



Computer Science Industry Advisory Board Meeting Minutes
October 13, 2006

Industry Members Present:

- Davis Almanza, representing Computers Unlimited for IAB member Jim Mckenney
- Jim Petrick, IAB member representing Electronic Data Systems (EDS)
- Kevin McManus, IAB member representing Zoot Enterprises
- Craig Spanning, IAB member representing Spraying Systems
- Julie Evans, a graduate 4-5 years out of the program. Julie works at Synesis 7

Montana Tech Representatives Present:

- Celia Schahczenski, C.S. Dept. Chair
- Frank Ackerman, C.S. Faculty
- Jeff Braun, C.S. Faculty
- Michele Van Dyne, C.S. Faculty
- Hwe-Chu Ackerman, Guest
- Tamara Windham, C.S. Administrative Associate
- Pat Kane, C.S. Student
- Steve Marmon, C.S. & S.E. Student

I. Welcome

Doug Coe, the Dean of the College of Mathematics and Sciences, welcomed the board members to MT Tech and expressed the excitement of adding three new; excellent faculty members to the C.S. Department. Dr. Coe also, emphasized the importance of recruiting new students to the Computer Science and Software Engineering programs and stressed the importance of the advice and information that the board gives the C.S. Department.

II. Introductory Comments

Celia Schahczenski gave an overview of the meeting last year and stated that since that meeting we have been collecting assessment data. We have summarized results from that data and are now ready to discuss program improvement based on what we have learned from our assessment data.

Celia stressed two things to be accomplished at this meeting:

1. Making changes to improve the CS and SE programs.
2. Making changes to improve the Assessment Plan.

Celia requested the board members balance:

1. Creating the best assessment plan that will maximize continual improvement of the CS and SE programs, and creating a plan that is not so time consuming to implement that we have difficulty offering those programs.
2. Creating the best assessment plan and only making incremental changes to the plan so that we have longitudinal data to show the ABET accreditors when they visit next year.

Celia invited the meeting participants to hold a free open discuss and to really scrutinize the program.

III. Introductions

Introductions of all attending the meeting were made.

IV. Computer Science Department Update Old:

A. Freshman Scholarship: The scholarship is \$250 per semester for eight semesters, beginning in the fall semester of the freshman year. Unfortunately, each student who has accepted the scholarship in the past has changed programs. The department awarded two scholarships this year. We are very selective when choosing students for the scholarship. Kevin McManus suggested changing the criteria for the scholarship to targeting sophomores, juniors and seniors- making sure there is commitment to the program when we give the scholarship. The department has been using the scholarship as a recruitment tool.

- B. Newsletter: The department developed a template for both the fall and spring newsletters but has not been getting them out. The last issue of the newsletter was sent in the spring of 2005. A newsletter was not sent in the Spring of 2006.
- C. Michele Van Dyne presented current C.S. and S.E. student enrollment numbers. Michele stated that enrollment continues to decline. The total enrollment of both programs is 59 students. C.S. has 39 students enrolled this year compared to 45 last year and 50 students the year before. S.E. stayed the same this year as last year with 20 students enrolled. A maximum number of students enrolled in S.E. was 27 students. Michele also mentioned that placement continues to be 100%, so people are getting jobs. Retention rate for freshman is at 42% - 46% which she contrasted to another school which had 36 %.
- D. CSI & II was presented by Frank Ackerman stating the current vision of CSI/II:
 - Maintaining calculus ready pre-requisite but letting special cases in
 - Grounded in basic understanding of computer architecture
 - Uses a variety of techniques to get students writing sizable and interesting programs early
 - Aims to cover all of C++, including introduction to STL
 - Using Visual Studio 2003
 - Would like to introduce Windows programming
 - Software Inspections?
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- E. Jeff Braun gave a brief overview of the Senior Seminar. It is a newer course that has been taught for two semesters, both times in the spring semester. The Senior Seminar was a course that was required in the S.E. curriculum but it had an engineering number. The engineering department never offered this course so we filled in with our own course. We added this new course to the C.S. curriculum. Eight students took this course last year; two of the students are software engineers. The students have to make a 35 minute presentation. The presentation must be a technical topic.

