1. Introduction and Welcome (Debbie Goldman, IAB President)
Debbie kicked off the meeting by welcoming five new members and visitors. She reviewed the agenda and then 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. ECE Welcomes New Faculty and Staff Members
   1. Dr. J. Rockey Luo, Assistant Professor
   2. Dr. Branislav Notaros, Associate Professor
   3. Dr. Ricky Kwok, Associate Professor (arriving July ’07)
   4. Olivera Notaros, Head of Senior Design
   5. Mary Kroeger, Program Assistant
   6. Karen Ungerer, Program Coordinator
b. 2007 Faculty Search Under Way
c. Dr. Sandra Woods Named Dean
d. Dr. Randy Bartels Receives Presidential Early Career Award
e. Dr. V. Chandrasekar Meets President of India
f. Dr. Louis Scharf Named Life Fellow of IEEE
g. Dr. Jorge Rocca Receives IEEE LEOS Distinguished Lecture Award
h. ECE Scientists Create World’s Smallest Microscope
i. ECE Receives Grant from National Semiconductor for Professorship in Analog Circuit Design
j. Aram Budak ECE Fellowship Exceeds $50K to Establish Endowment
k. Upcoming Events:
   1. K-12 Engineering Outreach Event at New Belgium: 10/20/06
   2. IS&T Day for High School Students: 11/3/06
   3. Engineering Internship Fair: 2/20/07
l. First-Ever Best Paper Contest Winner Announced in June (previous IAB action item)
m. Memorial Scholarship Established to Honor Former Student Chris Kautz
n. Good Samaritan Places at National & International Competitions
o. RAMBox Product (licensed by Rosco Laboratories as “Keystroke”) Wins National Design Award
p. Guangwei Yuan Receives Prestigious SPIE Scholarship
Enrollment Trends

Trends in Freshmen Enrollment

Undergraduate Degrees Awarded – Academic Year

Graduate Degrees Awarded – Academic Year

Percent of Graduate Degrees Awarded to International Students

ECE Research Expenditures

3. Update on Action Items from Spring Meeting (Tony Maciejewski)
Tony’s presentation provided an update on the following action items:

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

- **Status**: IAB recommendations currently available to students on ECE web site.

- **Action item**: 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.

- **Status**: ECE continues to solicit IAB involvement in ECE activities.

  - Record participation at this year’s Student Advising Day
  - Board members continue to volunteer their time for senior design talks and projects.

- **Action item**: Solicit the support of the IAB to help create an optimal senior design experience for today’s engineer.

- **Status**: Subject of today’s meeting.

4. Industry Spotlight: National Semiconductor (Mike Noonan)
Mike presented an overview of National Semiconductor with specific information on National’s presence in Colorado. He also highlighted company statistics, strategic plans, goals, current revenue, products, and areas of technical strengths.

5. ECE Senior Design Program Overview (Olivera Notaros)
Olivera provided high-level information about the current senior design program, including current projects, design requirements, weekly lectures, and program components. She also presented various project examples for the board to consider during the breakout sessions: interdisciplinary, entrepreneurial, community service and outreach, international collaborations, and projects for competitions.

6. Breakout Session I
Board members formed four different groups to discuss the ECE senior design program: interdisciplinary, entrepreneurial, community service and outreach, and international. Each group was asked to consider the questions below. The teams were asked to pick the questions of greatest interest, recognizing that there may not be enough time to answer every question in detail.

- What are the components of a good senior design program?
- What should the general structure look like?
- What topics should be covered during weekly lectures?
- What types of exercises will help teach effective communication skills to both a technical and non-technical audience?
- How do we design a program that guarantees relevant technical expertise and relevant design experience?
- What project management skills, techniques, and processes should be implemented to prepare students for the industry?
7. Discuss Results of Breakout Session I (Facilitator: Debbie Goldman)
Debbie asked each group to summarize their discussions and share their comments with the board.

