K-12 Outreach

Tony Maciejewski
Highlights of Existing K-12 Activities

ECE:
• High School Visit Program
• High School Counselor Visit Day
• Engineering Exploration Day

College of Engineering:
• E-Days Middle School Visit Program
• SWE Introduce a Girl to Engineering
• SHPE Noche de Ciencias
• NSBE Pass the Torch Event
• AISES Outreach to K-12 in Indian Country (with Little Shop of Physics)
• Science Olympiad (held at CSU)
College of Engineering Summer Camps

- Envision Camp with Denver Public Schools
- Native American STEM Camp
- Northrop Grumman Cyber Security Camp
Virtual Internships Launched in FA17

• Partnership with University of Wisconsin-Madison enhances professional formation and creativity threads
• NSF-funded virtual internships simulate engineering workplace through design projects
Breakout Session
K-12 Outreach

Facilitators:
Art Lizotte & Jeannine Looney
Considerations for Breakout

• How do we enable meaningful collaborations between universities, industry, and K-12 partners?
• What are the barriers to success, and how do we overcome the obstacles?
• How do we effectively share our rebranded messaging with K-12 audiences?
Report Results of Breakout Session

Facilitators: Art Lizotte and Jeannine Looney
Election for VP

Facilitator: Jeannine Looney
Closing Remarks

Tony Maciejewski