V. Computer Science Department Update New:

- A. Celica discussed recruiting. We are continuing to assign student advisors as soon as someone applies to the school. (Note that only 70 % of people who apply to a school typically attend that school.) We continue calling people who have expressed interest in the school. We have a new recruiting idea: we set up a match for each person with five people and we continue to call these people and establish a relationship with them. We are also thinking of nurturing a relationship with a particular school. We would keep going back to the same school to develop a relationship with the teachers and counselors. Doug Coe feels that Helena is an underserved area. We decided to develop a workshop and to take into the Helena High Schools. Fortunately a student has chosen to do an under-graduate research project on recruiting. This student graduated from Helena High and he knows the teachers. The student will go to Helena and survey them to discover what characteristics and what classes will get people interested in computer science and software engineering

Questions, comments, and suggestions about recruiting issues:

- What is Tech doing to corner the local market? *We are not sure we want to corner the local market- MT Tech may not be the best choice for every student.*
 - What is Tech doing to differentiate itself from other programs? *Our program has a lot of hands on combined with theory. Employers like the students because they work hard and are willing to step up and do tasks even though that task may not be written into their job description.*
 - How do other programs compare cost wise? *We have it all, not only cost wise but student/teacher ratio, we are the best deal!*
 - Recruiting strengths are alumni – look at alumni to help build a program to assist with recruiting.
 - Alumni value their education and want to ensure the same quality of education is still in place for other students.
 - Recruit to a younger age than high school age.
 - Don't compete on MSU strengths, compete on their weakness.
 - Compete for students in the eastern part of the state.
 - Sale the program to parents
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- B. The computer science students will be competing in the 2006 Rocky Mountain Regional ACM Programming Contest on October 28, 2006. Frank Ackerman updated the board on the contest and MTech goal, strategy and ideas to get local industry involved.

MTech Goal

- Win Rocky Mountain Region by 2011
- Our best students are as good as any of our competitors
- Most schools do not treat this as a serious endeavor
- Deciding factors are education and coaching

MTech Strategy

- Institute 2 credit hour Competitive Programming course
- Improve breadth and depth of programming experience of preparatory courses: CSI/II and Data Structures & Analysis of Algorithms
- Instructor develop solutions to all Programming Challenges problems
- Develop comprehensive “play book”
- Coach becomes involved with ACM contest structure.
- Coach takes on competitive programming as a research topic.

Local Industry Involvement?

- Sponsor a team?
- Jackets?
- Meal?
- Company events?

VI. Industry Update:

A. Each IAB member discussed their individual companies potential for hiring new employees in the future:

Kevin McManus stated that Zoot is in a growth mode. In 2006 the engineering group has hired 20 people.

There are a total of 45 software engineers at Zoot. Zoot has two positions open right now. The candidate pool has been slow. Kevin stated that if you want a job you pretty much have a job however they are not in the position where they have to hire just anyone. They want to make sure that they are hiring the right people. Based on the sales plan there will be 10 new positions in the next 6 months. Zoot’s projections and growth are fairly aggressive. Their goal is to become a half a million dollar company within the next few years.

Craig Spanning from Spraying Systems does not see any potential of hiring soon. Spraying Systems is a pretty static company, people who are employed there stick around.

Davis Almanza reported that Computers Unlimited is in the selective mode, they are looking for top notch people.

Jim Petrick said that EDS is now hiring senior level people. They are looking for people to do consulting. This requires considerable experience.

Julie Evans reported that Synesis7 does not see the potential for hiring in the near future. However, there may be internship opportunities in the spring.

B. IAB members discussed changing skill sets needed by graduates. They suggested enhancing:

- communication skills
- written skills
- email etiquette
- social skills

VII. Assessment Overview

Celia Schahczenski presented the background on accreditation of the C.S. program. The program first became accredited in the 1998/1999 accreditation cycle. The program was up for renewal in the 2001-2002 accreditation cycle. At that time the accreditors identified three deficiencies (oral communication, written communication and ethical implications of computing) and three concerns (continuity and stability of program, realistic amount of time to remain current in the discipline, realistic amount of time for scholarly activities and professional development and sufficient support to retain the current faculty). An interim report was required in two years. The interim report was submitted and full accreditation was granted although the concerns remained.