Interdisciplinary:
- Proposed changing the name of the senior design program. Because each project includes many other important aspects besides design, they suggested coming up with a new name that is broader and more inclusive.
  - They posed the question, “What percentage of a project should be allocated to design?” Some people believe it should be 60%-70% of the project.
- Find ways to incorporate the design experience throughout the curriculum so that students are prepared and familiar with the process when they reach their senior year.
- Expressed the importance of being able to present projects and ideas in a brief and concise manner, i.e., an elevator pitch.
- Project planning is important. Each team should define the project and agree upon end points and results.
- Suggested creating different tracks for the project teams. For example, students interested in graduate school or management might follow a different track than those who are planning to go right into industry.

Entrepreneurial:
- Industry and faculty need to be heavily involved in an entrepreneurial project in order for it to be successful.
  - Industry sponsorship is critical to the success of the project.
  - To gain financial support, the board recommended positioning the project as a pipeline for industry.
- Hugh Grinolds pointed to the University of San Diego as a good example of a program that has forged reciprocal partnerships with industry. The companies co-sponsor the project but the professor oversees the students’ work. All projects are completed in the space of a year. Many students receive internship and other employment opportunities through these collaborations.
- The group explored the idea of multi-year projects, as it is difficult to assess market needs and develop/market the project in one academic year. They suggested including other departments (e.g., marketing) to handle certain aspects of the project, such as writing the business plan and developing the marketing strategy.
- Other comments regarding entrepreneurial projects include:
  - Projects need to be a team of students, very collaborative in nature
  - Program management is important including setting schedules and milestones.
  - Industrial involvement outside of class is key
  - Provide very tight supervision and constraints during first semester of the project to provide students structure and help them learn processes; take off the training wheels during the second semester and allow students to function more independently.

Community Service and Outreach:
- Single projects should not be allowed – all teams should include more than one person.
The structure and organization of the project is critical. The team must define deliverables, timelines, milestones, etc.

- All communications need to be clear and succinct.
- The project should include an external component such as an outside review board. Could be industry, grad students, or others who aren’t familiar with the project.
- Disciplines outside of ECE should be incorporated into all projects.
- Provide professional development courses to address team dynamics, e.g., team building, conflict resolution, etc.
- In assigning projects to students, have them bid on project ideas. The best proposal wins the project.
- Advertise the senior design “labor force” to other departments as a way to build interdisciplinary projects. H.J. Siegel suggested using ISTeC’s Education Advisory Committee to facilitate this idea.

International:
- Defining scope and structuring project is crucial – Gantt charts, spreadsheets, etc.
- Weekly status meetings are necessary in order to ensure project stays on track.
- An international component should be weaved into every project.
- Bring in more speakers to discuss the topic of international engineering and the global marketplace.
- To improve communication skills, each team should be required to prepare a short presentation (5 minutes or less) and a longer, more detailed presentation.
  — The international group volunteered to serve on a panel to review project presentations and related communications.

8. Breakout Session II
Board members again formed four different groups to discuss the senior design program. This time each group was asked to come up with at least one project idea, taking into account the following considerations:
- Can industry play a role in your project? If yes, how would you engage the industry and solicit their support?
- Keeping in mind that we want to recruit the best and brightest students, would your project attract the interest of a high school student?
- If students were working on your project, what are the biggest obstacles and challenges they would face? What skill sets should we teach students to overcome these challenges?
- Should you enter your project in a competition? If yes, how would this benefit the students, and what kind of competition would make sense?
- Evaluate the pros & cons of your project with respect to the items discussed in Breakout 1 – is your approach a good vehicle for implementing what you determined was important in a senior design program?

9. Discuss Results of Breakout Session II (Facilitator: Debbie Goldman)
Debbie asked each group to summarize their discussions and share their comments with the board.
Interdisciplinary:
- Project would have to be limited in complexity or it would be impossible to complete in one year. Recommended a project that could be used by heavy equipment operators to sense overhead obstacles.
- Upfront technical investigation is important to the development of this product idea.

