Assessment of Student Learning
Department of Biology
Indiana University-Purdue University Indianapolis

2010-2011 Progress Report
for the Six-Stage Assessment Strategy

Submitted Patricia Clark, Ph.D., Trustee's Lecturer
(Edited by Joseph L. Thompson)
August 2011

Introduction

The IUPUI School of Science Assessment Committee endorsed the following six-stage plan in 2005 to assess the academic programs of its eight undergraduate programs (Biology, Chemistry, Computer Science, Earth Science, Forensic and Investigative Sciences, Mathematics, Physics, and Psychology).

Stage 1 → Identify the program's student learning outcomes (SLOs).
Stage 2 → Link these SLOs to specific components of the program's curriculum.
Stage 3 → Identify or create methods to measure these SLOs.
Stage 4 → Collect data to determine if the SLOs are being accomplished successfully.
Stage 5 → Use the data collected in Stage 4 to make curricular changes.
Stage 6 → Repeat Stage 4 to determine if the curricular changes were effective.

These stages are comparable to the following stages in the Planning for Learning and Assessment table that has been approved and distributed by IUPUI's Program Review and Assessment Committee,

1. What general outcome are you seeking?
2. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)
3. How will you help students learn it? (in class or out of class)
4. How could you measure each of the desired behaviors listed in #2?
5. What are the assessment findings?
6. What improvements have been made based on assessment findings?

Current State of Assessment in the IUPUI Department of Biology Undergraduate Program

As a result of the addition of new faculty and changes in course offerings, the Department of Biology has revised the identification and refinement of the department SLOs. The linking of SLOs with individual courses, stages 1 and 2 of the School of Science's six stage plan to assess the academic programs of its eight undergraduate programs of strategies, has been completed. As a result of the current revisions, we have also been able to begin work on the identification and creation of methods to measure the SLOs, stage 3, of the six stage plan. In addition some faculty have begun the assessment and revision of course material, stage 4. We will continue to revise the work completed on stages 1 and 2 as a result of reassessing the Biology curriculum and as a result of continuing to add new faculty. Although much progress has been made towards the completion of stage 3, work will continue on stage 3 through the coming academic year.

Stage 1 → Identification of the Department's Student Learning Outcomes (SLOs)

The Department of Biology has historically had a Departmental set of SLOs in place. However, these SLOs were dramatically upgraded in the 2010 – 2011 academic year. The Department of Biology SLOs are as follows:

1. Demonstrate knowledge of how biological molecules such as DNA, RNA, proteins, lipids, and carbohydrates contribute to the structure and function of prokaryotic and eukaryotic cells.

2. Integrate the cellular, molecular and physiological basis of how organisms develop structure, carry out functions, sense and control their environment, and respond to external change.

3. Describe how genetic principles associated with natural selection contribute to the functioning of an organism and the evolutionary diversity of life on earth.

4. Access, evaluate, and communicate information relevant to the study of biological sciences.

5. Work safely and effectively with basic laboratory techniques and instrumentation.

6. Exhibit problem solving and critical thinking skills needed to design and implement laboratory projects, and gather, analyze and draw conclusions from data.

7. Apply basic principles of chemistry, math, and other disciplines to the functioning of living systems.

8. Successfully complete a laboratory or literature-based research project with supervision from a faculty sponsor.

Stage 2 → Link These SLOs to Specific Components of the Department's Curriculum

Faculty members in the Biology Department were asked to identify the SLOs addressed in individual courses and indicate the level of presentation of each SLO. When addressed, the level of presentation of an SLO was identified as beginning, intermediate, or advanced. The analysis of this information was then used by the department to determine where each SLO was being taught in the curriculum and at what level students were expected to understand the concept addressed in each SLO. The results of this curriculum audit are given in **Appendix A**.

Stage 3 → Identify or Create Methods to Measure These SLOs

In preparation for the 2012 reaccreditation, faculty members of the Biology Department were asked to identify the Principles of Undergraduate Learning (PULs) most closely aligned with the SLOs of their courses (for a listing of the Biology courses and the PULs selected as having a major emphasis, a minor emphasis, or some emphasis see http://www.planning.iupui.edu/pul/matrix/). As a result of the University-wide implementation of PUL assessment, the faculty identified an existing tool or produced assessment tool appropriate for measuring student achievement of the major emphasis PUL, (this may also apply to minor emphasis PULs, and some emphasis PULs, if identified). As a result of the alignment of course SLOs with the university PULs, assessment of student acheivement of the identified PUL also allowed the faculty member to also assess the student's acheivement relative to the SLOs. As faculty continue to assess student attainment of PULs in additional courses, the tools for assing student acheivment of SLOs will also progress. The general means of SLO assessment are given in **Appendix B.**

Stage 4 → Collect data to determine if the SLOs are being accomplished successfully.