In the fall the C.S. program will have its next visit. We decided to coordinate accreditation of the S.E. program with that of the C.S. program. These are accredited by two different ABET commissions: C.S. is under the Computing Accreditation Commission while S.E. is under the Engineering Accreditation Commission. This means that we will have two teams visiting in the fall, but the teams will coordinate their visits and come at the same time.

ABET assessment was described: Each program must have documented educational objectives. These are skills that graduates are expected to have 4-5 years after graduating. They must also have documented program outcomes. These are skills that our graduates are expected to have when they graduate. An assessment plan must be documented for collecting assessment data on how we are meeting these educational objectives and program outcomes. There must be a plan for analyzing the assessment data, improving the program, and improving the assessment plan. The goal is to insure continual program as well as continual improvement of the assessment plan itself.

The C.S. and S.E. assessment plan were included in the folder of materials and these were reviewed. This plan can also be viewed on the web at http://www.mtech.edu/math_science/cs_se/assessment.htm

The remained of the meeting was spent presenting summaries of the assessment data collected since the assessment plan was put into place at the last IAB meeting, spring 2006.

VIII: Feedback from Standardized forms

Celia Schahczenski gave an overview of the standardized forms. Celia stated that she thinks they have improved the program by using the new forms.

- Oral Skills
- Written
- Development Process Skills

A. Jeff Braun presented an evaluation summary of the Standardized Oral Assessment Form

Over 50 evaluations were collected in 8 courses for the 2005-2006 academic year. Courses include Database Management (CS 2656), Software Engineering I and II (SE 3250 and SE 3260), Operating Systems (CS 3406), Computer Architecture (CS 4406), Artificial Intelligence (CS 4556), Internship (CS 4916), and Senior Seminar (CS 4946). Group presentations were made in CS 2656, SE 3260, and CS 3406. Seniors also presented their senior design projects, undergraduate research projects, internships, and research on topics of their choice. Presentations are either made in Senior Seminar or to the ACM club. Theses presentations were generally good.

Summaries for the sophomore, junior, and senior classes were presented.

Summary

Direct comparing scores between different classes is probably not reasonable. Four different instructors evaluated students and each instructor has different criteria for poor, fair, good, and excellent. As the presentation material becomes more detailed and complex the presentation quality appears to decline. Sophomores are usually not held to as high a level of scrutiny as seniors, so this explains a portion of the declining scores. From these evaluations it appears students are more comfortable presenting their work on projects and internships than technical research topics. In the future it would be advisable for instructors to discuss the evaluation process with students and explain how previous weak areas can be improved.

Questions, comments or suggestions concerning form:

- Do students help the professor with the evaluation process? *Yes*
- Do the comments get filled out regularly? *Yes, Jeff types the comments and returns the form with the student's grade.*
- Add a beginning and ending time to the oral form.
- Keep the visual aids of good, average and poor presentations.
- Department needs to do a better job at making students aware that they will be evaluated via the Standardized Oral Assessment Form,
http://www.mtech.edu/math_science/cs_se/Forms/std-oral-assessment-form.htm

- B.** Frank Ackerman presented an overview of the Written Assessment form with a power point presentation. Frank feels the faculty should be modeling for the student with their writing skills and the faculty should be assessing the student's writing skills on a regular basis. The C.S. program does not have a lot of data, but they are learning how to gather more data.

