

**Summary of Formative Mentor Evaluations of the NIH-NSF Southern California Bioinformatics Summer Institute Program held at California State University, Los Angeles during summers 2003-2005. A total of 30 mentors responded to the survey over the 3 year period; 5 in 2003, 5 in 2004 and 14 in 2005. Items are listed in rank order for the complete 3 year time period. The number of mentors who identified each item is indicated to the left of the item. The years that an item was identified and the rank (average for ties) for the item that year are indicated in parentheses following the items. Interesting direct quotes or paraphrased comments are included in sections II and III. Totals may exceed 30 if some mentors entered several responses to a question**

I. Comments on your student's preparedness for the project itself

1. Computer knowledge?

- 18 programming skills (2003/2, 2004/1, 2005/1)
- 11 basic computer knowledge/skills appropriate for project (2003/1, 2004/2, 2005/1)
- 4 willingness to learn new programs (2003/2.5, 2005/3)
- 2 familiarity with spreadsheet programs (2003/5, 2005/6)
- 1 well organized (2003/5)
- 1 bioinformatics training (2005/6)
- 1 weak computer skills (2005/6)
- 1 MATLAB experience (2003/5)

2. Math knowledge?

- 12 sufficient for project (2004/1, 2005/1)
- 3 basic math skills/knowledge (2003/1)
- 3 not sure (2003/2.5, 2005/4.5)
- 3 good (2004/2)
- 3 not applicable (2005/2)
- 2 understanding of basic statistics (2003/2.5)
- 2 nothing indicated (2005/3)
- 1 knowledge of advanced statistics/clustering algorithms (2003/4.5)
- 1 advanced math skills/knowledge (2005/4.5)

3. Biology knowledge?

- 10 sufficient for project (2004/1, 2005/1.5)
- 10 basic biology (2003/1, 2004/2.5, 2005/1)
- 4 fundamental understanding of microarrays (2003/2.5, 2005/3)
- 2 none indicated (2003/2.5)
- 2 not applicable (2004/2.5, 2005/5)
- 1 eager to learn what is needed (2005/5)
- 1 biochemistry/genetics knowledge (2005/5)

B. Weaknesses as they apply to the project

1. What computer-related skills had you expected/hoped would be more fully developed in your student than they are?

- 19 nothing indicated (2003/1, 2004/1, 2005/1)
- 5 familiarity with specific languages/programs (2003/3.5, 2005/2)
- 4 programming experience (2003/2, 2004/2, 2005/4.5)
- 2 ability to learn quickly (2005/3)
- 1 EXCEL skills (2005/4.5)
- 1 organizational skills (2003/3.5)

2. What math concepts had you expected your student to have more completely internalized prior to their research experience?

- 22 none (2003/1.5, 2004/1, 2005/1)
- 8 probability and statistics (2003/1.5, 2005, 2)

3. What biology concepts had you expected your student to have more completely internalized prior to their research experience?

- 25 none (2003/1, 2004/1, 2005/1)
- 2 molecular Biology/Human Genetics Knowledge (2003/2.5, 2004/3)
- 1 knowledge of microarrays (2003/2.5)
- 1 population genetics/variation (2004/3)
- 1 general Biology (2004/3)

4. Would you view the acquisition of the skills and knowledge you have cited above as

a) an appropriate part of college or graduate curriculum,

- 4 probability and statistics/math or life science major/1 required and 1 elective
- 4 programming skills/computer science, bioinformatics, math, biology, computational biology major/required and elective
- 1 molecular Biology/bioinformatics, computer science major/ required as an “undergraduate research program” (in conjunction with a research laboratory) for upper division students.
- 1 general Biology/bioinformatics or computer science major/required
- 1 critical Thinking/any major/required
- 1 organizational skills/any major/required

or,

b) material that would more likely be acquired outside of school, on the job.

- 4 statistics if computer science/biology major
- 3 specific computer languages
- 1 specific biological knowledge
- 1 knowledge of microarrays

5. If you answer “a” to #4 above, in which part of an undergraduate/M.S. curriculum would you expect it to be included.

a) What major? See 4 above.

b) Required or elective in that major? See 4 above.

6. What have you or your student done to make up for any weaknesses noted above?

- 9 mentor conducts tutorials (2003/4, 2004/2, 2005/1.5)
- 8 student has taken responsibility for researching topics and self-teaching (2003/4, 2005/1.5)
- 8 not applicable (2004/1, 2005/3)
- 4 mentor provides reading materials (2003/4, 2004/3, 2005/4.5)
- 3 mentor enlists help of others in lab/at worksite (2003/4, 2005/4.5)
- 3 student and mentor worked together to debug and fix errors (2003/1)
- 1 student shows no hesitation in seeking advice (2003/7)

II. Comment on your student's work ethic.

A. Does your student

1. Arrive at work on time? 28 Yes/2 not applicable

2. Put in a full, wisely spent workday? 27 Yes/3 do not know

comments –some mentors note that students put in more than a full day, “a few absences and short days”

3. Respond to suggestions and criticisms positively? 28 Yes/2 do not know

comments - “Yes, and asks for them.”