The Department of Biology faculty is currently being asked to collect data to assess the successful completion of SLOs by students in their courses.

Stage 5 → Use the data collected in Stage 4 to make curricular changes.

The Department of Biology has made an audit of the past curriculum (2009) and has made changes in the curriculum as a result of this audit. These changes were based primarily upon faculty turnover and the hiring of new faculty. The department has not yet assessed the entire curriculum based upon student achievement of SLOs, but is in the process of doing so. This has progressed further for some courses than in other courses with respect to the collection and assessment of student SLO achievement. As a result, some of the faculty are currently in the process of modifying their courses and providing information for department curricular changes.

Appendix A
IUPUI Department of Biology
Student Learning Outcomes (SLOs)

Course	Title	Cr Hrs	**Biology Student Learning Outcomes** Demonstrate knowledge of how biological molecules such as DNA, RNA, proteins, lipids, and carbohydrates contribute to the structure and function of prokaryotic and eukaryotic cells.	Integrate the cellular, molecular and physiological basis of how organisms develop structure, carry out functions, sense and control their environment, and respond to external change.	Describe how genetic principles associated with natural selection contribute to the functioning of an organism and the evolutionary diversity of life on earth.	Access, evaluate, and communicate information relevant to the study of biological sciences.	Work safely and effectively with basic laboratory techniques and instrumentation.	Exhibit problem solving and critical thinking skills needed to design and implement laboratory projects, and gather, analyze and draw conclusions from data.	Apply basic principles of chemistry, math, and other disciplines to the functioning of living systems.	Successfully complete a laboratory or literature-based research project with supervision from a faculty sponsor.
BIOL-K101	Concepts of Biology I	5	B		B	B	B	B	B	
BIOL-K103	Concepts of Biology II	5	B	B	B	B	B	B	B	
BIOL-K322	Genetics and Molecular Biol.	3	I		I				B	
BIOL-K323	Genetics & Mol. Biol. Lab	2	I	B			I	I	I	
BIOL-K324	Cell Biology	3	I	I		B			I	
BIOL-K325	Cell Biology Lab	2	B	I			I	I	I	
BIOL-K331	Embryology	3	I	A	B	I			I	I
BIOL-K333	Embryology Lab	2	I	A			I	I	B	
BIOL-K338	Intro. Immunology	3	I	I						
BIOL-K339	Intro. Immunology Lab	2	I	I			I	I	B	
BIOL-K341	Prin. of Ecology & Evol.	3		I	I			I		
BIOL-K342	Prin. of Ecol. & Evol. Lab	2		I	I	I	I	B	B	
BIOL-K350	Comp. Animal Physiology	3	I	I	I	I			I	I
BIOL-K356	Microbiology	3	I	I	I	I			B	
BIOL-K357	Microbiology Lab	2	I	I	I		I	I	I	
BIOL-K411	Global Change Biology	3		I	I			I		
BIOL-K483	Biological Chemistry	3	A						A	
BIOL-K484	Cellular Biochemistry	3	A	A		A	A	A	A	
BIOL-K295	Special Assignments	Arr				B	B	B	B	B
BIOL-K490	Capstone	1								A
BIOL-K493	Independent Research	1 to 3				A	A	A	A	A
BIOL-K494	Senior Thesis	1				A		A		A