Entrepreneurial:
- Decided to create an autonomous surveillance helicopter or a fan noise reduction device.
- Profitability of the product is a major consideration; cost reduction and IP are important factors as well.
- Involve industry, perhaps through an internship program.
- Marketing, sales, and product definition are the biggest obstacles. Involve other departments to balance the workload, allowing the engineering students to focus on design.
- Would consider a competition, as it would likely drive up the quality of the project.
- Suggested making the project multi-phase/multi-year.

Community Service and Outreach:
- The first step is to identify social problems that require engineering solutions and consider methods for finding appropriate projects that fit within the boundaries of senior design.
- Start with the Bill & Linda Gates Foundation, Bohemian Foundation, or a similar philanthropic organization, and maybe even look to the Peace Corps for ideas.
- In choosing the project, keep in mind the recruiting aspect. The team believes students would be interested in a service project – it would provide a good outlet for giving back to society. This sort of project would also look good on a student’s resume.

International:
- An international project would definitely have its challenges, so it might make sense to do a pilot project to see if it works. Ask students to report back at the end of the semester to share their feedback and lessons learned.
- International projects would allow students to communicate across cultures – data sharing, working across time zones, etc.
- An international project would expose students to people in other parts of the world, giving them a chance to see if foreign students are receiving the same level of education as U.S. students.
- The team wondered if CSU could be the leader in the area of international collaborations, creating a framework that other universities can use.

Following the breakout discussions, Tony posed the following questions to the board:
- What tools are being used in the industry for international collaborations? The board indicated the following: instant messaging, pod casting, web casting, and Net meeting.
How do we train our students to manage projects effectively? Responses include:

- Start with project management lectures – two or three throughout the year – by the same person.
- Acquaint students early on with senior design projects. Have seniors mentor freshmen to give them early exposure to senior design and related processes.
- Have students participate in live web casts and net meetings. Require them to organize the meetings and learn how to use the technology.

To provide a real-world international experience for our students, are any of you interested in allowing us to work with your company’s international manufacturing division(s) to create and manufacture a product?

- The board didn’t think this would be a feasible idea.

Is an international exchange program a fair alternative to a senior design project that involves international collaboration?

- The IAB agreed that an exchange program is another good way to expose students to a global marketplace and teach them to communicate across cultures.

Summary of Key Points:

- The board seems to agree that certain components are key to the senior design experience:
  - Design
  - Communication
  - Project management
  - Teamwork
  - Multi-year projects

- We should not force anyone to do a specific type of project, just continue to encourage interdisciplinary involvement and strive to create interesting, unique, and challenging projects for all students.

- The ECE department would like to encourage the board to stay involved with the senior design program by sending us project ideas, sponsoring projects, reviewing communications, etc.

ACTION ITEMS:

**Design:**

- Find ways to incorporate the design experience throughout the curriculum so that students are prepared and familiar with the program when they reach their senior year.
- Advertise the senior design “labor force” to other departments as a way to build interdisciplinary projects (possibly use ISTeC’s Education Advisory Committee to facilitate this idea).

**Communication:**

- Require students to prepare a 3-5 minute presentation (elevator speech) as well as a longer, more detailed version.
- Continue Best Paper Contest – ask IAB to review papers
- Ask IAB members to serve on a panel to review project presentations (international group volunteered to help with this)
Project Management:
- Teach students project management skills through the senior design lecture series. Bring in a speaker early in the semester and then two or three later in the semester.
- Investigate how to give students early exposure to senior design projects and project management processes. Possibly have seniors mentor freshmen as part of their senior design project.

Teamwork:
- Offer professional development courses to address team dynamics, e.g., team building, conflict resolution, etc.

Multi-Year Projects:
- Consider creating more multi-year, multi-phase projects.

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

Please mark your calendar for the spring IAB meeting on Friday, April 13, 2007.