

NTID
Laboratory Science Technology Program Outcomes Assessment
Plan and Report for AY 2008-2009

Program Goal: To provide graduates with laboratory analytical testing knowledge and skills, for entry level positions, with scientific organizations.

Critical Outcomes for all Students		Assessment of Outcomes		Timeline		Results	
Domain/Task/ Capability	Performance Criteria/ Benchmarks	Instrument/ Opportunity	Assessment of Performance	Develop	Collect	Summarization of Results	Use of Results
1. General Skills and Professional Competence (Technical) [Eighty percent (80 %)] of all students will understand, use, and document appropriate laboratory skills related to safety, quality control, technical communication, and professional readiness.	<p>a. Students will understand and apply safety regulations and protocols and correctly utilize safety equipment.</p> <p>b. Students will appropriately follow quality control procedures.</p> <p>c. Students will demonstrate effective technical communication of results.</p> <p>d. Students will develop a resume that is accurate, complete, and professional.</p>	Portfolio review. To occur at the end of Laboratory Applications VI course (0879-206).	a.-d. Score of at least "2" ("acceptable/meets entry level professional standards") on all related items on the Laboratory Science Technology portfolio rating sheet.	AY 2004-2005	Annually in the Laboratory Applications VI (0879-206) or Senior Seminar (0879-250) courses.	<p>12 students in the Laboratory Applications VI/Senior Seminar courses were evaluated in academic year 2008-2009.</p> <p>92% of students performed at or above the benchmark for Safety-related skills in the General Skills and Professional Competence sections.</p> <p>83% of students performed at or above the benchmark for Quality Control-related skills in the General Skills and Professional Competence sections.</p> <p>100% of students performed at or above the benchmark for Technical Communication-related skills in the General Skills and Professional Competence sections.</p> <p>92% of students performed at or above the benchmark for the Development of a Professional resume skill in the General Skills and Professional Competence sections.</p>	<p>The program again met the benchmark for all items in the General Skills and Professional Competence section. For the past several years, we have reported improvement in the all-important category of Laboratory Safety due to programmatic curricular changes. We believe that this trend of improvement is still occurring, even though we had one student (n=1) not meet an acceptable rating in this field. We believe that this was an issue of improper documentation of the skill in the student's portfolio, not due to an actual lack of competence of the technical skill. The same could be said for the Quality Control assessment- two students (n=2) appeared to have difficulty documenting this skill in their portfolio. Last year, we reported a desire to improve on Technical Communication, and this year we are pleased to report improvement (100%, n=12 students meeting the acceptable rating in this category). One student (n=1) did not submit a Professional Resume with the portfolio.</p> <p>We feel that the program is doing a very good job of addressing all technical skills in this section through coursework. In coming years, we plan to instruct students how to better document their technical skills in their portfolios.</p>
2. Instrumentation (Technical) [Eighty percent (80 %)] of all students will produce laboratory reports that demonstrate an understanding of the use of analytical instrumentation including: electroanalytical, spectroscopy, and chromatography	<p>a. Students will demonstrate an understanding of how to set-up, run, and maintain selected electroanalytical probes/meters.</p> <p>b. Students will demonstrate an understanding of how to set-up, run, and maintain</p>	Portfolio review. To occur at the end of Laboratory Applications VI course (0879-206).	a.-e. Score of at least "2" ("acceptable/meets entry level professional standards") on all related items on the Laboratory Science Technology portfolio rating sheet.	AY 2004-2005	Annually in the Laboratory Applications VI (0879-206) or Senior Seminar (0879-250) courses.	<p>12 students in the Laboratory Applications VI/Senior Seminar courses were evaluated in academic year 2008-2009.</p> <p>92% of students performed at or above the benchmark for Probe/Meter-related skills in the</p>	<p>Students continually perform very well in skills related to Instrumental Analysis. We believe that this is a strength of the program and are thrilled that students appear to be performing so well in the field of instrumental analysis; as the setting-up, running, and maintaining of analytical instrumentation is one</p>