4. Interact positively with all individuals in the workplace? 28 Yes/2 do not know

5. Take initiative? 29 Yes/1 could use improvement

comments – “could do it a bit more”, “quite a bit”

6. Use good judgment about whom, when and how frequently to ask for help? 28 Yes/2 do not know

comments - “Could ask more. If I stop by to check, he will ask.”, 1 mentor felt that they had been away so much that it had prevented the student from asking for help, “most of the time”

7. Study on his/her own time to make up for deficiencies? 18 Yes/10 do not know/2 N/A

comments - “I don't know how long it should take to learn what she is learning, so it is hard to judge.”, “quite a bit

B. Your responsibilities as a mentor – Have you

1. made clear to your student your expectations with respect to

a. the project? 28 Yes/1 no answer/1 expectations somewhat unknown

comments - “as clear as possible, as the current project rapidly changes”, “I hope so. I think so.”

b. Workplace “rules”? 25 Yes/4 No/1 no answer

Comments - several mentors note that there are few/no rules, “No we did not discuss this, but there were no issues.”

2. provided help when you were asked? 30 Yes

comments - “student takes volunteered help very well”, “I have referred her to our programmer for more technical help”, “if unable to provide assistance, recommended they consult with a senior programmer”, “extensively”, 1 mentor notes that a graduate student provided help in their absence, but plans to be more involved from now on

III. Please provide any additional comments you feel would be helpful at this time. Include any issues you would like to see addressed on subsequent evaluations.

- student found all available clustering algorithms for use in the lab in the future
- "...I hope that the major lesson s/he gets from this project is how rapidly data can accumulate, and how rapidly one may get confused without guidelines – particularly with microarrays."
- "...has been a model student, anxious to learn. S/he was not upset when we determined that a software development role was not appropriate, and has sought multiple ways of contributing. His/her interests are more heavily weighted towards math than biology, but is quite capable of understanding any biological concepts needed."
- "Although I was somewhat critical above, I wish to emphasize that X has a very strong work ethic, has been serious about her/his project, and has been a pleasure to work with."
- "X has an excellent work ethic and is a pleasure to work with."
- "It is simply too early to judge how s/he will work out. Until now, s/he's spent all her/his time learning the background (reading books on perl, cgi, dbi, etc., as well as trying to understand existing code). S/he only started generating code herself this week. In a few weeks we'll know whether s/he accomplished anything. S/he seems OK with how things are proceeding, so I'll wait and see."
- "X's progress is above what I would consider average progress in the program."
- "Both students were a joy to have. They arrived with their necessary background, took to their assigned tasks, and were able to work independently."
- "I feel the students represented the "ideal duo" for the SoCalBSI program. They performed well as complimentary entities. [Name omitted] had more advanced knowledge in biology (due to standing in Biology major) while [name omitted] brought to the project the expertise in programming and database architecture. Though I felt both students project might be a bit "mundane" (designing a DB to keep track of repetitive PCR experiments) during its inception, design, and initial programming, I was pleased to see the interest it generated amongst some of the mentors from the other institutions at the final presentation. As a result of these responses, I feel [names omitted] felt their time had been well spent on a worthwhile project, that with the commitment of one student, will result in a finished product useful to not only my group but to potentially others as well. I was impressed by both students work ethics – arriving at 8:30 am and typically staying at their workstations until 5:30 pm to 6:00 pm. I also feel that [name omitted] represents a 'new breed' of students – one caught between their love of biology and desire to pursue mathematical interests prior to the advent of a *bone fide* Bioinformatics major."
- "[Name omitted] possesses a realistic view of the computer world. The student represents an unconventional student having returned to school to pursue Bioinformatics. I am confident the student will learn additional biological concepts that will allow the student to prosper in Bioinformatics and better integrate with bench-driven biologists."
- "I would hope that future evaluations by students would allow them to provide feedback about their internship mentors. Perhaps this currently exists though I have not had any feedback one way or another. Might this be possible? Positive and negative feedback can assist the mentors in providing the most productive work environment possible for future students."
- time spent on internship is truncated due to extensive microarray data analysis training
- "It has been a positive experience to work with (the student)."
- "incredibly diligent worker who performed above and beyond our best hopes for an student"
- 1 mentor suggests adding a self evaluation for students indicating level of interest in various areas of bioinformatics
- room for growth in critical thinking and analysis - typical of undergraduates - trying to emphasize in discussions with student (appropriate controls, aberrant results)
- student has "demonstrated extraordinary resilience and initiative", compares the student to a graduate student instead of an undergraduate student ("I have been very impressed.")
- pleasure to have student
- "I believe that this is a very good program and that the student is benefiting from the exposure to the lab environment."