1. **Introduction and Welcome (Tim Ash, IAB President)**
   Tim opened the meeting by welcoming 10 new members and visitors. He also asked everyone to go around the room and introduce themselves. He walked through the agenda and turned it over to Tony for the department update.

2. **ECE Department Update (Tony Maciejewski, ECE Department Head)**
   The presentation included the following topics:
   a. Dr. Derek Lile Retires
   b. ECE Faculty Named Fellows of Prestigious Societies:
      1. Chandra, American Meteorological Society
      2. Jorge Rocca, American Physical Society
   c. Randy Bartels Named Monfort Professor
   d. Faculty Search Under Way
   e. ECE Faculty Named to IEEE Professional Boards:
      1. Edwin Chong, Board of Governors for the IEEE Control Systems Society
      2. Carmen Menoni, Board of Governors for the IEEE Lasers and Optics Society
      3. Steven Reising, Re-elected to AdCom for IEEE Geoscience and Remote Sensing Society
   f. College of Engineering New Hires:
      1. Audra Brickner, Director of Development
      2. John Haines, Career Center Liaison
   g. Bill Gates Touts CASA Research
   h. Jmar Technologies Licenses CSU X-Ray Laser
   i. Department Hosted First-Ever Graduate Recruiting Weekend
   j. New IAB Member Mary Peery Received Distinguished Alumni Award
   k. Graduate Student Mark Berrill Awarded Department of Energy Computational Science Graduate Fellowship (DOE CSGF)
   l. Graduate Student Vladimir Shestak Received Competitive IBM Ph.D. Fellowship
   m. Undergraduate Abbie Tippie Chosen for NSF Graduate Fellowship
n. Undergraduates Abbie Tippie and Christopher Kautz Win IEEE Senior Design Award
o. Upcoming Events
p. Enrollment Trends
q. All Time High for Undergraduate Degrees Awarded in 2005
r. All Time High for Ph.D. Degrees Awarded in 2005
s. Trends in Graduate School Applicants
u. Expenditures Well Distributed Among Faculty

3. **Update on Action Items from Spring Meeting (Tony Maciejewski)**

Tony’s presentation provided an update on the following action items:

- **Action item**: Present statistics at next meeting on the ECE Faculty’s work such as peer-reviewed papers and citations.
  - **Status**: ECE is among the top 25 departments in the nation for faculty citations and awards, ranking higher than top ECE departments such as the University of Southern California, Carnegie Mellon, Georgia Institute of Technology, University of Wisconsin-Madison, Ohio State University, and Rensselaer Polytechnic Institution. Tony also showed examples of highly cited work (there are 21 works with more than 100 citations), including the faculty member with the most citations as well as the most citations for a single work.

- **Action item**: Follow-up on the idea of adding a “Best Paper Award” to the senior design curriculum.
  - **Status**: Thanks to the IEEE Denver section and the local IEEE Solid-State Circuits Society, ECE is hosting its first-ever Best Paper Contest this spring.
    - A panel of 10 IAB members will judge the student papers
    - The winning team will receive a plaque and $500 cash award

- **Action item**: Consider ways to provide a broader range of continuing education opportunities for industry.
  - **Status**: Department offers distinguished lecture series through ISTeC; faculty available for industry site visits/research seminars (e.g., Center for Robustness in Computer Systems); hiring more faculty, giving us the ability to offer more opportunities in the future.

- **Action item**: Continue encouraging industry involvement in ECE education such as giving talks to senior design class, serving as adjunct faculty, participating in student activities, collaborating on special events, etc.
  - **Status**: Examples of industry involvement in ECE education:
    - 2 board members currently serving as adjunct faculty
    - 10 board members spoke to senior design class in FA05/SP06
    - 15 board members participated in Fall Student Advising Day
    - 2 board members spoke at the Fall Graduate Study in ECE event

- **Action item from previous meeting**: Encourage teaching the process of Six Sigma; try to get an industry representative to give a talk on the topic.
Status: Dana Kirchmar scheduled to give a talk in the fall.