instruments.	<p>selected molecular spectrophotometers.</p> <p>c. Students will demonstrate an understanding of how to set-up, run, and maintain selected atomic spectrophotometers.</p> <p>d. Students will demonstrate an understanding of how to set-up, run, and maintain High Performance Liquid Chromatographers.</p> <p>e. Students will demonstrate an understanding of how to set-up, run, and maintain Gas Chromatographers/Gas Chromatographer – Mass Spectrometers.</p>					<p>Instrumental Analysis section.</p> <p>83% of students performed at or above the benchmark for Molecular Spectrophotometer-related skills in the Instrumental Analysis section.</p> <p>100% of students performed at or above the benchmark for Atomic Spectrophotometer-related skills in the Instrumental Analysis section.</p> <p>92% of students performed at or above the benchmark for Gas Chromatographer-related skills in the Instrumental Analysis section.</p> <p>83% of students performed at or above the benchmark for HPLC-related skills in the Instrumental Analysis section.</p>	of the primary expectations of the workplace. No further action is needed at this time.
<p>3. Volumetric and Gravimetric Analysis (Technical)</p> <p>[Eighty percent (80 %)] of all students will produce laboratory reports that demonstrate an understanding of the processes involved in volumetric and gravimetric analyses including: sample preparation, titrations, and gravimetric techniques.</p>	<p>a. Students can perform sample preparation procedures and the corresponding calculations.</p> <p>b. Students can perform gravimetric procedures and the corresponding calculations.</p> <p>c. Students can perform acid/base titrations and the corresponding calculations.</p>	Portfolio review. To occur at the end of Laboratory Applications VI course (0879-206).	a.-c. Score of at least “2” (“acceptable/meets entry level professional standards”) on all related items on the Laboratory Science Technology portfolio rating sheet.	AY 2004-2005	Annually in the Laboratory Applications VI (0879-206) or Senior Seminar (0879-250) courses.	<p>12 students in the Laboratory Applications VI/Senior Seminar courses were evaluated in academic year 2008-2009.</p> <p>100% of students performed at or above the benchmark for Sample Preparation-related skills in the Volumetric/Gravimetric Analysis section.</p> <p>100% of students performed at or above the benchmark for Acid/Base Titration-related skills in the Volumetric/Gravimetric Analysis section.</p> <p>83% of students performed at or above the benchmark for Gravimetric-related skills in the Volumetric/Gravimetric Analysis section.</p>	Students continually perform very well in skills related to Instrumental Analysis. Skills in this category are among the most crucial for individuals working in the field. We will continue to emphasize these skills in coursework so that we maintain this high level of student competence. No further action is needed at this time.

<p>4. Biological and Microbiological Techniques (Technical) [Eighty percent (80 %)] of all students will produce laboratory reports that demonstrate an understanding of biological and microbiological techniques including: tasks involving sterile technique and the identification/classification/evaluation of microorganisms.</p>	<p>a. Students can identify/classify/evaluate microorganisms. b. Students can prepare media using sterile technique.</p>	<p>PORTFOLIO review. To occur at the end of Laboratory Applications VI course (0879-206).</p>	<p>a.-b. Score of at least "2" ("acceptable/meets entry level professional standards") on all related items on the Laboratory Science Technology portfolio rating sheet.</p>	<p>AY 2004-2005</p>	<p>Annually in the Laboratory Applications VI (0879-206) or Senior Seminar (0879-250) courses.</p>	<p>12 students in the Laboratory Applications VI/Senior Seminar courses were evaluated in academic year 2008-2009.</p> <p>67% of students performed at or above the benchmark for Sterile Technique-related skills in the Biological Techniques section.</p> <p>50% of students performed at or above the benchmark for Identifying Microorganisms-related skills in the Biological Techniques section.</p>	<p>Again, this category yielded some of the lowest relative scores. We are in a several year programmatic transition with some of the courses in which these skills are taught. To remedy some of the concerns that we were seeing in prior assessments, this year we offered a Special Topics course (Molecular Biology) as a substitute to one of the Microbiology series courses. Though we will not begin to see the fruits of this change until next academic year, we believe that this modification will not only help the program to remain current with the field, but should also help to address some of the identified student weaknesses that have surfaced as a result of our Outcomes Assessment initiatives. The "Biology strand" of courses are being reviewed- and where the subject of considerable discussion with the program's Advisory Board during their last visit. We also continue to search for faculty to teach, and ultimately improve, these courses.</p>
<p>Co-op Work experience</p>	<p>Having completed a job search process, a student will complete at 10-week co-op work experience.</p>	<p>Assessment will occur prior to graduation by a Co-op supervisor.</p>	<p>80% of the students will successfully complete a 10-week program-related work experience and receive a score of 3 or above (5 point scale) on overall Co-op performance.</p>	<p>AY 2004-2005</p>	<p>Quarterly</p>	<p>For students in the LST program the mean rating by co-op supervisors who completed the evaluation online was 4.50 (N=10) during the four quarters 20074-20083.</p>	<p>We are again pleased that co-op supervisors rate our students so high in overall satisfaction with our students. We believe that this is one of the best metrics for evaluating the efficacy if a program's curriculum, and have always felt that our students are very well trained in practical applications of Laboratory Science and prepared to contribute to the host lab with minimal training while on co-op.</p> <p>Last year we reported a desire to improve the percentage of supervisors who complete evaluations online. We are pleased that this year we had a 100% online return of student</p>