Written Evaluations Summary 2006

Course	Topic	Summary
CS1006/SE1000 F05 Seminar	Copyright on a relevant issue	20 assessments Avg. score: 74.2 Four samples
CS2656 S06 Database Management	Information Stewardship & Computer Technology	14 assessments Avg. Score: 85.4 Three samples
CS3406 S06 Operating Systems	OS Research Topic <ul style="list-style-type: none"> • Exokernal Operating Systems • User Authentication Utilizing Biometric Methods 	3 assessments No % score Three samples

	<ul style="list-style-type: none"> • Beowulf Clusters 	
SE 3250 F05 Software Engineering I	SW Development or Metrics <ul style="list-style-type: none"> • Number and Categorization of Issues Resulting from a Code Review • Metric: Person Hours Spent per Activity 	7 assessments Avg. Score: 88.9 Four samples
CS4556 S06 Artificial Intelligence	<ul style="list-style-type: none"> • Smart Compilers • Text to Speech • Vehicle Recognition 	10 assessments No % score Two samples

Samples:

Freshman: Legality of Downloading Music

Sophomore: Information Stewardship

Junior: User Authentication Utilizing Biometric Methods

Questions, comments or suggestions concerning form:

- Let's stay uniform, keep assignments of written papers

C. The next standardized form to be reviewed by Frank Ackerman was Development Process Skills form. The C.S. program does not have a lot of data. One of the reasons for this is because the form was not developed until later. There was a different form that was in place but you could not use it to compare data.

Written Evaluations Summary F06

Course	Topic	Summary
CS2116 S06 CS 1	Date Class	8 assessments No %
CS456 S06 Networking Principles	Multi-threaded Client or Server	9 assessments No %
CS2116 F06 CS 1		17 assessments Avg. score is 73.0

Samples:

Freshman – Date Class

Freshman – Compute GPA

Questions, Comments, or suggestions concerning forms:

- Who makes sure these assessments are getting done? Is that Celia's job? *Yes*
- Is it to early to tell how the assessment tools are doing? *Yes, we really haven't used them yet.*
- It is nice to have a structure in place, it keeps faculty organized and students get used to the expectations.
- Faculty scoring on the standardized written, oral and development process should be calibrated (see http://www.mtech.edu/math_science/cs_se/Forms/std-oral-assessment-form.htm)
- Watch video of the student's presentation and have the student critic themselves
- Show a video of a good presentation and a video of a not so depth presentation so the students can see the difference.
- Faculty can ask students questions after each oral presentation to encourage depth in the presentation. A question shall be added to the standardized form that rates the students on their ability to answer questions.
- Add a new course: Presenting Technical Information and keep Public Speaking in curriculum.

IX. Feedback from Reflection Papers:

Celia Schahczenski presented the summary. Over 28 reflection papers were collected in 3 courses for the academic years 2004/2005 and 2005/2006. Most of these were collected in the 2005/2006 year. Courses were to include Database Management (CS2656), Software Engineering I and II (SE3250 and SE3260), Senior Design (SE4920) and Internships (SE4916). Reflection papers were written in each of these classes; however, data is not present for SE3260 or SE4920.

Unfortunately we have collected the wrong information. The program outcomes that are being assessed are:

- CS/SE 2: Work with clients and co-workers, have tact and see things from other perspectives. (ABET c: an ability to design a system, component, or process to meet desired needs)
- CS/SE 7: Work effectively in multi-disciplinary teams. (ABET d: an ability to function on multi-disciplinary teams)
- CS/SE 9: Learn new technologies independently (ABET i: recognition of the need for, and an ability to engage in life long learning)
- CS/SE 10: See a multistage project/ task through to completion.
- CS/SE 16: Work effectively in a non-IT application domain. (ABET SE 3: the ability to work in one or more significant application domains)

We kept a copy of the good, average, and poor reflection papers and we kept all of the written assessment forms. However, the written assessment forms do not give us feedback on the above questions. Celia purposed a new form for reflection papers.

Questions, comments or suggestions concerning reflection paper:

- Develop a new description of the reflection paper.
- Develop a new standardized reflection paper form.
- Take the names off of the reflection papers
- In reflection paper, instead of asking students to describe how they worked as a team, ask them to describe conflicts that they had in working as a team.
- Design a database for the information
- Performance review is basically what you are using these reflection papers for. This is a good exercise, it has some real world applications to it, peer feed back is very important.
- Peer review forms should be collected
- A standardized peer review form should be developed

X. Feedback from Assessment Exams

Michele Van Dyne presented the feedback form the assessment exams. Michele explained the procedure used to summarize the data and presented summaries by program outcome and by course.