Key
B - Beginning
I - Intermediate
A - Advanced

Appendix B
IUPUI Department of Biology
SLO Assessment Methods

Course	Title	Cr Hrs	**Biology Student Learning Outcomes Assessment Methods** Demonstrate knowledge of how biological molecules such as DNA, RNA, proteins, lipids, and carbohydrates contribute to the structure and function of prokaryotic and eukaryotic cells.	Integrate the cellular, molecular and physiological basis of how organisms develop structure, carry out functions, sense and control their environment, and respond to external change.	Describe how genetic principles associated with natural selection contribute to the functioning of an organism and the evolutionary diversity of life on earth.	Access, evaluate, and communicate information relevant to the study of biological sciences.	Work safely and effectively with basic laboratory techniques and instrumentation.	Exhibit problem solving and critical thinking skills needed to design and implement laboratory projects, and gather, analyze and draw conclusions from data.	Apply basic principles of chemistry, math, and other disciplines to the functioning of living systems.	Successfully complete a laboratory or literature-based research project with supervision from a faculty sponsor.
BIOL-K101	Concepts of Biology I	5	E		E	E	L	L	E	
BIOL-K103	Concepts of Biology II	5	D, E	D, E	D, E	L	L	L	E, L	
BIOL-K322	Genetics & Molecular Biol.	3	E		E				E	
BIOL-K323	Genetics & Mol. Biol. Lab	2	E	E			E, L	E, L	E, L	
BIOL-K324	Cell Biology	3	E	E		E			E	
BIOL-K325	Cell Biology Lab	2	E	E			E	E	E	
BIOL-K331	Embryology	3	E	E	E	E			E	E
BIOL-K333	Embryology Lab	2	E	E			E	E	E	
BIOL-K338	Intro. Immunology	3	E	E						
BIOL-K339	Intro. Immunology Lab	2	E	E			E	E	E	
BIOL-K341	Prin. of Ecology & Evol.	3		E	E			E		
BIOL-K342	Prin. of Ecol. & Evol. Lab	2		E,L,O	E,L,O	E,L,O	E,L	E,L	E,L	
BIOL-K350	Comp. Animal Physiology	3	D,E	D,E	D,E	E			E	P
BIOL-K356	Microbiology	3	E	E	E	E			E	
BIOL-K357	Microbiology Lab	2	E	E	E		E	E	E	
BIOL-K411	Global Change Biology	3		O,P	O,P			O,P		
BIOL-K483	Biological Chemistry	3	E,D						E,D	
BIOL-K484	Cellular Biochemistry	3	E	E		E	E	E	E	
BIOL-K295	Special Assignments	Arr				V	V	V	V	V
BIOL-K490	Capstone	1								V
BIOL-K493	Independent Research	1 to 3				V	V	V	V	V
BIOL-K494	Senior Thesis	1				V		V		V

Key
D - Discussion
E - Exam
L - Lab Report
O - Oral Report
P - Paper
V - Varies by Instructor

Assessment of Student Learning
Department of Chemistry and Chemical Biology
Indiana University-Purdue University Indianapolis

2010-2011 Progress Report

Submitted by Hongqiu Zhao, Ph.D.
(Edited by Joseph L. Thompson)
July 2011

Introduction

Outcome based assessment is the current trend in higher education. IUPUI proposed Principles of Undergraduate Learning (PULs), which summarize the general education outcomes and abilities we want all undergraduate students to have opportunities to achieve, regardless of major. Starting Spring 2010, all courses offered by each department are required to assess PULs at least once by 2014.

Principles of Undergraduate Learning

1 = Core Communication and Quantitative Skills
2 = Critical Thinking
3 = Integration and Application of Knowledge
4 = Intellectual depth, Breadth and Adaptiveness
5 = Understanding Society and Culture
6 = Values and Ethics

Concurrently, the IUPUI School of Science Assessment Committee endorsed the following six-stage plan in 2005 to assess the field-specific student learning outcomes for each of its eight undergraduate programs (Biology, Chemistry, Computer Science, Earth Science, Forensic and Investigative Sciences, Mathematics, Physics, and Psychology).

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Stage 5 → Use the data collected in Stage 4 to make curricular changes.
Stage 6 → Repeat Stage 4 to determine if the curricular changes were effective.

These stages are comparable to the following stages in the Planning for Learning and Assessment table that has been approved and distributed by IUPUI's Program Review and Assessment Committee,

1. What general outcome are you seeking?
2. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)
3. How will you help students learn it? (in class or out of class)
4. How could you measure each of the desired behaviors listed in #2?
5. What are the assessment findings?
6. What improvements have been made based on assessment findings?

To prepare for the re-accreditation in 2012, IUPUI required each school and department to revisit and propose solid and assessable Undergraduate Learning Outcomes for each undergraduate degree offered.