4. **Introduction of New Career Center Liaison (John Haines)**
   John gave a quick overview of his new role as Career Center Liaison. He passed around his business card and encouraged board members to contact him anytime regarding internship and employment opportunities. John can be reached via email at john.haines@colostate.edu or by phone at 970-491-0716.

5. **Industry Spotlight: Aviation Technology Group (Dana Kirchmar)**
   Dana presented an overview of Aviation Technology Group, including company statistics, business concept, company development, leadership team, ATG products, sales progress, international presentations, strategic partners, competition, civil comparisons, military comparisons, certification progress, and company values.

6. **Breakout Session I: Undergraduate Curriculum**
   Board members formed seven different groups to discuss the ECE undergraduate curriculum and identify appropriate technical elective courses for each career field/industry: Analog/RF Circuit Design; ASIC Design; Systems Engineering; Controls/Embedded Systems; Power; Engineering Management; and Software/Networking. Results of the breakout discussions are included in these notes under “Summary of Curriculum Breakout Discussions.”

7. **College Update (Sandra Woods)**
   Dr. Sandra Woods, who recently was named the new Dean of the College of Engineering, delivered an overview of the college that included updates on academic affairs; research, scholarship, and economic development; development; business and finance; College of Engineering goals; and facilities.

8. **Breakout Session II: Graduate Curriculum**
   Board members again formed seven different groups to discuss the ECE graduate curriculum and identify appropriate courses for each career field/industry. Results of the breakout discussions are included in these notes under “Summary of Curriculum Breakout Discussions.”

9. **ABET Survey and Lunch (Marvin Criswell)**
   Dr. Marvin Criswell gave a brief overview of ABET accreditation and reviewed the desired outcomes and objectives for this year’s review. The board unanimously voted in support of these items. He also conducted an employer survey during lunch.

### SUMMARY OF CURRICULUM BREAKOUT DISCUSSIONS

#### 1. ANALOG/RF CIRCUIT DESIGN

**Undergraduate:**

*Science/Engineering Electives:*
1. CS 156 – Intro to C Programming
2. M229 – Matrices and Linear Equations
3. M332 – Partial and Differential Equations
Electrical and Computer Engineering Electives:
1. EE 412 – Digital Control and Digital Filters
2. EE 472 – MOS Integrated Circuits
3. EE 534 Analog IC Design and EE 534 Analog IC Laboratory
4. EE 571 – VLSI System Design I
5. EE 524 – Wireless Telecommunication or EE 536 – RF Integrated Circuit Design

Graduate:
1. EE 512 – Digital Signal Processing
2. EE 520 – Optimization Methods for Control and Communication
3. EE 548 – Microwave Theory and Component Design
4. EE 550 A-B – Microprocessor Based Systems
5. EE 562 – Power Electronics I
6. EE 576 – VLSI Processing – Science and Technology I
7. EE 614 – Principles of Digital Communication
8. EE 652 – Estimation and Filtering Theory
9. EE 672 – Principles of Semiconductors
10. PH 531 – Intro Solid State Physics I
11. ST 511 – Design and Data Analysis for Researchers

Other suggested courses not on list:
- Mandarin
- Modeling
- Data Converters
- Design for Testability

II. ASIC DESIGN

Undergraduate:

Science/Engineering Electives:
1. CS 156 – Intro to C Programming or CS 157 – Intro to C Programming II
2. CS 200 – Algorithms and Data Structures
3. RTL Development/FPGA course
4. Combine Unix with some other class

Electrical and Computer Engineering Electives:
2. EE 453 – Digital Systems Testing I
3. EE 472 – MOS Integrated Circuits
4. EE 550 A-B – Microprocessor Based Systems
5. EE 571 – VLSI System Design I and EE 575 – Experiments in VLSI System Design