Observations and conclusions:

Many of the questions were listed more than once in the test bank. Inconsistencies were found as to which program outcome the question related, particularly where outcomes were separated between CS and SE. It is suggested that the test bank be cleared of redundancies and each question evaluated for the outcome to which it relates.

Some of the outcomes appear under-represented (or not represented at all) and some of the courses were under-represented (or not represented at all). If it is important that all courses be equally represented, it is suggested that questions be added to address those courses under-represented, and a method for equalizing the number of questions selected per course for each test be developed. Obviously, those courses at lower levels are more likely to have more exam questions appear on exams because students will have taken those courses earlier in their studies. For the most part, courses with no exam questions associated with them were either internships or senior project courses. The only course that should have had some exam presence which didn't was SE 3300, User-Interface Design.

Some questions showed a very poor correct answer rate, with some questions receiving no correct answers at all. This either indicates that the question is not representative of what is being taught, or that the concept is not being presented to students. This should be investigated. On the other end of the extreme, some questions were answered correctly all the time. Again, these questions should be evaluated to make sure they are measuring what is expected.

Questions, comments, or suggestions concerning Assessment Exams:

- Do you want a measurement of what your students forgot? *Yes, we want to know what the student retained and what the student did not retain.*
- Are we covering things that we think are really important? *The purpose of the matrix is to help us decide this.*
- How technical are the questions, it is unlikely the student would retain some things throughout the summer.
- A lot of this is how we write the questions and quite honestly I don't think we have done a good job.
- The assessment exams are really helpful.
- Periodically have members of the advisory board take an assessment exam.
- Check out CS CRE exams, ETS CS exams, the Professional Software Engineering Exams and any other appropriate standardized exams to give us ideas for our questions.

XI. Welcome

Chancellor Frank Gilmore welcomed the board members to MT Tech and emphasized the importance of their advice to the department. Dr. Gilmore gave an overview of the new MT Tech logo “*Get into it!*” Dr. Gilmore also expressed his appreciation to the board members for their time and efforts put in to the Computer Science program.

XII. Purposed Changes to the Program Outcomes

The faculty propose changing program outcome CS/SE 16 “Work effectively in non-IT application domains” to “Work effectively in one or more significant application domains”. “Non-IT” does not capture the idea of working in a significant domain. This program outcome was motivated in part by ABET SE criteria 3 “the ability to work in one or more significant application domains”. The proposed change more closely parallels the ABET wording.

In addition Celia proposed that grammatical errors throughout the assessment document be fixed and this was unanimously accepted.

XIII. Feedback from Educational Objectives

Jeff Braun summarized data collected on how well the program is meeting its educational objectives. Educational objectives are measured 4-5 years after graduation. The objectives are for graduates to have adapted, thrived and contributed in an industry setting or completed a graduate program.

The Computer Science Department contacted 13 graduates from 2002 and 2003. All graduates have worked professionally in CS related fields and two have attended graduated school. Six have worked for more than one organization (including graduate school). All 8 graduates contacted from the class of 2003 are coding as part of their current positions.

The survey form contains 7 questions related to the educational objectives and the results were summarized.

Questions, Comments, or suggestions concerning form:

- Develop questions for supervisors and alumni 4-5 years out and contact a supervisor at Computers Unlimited and EchoStar at the minimum.
 - This was called for but never completed in the current assessment plan objectives (see http://www.mtech.edu/math_science/cs_se/)
- The question about membership in professional societies seemed insufficient for determining if alumni have demonstrated an ongoing commitment to professional development.
- Develop a written survey that will be given to alumni 4-5 years after they graduated. This survey will ask students how prepared they were in various areas. In addition to interviewing the alumni over the phone, have them take this survey.
 - While on the phone interviews give useful information, we may gain additional information by asking alumni how prepared they were in particular areas. Seeing these areas spelled out may enhance feedback.

XIV. Wrap up

Celia Schahczenski discussed next year’s meeting. Board members requested more of an advanced notice for the next meeting. The week of the Career Fair was a suggested time for the next IAB meeting. Celia will contact members by email to coordinate the next IAB meeting.

Closing remarks: Celia “Thank you for all of your input. This was a very productive meeting.”