Current State of Assessment in the Department of Chemistry and Chemical Biology

1. Revisit of Student Learning Outcomes (SLOs) for undergraduate and graduate students

During 2007 to 2008 school year, SLOs of each branch of Chemistry were devised and approved by Chemistry department. Though these detailed SLOs are great guidelines for assessment, they do not meet the general guideline for accreditation purpose. During 2010-2011 school year, the following SLOs were proposed based on the degrees (B.A., B.S., M.S. and Ph.D.) offered by Department of Chemistry and Chemical Biology, and were approved by faculty and chair of Chemistry Department:

Students who graduate with a B.A. degree in Chemistry from IUPUI will be expected to:

1. Understand major concepts and theoretical principles in organic chemistry, analytical chemistry and physical chemistry.
2. Exhibit problem solving and critical thinking skills relevant to the field of chemistry.
3. Access, retrieve, and interpret accurate and meaningful information from the chemical literature.
4. Communicate scientific information effectively, both orally and in writing.
5. Work effectively in teams in both classroom and laboratory.
6. Design, carry out, record, analyze the results and draw conclusion of chemical experiments.
7. Use instrumentation for chemical analysis and separation.
8. Use computers in experiments, data analysis, and in communication.
9. Understand and follow safety guidelines in chemical labs.
10. Be aware of and abide by ethics and professional standards suggested by the American Chemical Society.
11. Integrate knowledge from mathematics, physics and other disciplines in support of chemistry.

Students who graduate with a B.S. degree in Chemistry (including biochemistry options) from IUPUI will be expected to:

1. Understand major concepts, theoretical principles and experimental findings in organic chemistry, analytical chemistry, inorganic chemistry, physical chemistry and biochemistry.
2. Exhibit problem solving and critical thinking skills relevant to the field of chemistry.
3. Access, retrieve, and interpret accurate and meaningful information from the chemical literature.
4. Communicate scientific information effectively, both orally and in writing.
5. Work effectively in teams in both classroom and laboratory.
6. Design, carry out, record and analyze the results of chemical experiments.
7. Use instrumentation for chemical analysis and separation.
8. Use computers in experiments, data analysis, and in communication.
9. Understand and follow safety guidelines in chemical labs.
10. Be aware of and abide by ethics and professional standards suggested by the American Chemical Society.
11. Integrate knowledge from mathematics, physics and other disciplines in support of chemistry.
12. Conduct research projects with supervision.

Students who graduate with a M.S. degree in Chemistry will be expected to:

1. Demonstrate increased depth of understanding in most sub-disciplines of chemistry.
2. Integrate sub-disciplines of chemistry and other disciplines as applicable in problem solving and research.
3. Read and understand peer-reviewed chemical literature, and apply in field of study.
4. Present and communicate results to peers through poster, seminar and/or publishing.
5. Identify chemical problems and design experiments to solve these problems.
6. Teach effectively in labs or recitations in lower-level undergraduate chemistry courses.
7. (For thesis M.S. only) Propose major area of research and conduct independent research under the mentoring of a research advisor.
8. (For thesis M.S. only) Write and defend the thesis.

In addition to above learning outcomes for M.S. degree, Chemistry Ph.D. students upon graduation will be expected to:

1. Think critically and creatively.
2. Propose original research project and conduct this research independently, including project design, analysis and conclusion.
3. Demonstrate mastery of chemistry in at least one discipline of chemistry.
4. Communicate and defend scholarly works.

2. Assessing PULs in selected Chemistry courses

(1) Courses that assessed PULs in School year 2010-2011
During 2010-2011 school year, the following ten (10) courses offered in Department of Chemistry and Chemical Biology assessed major and moderate PULs:

Fall 2010: CHEM-C121: Elementary Chemistry Lab 1
CHEM-C106: Principles of Chemistry II
CHEM-C342: Organic Chemistry II
CHEM-C410: Principles of Chemical Instrumentation
CHEM-C411: Principles of Chemical Instrumentation Lab
CHEM-C494: Introduction to Capstone in Chemistry

Spring 2011: CHEM-S126: Experimental Chemistry I for Honors
CHEM-C341: Organic Chemistry I
CHEM-C363: Experimental Physical Chemistry
CHEM-C430: Inorganic Chemistry

(2) Direct assessment results

Currently the PUL assessment data are only available at school level, not the department level, but studying the school level assessment data is still valuable to each department. The direct assessment results for the School of Science at different level of courses are summarized in the following table. These results are based on assessment made in Spring 2010, Fall 2010 and Spring 2011.