							performance evaluations by supervisors.
Job Placement	Students will gain entry-level employment in the LST field	NCE Data	90% of graduates will be employed in the field.	Ongoing	Annually	For AY 2006-2007 n=2; 100% of students seeking employment were working.	In every case where an individual is not looking for a job, the graduates of the LST program are continuing in baccalaureate programs as a result of a newly established transfer degree from the LST program. The number of students who continue their education past the LST program is a strong majority of graduates. Of the remaining students, we are pleased that 100% are finding permanent jobs.
80 % of graduating students will indicate overall satisfaction with the program and the courses.	Graduating students will indicate overall satisfaction with program and courses.	Student Satisfaction Survey	Students will indicate they <i>Strongly Agree</i> or <i>More Agree than Disagree</i> (4-point scale) when asked to give an overall rating on two global items, one related to the program in general and the other related to the courses in the major.	AY 2004-2005	Annually	<p>11 students in the Laboratory Applications VI/Senior Seminar courses completed surveys in academic year 2008-2009 related to student satisfaction.</p> <p>100% indicated <u>overall satisfaction</u> with the program.</p> <p>•82% responded "Agree Strongly" with question "I would recommend the Laboratory Science Technology Program to other students." The other 18% responded that they "More Agree than Disagree" to the same question.</p> <p>100% indicated <u>overall satisfaction</u> with the courses in their major.</p> <p>•82% responded "Agree Strongly" to the question "I was satisfied with what I learned in the Laboratory Science Technology program." The other 18% responded that they "More Agree than Disagree" to the same question.</p>	<p>Although students indicated overall satisfaction with their courses, we examined the results from the assessment of individual courses and found the following information.</p> <p>•Of the 8 categories of courses, 4 received overall ratings well above average in the extent to which the courses improved their skills. The Instrumentation series of courses, Principles of Chemistry series of courses, Chemical/Biotechnology, and Fundamentals of Chemistry series of courses all received overall ratings above average. These series of courses also received high scores last year (and the year prior), and it appears that we are doing well to satisfy student in these courses. The Fundamentals of Biology course took a step backwards from last year, but was still rated as "average" related to student satisfaction. The Lab Math series of courses showed improvement for the second straight year and are rated "average" in regard to student satisfaction. The Laboratory Applications series of courses received overall ratings of slightly below average. The Microbiology course was somewhat disappointing, receiving overall ratings below average. This course is</p>

						going through curricular and faculty changes. In fact, this past year, we replaced one of the Microbiology sequence courses with a Special Topics course (Molecular Biology). We believe that this new course will better bridge the gap between Fundamental Biology and the applied Biotechnology course.
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Comments:
(Summary/Reflections on progress made since AY 2006-2007 Middle States Report)

Over the past few years, the LST program has been comprehensive in their attention to Outcomes Assessment. Inasmuch as the program is still relatively new, the Outcomes play a major role in the continual shaping of our program. The results of our assessments show that there are many things that we are doing very well. For example, we greatly value the feedback that we receive from the supervisors of our co-op students. We take pride in our program being geared toward satisfying the industrial standards and needs of the laboratory science industry to which we supply graduates, and feel that the positive feedback from employers are confirmations of our efforts. To this end, we are also pleased with the placement of our graduates in permanent jobs.

In regard to specific technical skills, the results of our Outcomes Assessment efforts indicate that we are doing very well in the important areas of instrumental analysis, volumetric/gravimetric analysis, and general laboratory skills. Again, these skills resonate well with the results of supervisor co-op feedback. It seems that every year, in our Outcomes Assessment reports we discuss the concept of Laboratory Safety. Of course, a scientific program can never be too emphatic about attention to safety. Our assessments led us to increase our focus on safety- to a level of believed national leadership for comparable programs. From our assessment efforts, we also learned that, even though the students were very strong in their solution preparation technical skill, the manner in which they were presenting the skill in their portfolios did not match the level of their competence. In classes, we discussed how students could improve this, and the subsequent assessments have been positive.

Like with the increased focus on safety mentioned above, our assessments uncovered areas in need of improvement. Technical skills in the Biology and Microbiology disciplines showed such areas of needed attention in regard to the attainment of technical skills. We have made several programmatic changes in this area, shuffled the sequence of courses, and discussed this program strand in detail with our Advisory Board. This Spring, we will offer a new course (Special Topics: Molecular Biology) in an attempt to better bridge concepts from cellular and microbiology to biotech.

We believe that we have a group of students who are serious about their education. The results of the student satisfaction portion of our Outcomes Assessment efforts show that there appears to be somewhat of a correlation between the courses that they feel are most preparing them for their futures and those in which their portfolios showed that the technical skills were being taught well (i.e- instrumentation skills, volumetric/gravimetric skills, etc.). Likewise, some of the biology/microbiology courses from which assessment of portfolios showed technical skill deficiencies, were also rated lower by the students in their perception of how well the courses are preparing them for the future. Again, this is an area of improvement that we have been investigating, and will continue to modify and monitor.

We are a program in perpetual assessment, and therefore, continual change/improvement. We have confirmed that there are a lot of things that we do very well, and have remedied (or are in the process of remedying) many of our identified areas of improvement. Overall, we are very pleased with the way in which the program is perceived by our students, faculty, and co-op/permanent job supervisors.

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Rev: 07/09/2009