Graduate:
1. EE 550 A-B – Microprocessor Based Systems
2. EE 571 – VLSI System Design I and EE 575 – Experiments in VLSI System Design
3. EE 672 – Principles of Semiconductors
4. CS 533 – Database Management Systems
5. CS 575 – Parallel Processing
6. M 560 – Linear Algebra I
7. ST 501 – Statistical Science
8. BN 305 – Business Management
9. CS 414 – Object Oriented Programming
10. a Communication Class – e.g., Technical Writing or Public Speaking

III. SYSTEMS ENGINEERING

Undergraduate:

Science/Engineering Electives:
2. BS301 – Human Gross Anatomy (need to understand as system of systems)
3. Product lifecycle course – cradle to grave with small teams that must present
design reviews to other teams, reinforcing written and verbal communication
skills, requirements, development, etc.

Electrical and Computer Engineering Electives:
1. CS 155 – Intro to Unix
2. CS 156 – Intro to C Programming
3. CS/M 166 – Discrete Structures
4. ME 237 – Intro to Thermal Sciences
5. PH 353 – Optics and Waves

Other suggestions:
6. CS 301 – Foundations of Computer Science
7. CS 314 – Software Development Methods
8. EE 423 – DSP for Communications
9. EE 411 – Control Systems
10. CS 420 – Intro to Analysis of Algorithms

Graduate:

1. CS 514 – Software Product and Process Evaluation
2. CS 517 – Software Specification and Design
3. CS 518 – Distributed Software System Development
4. CS 556 – Computer Security
5. CS 614 – A-B – Microprocessor Based Systems
6. CS/EE 658 – Internet Engineering
7. CS/EE 670 – Topics in Architecture/Systems
8. M 517 – Intro Mathematical Analysis I
9. ST 511 – Design and Data Analysis for Researchers
10. ST 515 – Statistical Science and Process Improvement

Other suggestions:
11. M 540 – Dynamical Systems
12. CS 656 – Advanced Topics in Computer Security  
13. ST 540 – Data Analysis and Regression  
14. ST 675 – Topics in Statistical Methods  

IV. CONTROLS/EMBEDDED SYSTEMS  

Undergraduate:  

Science/Engineering Electives:  
1. CS 156 – Intro to C Programming  
2. CS/M 166 – Discrete Structures  
3. CS 200 – Algorithms and Data Structures  

Electrical and Computer Engineering Electives:  
1. CS 460 – Embedded Systems  
2. EE 550 – Microprocessor Based Systems  
3. EE 512 – Digital Signal Processing  
4. EE 451 – Digital Systems Design  
5. EE 412 – Digital Control and Digital Filters  

Graduate:  

1. EE 512 – Digital Signal Processing  
2. EE 550 A-B – Microprocessor Based Systems  
3. EE 614 – Principles of Digital Communication  
4. CS 518 – Distributed Software System Development  
5. CS 570 – Advanced Computer Architecture  
6. CS 518 – Distributed Software System Development  
7. M 510 – Linear Program and Network Flows  
8. EE 560 – Reconfigurable Computing  

V. POWER  

Undergraduate:  

Science/Engineering Electives:  
1. PH 314 – Modern Physics and PH 315 – Modern Physics Lab  
2. CS 156 – Intro to C Programming  
3. M369 – Linear Algebra  

Electrical and Computer Engineering Electives:  
1. EE 461 – Power Systems I  
2. EE 562 – Power Electronics I  
3. EE 362 – Electromechanical Devices (include lab)  
4. EE 563 – Power Electronics II  
5. Power Systems II (suggested adding this class to curriculum)  
6. EE 411 – Control Systems  

Graduate:  

No suggestions were provided
VI. ENGINEERING MANAGEMENT

Undergraduate:

Science/Engineering Electives:
1. CE 262 – Engineering Management
2. ME 237 – Intro to Thermal Sciences
3. Technical Writing course (or CO 301A – Writing in the Disciplines)

Electrical and Computer Engineering Electives:
1. EE 411 – Control Systems
2. EE 554 – Computer Architecture
3. EE 430 – Database Systems
4. EE 461 – Power Systems I
5. EE 456 – Computer Networks

Additional suggestion:
6. Add project management into senior design practicum

Graduate:

1. CS/EE 658 – Internet Engineering
2. ST 500 – Statistical Computer Packages
3. EE 521/524/525 – Satellite, Wireless, and Fiber Optic Communications
4. EECS 674 – Heterogeneous Computing
5. CS 517 – Software Specification and Design
6. CS 514 – Software Product and Process Evaluation
7. ST 501 – Statistical Science
8. EE 571 – VLSI System Design I
9. EE 512 – Digital Signal Processing
10. Business or Engineering Management course, e.g., BG 635 – Business Economics for the World Market

VII. SOFTWARE/NETWORKING

Undergraduate:

Science/Engineering Electives:
1. CS 155 – Intro to Unix
2. CS 200 – Algorithms and Data Structures
3. M369 – Linear Algebra

Electrical and Computer Engineering Electives:
1. CS 457 – Computer Networks and the Internet
3. CS 314 – Software Development Methods
4. CS 460 – Embedded Systems
5. EE 554 – Computer Architecture
6. EE 411 – Control Systems
Other suggestion:
Develop course on Systems-Level Design for Networking Devices – teaches how to build networking systems-level devices (routers, switches, firewalls, etc) that rely on packet and file-level technologies.

**Graduate:**

1. EE 544 – Computer Architecture
2. EE 658 – Internet Engineering
3. CS 556 – Computer Security
4. CS 580 – Advanced Networking
5. CS 656 – Advanced Topics in Computer Security
6. EE 614 – Principles of Digital Communication
7. EE 524 – Wireless Telecommunication
8. ST 520 – Introduction to Probability Theory and ST 720 – Probability Theory

Suggested new course:
Systems-Level Design for Networking Devices (see description above)

**Summary of discussions:**

- Tony asked board members for their opinion on an electrical/mechanical systems engineering joint degree. Dana Kirchmar, with Aviation Technology Group, thought it would be a perfect match for her field, while folks from Agilent and HP felt that an electrical engineering/computer science degree (with an emphasis on programming) would be more attractive.

- During the curriculum discussions, the board agreed that more emphasis should be placed on product development and management, taking the product from “cradle to grave.” As part of this process, teams would be required to present design reviews to other teams, reinforcing written and verbal communication skills, requirements, development, etc. Tony suggested weaving these elements into the senior design practicum, and he proposed discussing how to implement these changes at the fall 2006 IAB meeting. The board said they’d like to be involved in helping design the program’s structure.

- Alvin Loke shared an example from the University of British Columbia’s electrical engineering program. The project-based learning program, still in its early stages, is a new approach to engineering education. Emphasis is on an integrated understanding of electrical and computer engineering principles, and on being able to design practical applications of those principles. He suggested the possibility of adopting aspects of this program for the restructured senior design practicum.

**10. IAB Elections (led by Tim Ash)**
The board unanimously voted in favor of Fernando Tomasel as the new IAB vice president. Deborah Goldman becomes IAB president.
**ACTION ITEMS:**

- Solicit the support of the IAB to help design a new structure for the senior design practicum.

- Continue encouraging industry involvement in ECE education such as giving talks to the senior design class, serving as adjunct faculty, participating in student activities, collaborating on special events, etc.

- Share the board’s curriculum recommendations with ECE Academic Adviser, Elisabeth Wadman, and ask her to share the information with students.

11. Closing Thoughts
   Tony wrapped up the meeting and thanked everyone for their participation.

Please mark your calendar for the fall IAB meeting on **Friday, October 20, 2006.**