Faculty Ratings of School of Science Student Performance on PULs

	100 level & lower mean[2]		200 level mean[2]		300 level mean[2]		400 level mean[2]	
	Major	Moderate	Major	Moderate	Major	Moderate	Major	Moderate
1A: Language Skills	329 3.67	153 2.82				136 2.72	4 3.00*	73 3.37
1B: Quantitative Skills	1585 2.69	327 2.85	111 3.12	369 3.27	127 2.96	276 3.10	3 2.00*	31 3.00
1C: Information Resource Skills	174 3.21			232 3.31		123 3.33		
2: Critical Thinking	1294 2.45	480 2.59	241 3.08	806 2.52	711 3.00	356 2.83	255 3.02	15 3.60
3: Integration and Application of Knowledge	714 2.54	477 2.50	1843 2.48	160 2.66	495 2.79	249 2.82	60 3.68	54 2.85
4: Intellectual depth, Breadth and Adaptiveness	183 2.31	169 3.13	248 3.19	435 2.25	494 2.77		17 2.88	23 3.22
5: Understanding Society and Culture						58 2.67		24 3.04
6: Values and Ethics		66 3.55				25 3.36		8 3.13*
Total[1]	4279 2.67	1672 2.73	2443 2.64	2002 2.70	1827 2.88	1223 2.93	339 3.12	228 3.15

[1] Combined number of student ratings in all corresponding level courses sampled in Spring 2010, Fall 2010, and Spring 2011. A student may be evaluated more than once if multiple courses taken were evaluated.
[2] Scale: 1 = "Not Effective", 2 = "Somewhat Effective", 3 = "Effective", 4 = "Very Effective"
* Limited number of students.

(3) Interpretation of assessment results

Though the assessment data are only based on three semesters and limited number of courses offered in School of Science, these results validate the education effectiveness of academic programs in School of Science.

i. Students in science courses demonstrated basic Language Skills (1A), Information Resource Skills (1C) and Values and Ethics (6) to support their study in scientific field.

ii. Students started to develop many skills in Quantitative Skills (1B), Critical Thinking Skills (2), PUL 3 (Integration and Application of Knowledge) and PUL 4 (Intellectual Depth, Breadth and Adaptiveness) in lower level (100- and 200-level) courses. These skills were significantly advanced in upper level (300- and 400-level) courses.

iii. The results showed expected learning curves (development) for students, and when students enter their junior and senior year, they are pretty effective in most of the skills listed in PULs. This is consistent with the following survey on Student Self Ratings of Effectiveness on Principles of Undergraduate Learning Scales (taken from the *Continuing Student Satisfaction and Priorities Survey*).

IUPUI Undergraduate Student Self Ratings of Effectiveness on the Principles of Undergraduate Learning Scales[1]

PULs	IUPUI[2]	School of Science[2]
1A: Language Skills	3.41	3.34
1B: Quantitative Skills	2.98	3.08
1C: Information Resource Skills	3.40	3.41
2: Critical Thinking	3.34	3.27
3: Integration and Application of Knowledge	3.25	3.20
4: Intellectual depth, Breadth and Adaptiveness	3.26	3.27
5: Understanding Society and Culture	3.43	3.42
6: Values and Ethics	3.42	3.33

[1] Only baccalaureate-seeking students of *junior* or *senior* standing were included in this analysis.
[2] Scale: 1 = "Not Effective", 2 = "Somewhat Effective", 3 = "Effective", 4 = "Very Effective"

Plans to Accomplish in Assessment During School Year 2011 – 2012

1. Assessing PULs

PUL assessment will be conducted as scheduled. Six (6) courses, in different branches of Chemistry and at different course level, will assess PULs in Fall 2011 and Spring 2012:

Fall 2011: CHEM-C115: Lab for the Chemistry of Life
CHEM-C126: Experimental Chemistry II
CHEM-C484: Biomolecules and Catabolism

Spring 2012: CHEM-C100: The World of Chemistry
CHEM-C311: Analytical Chemistry Laboratory
CHEM-C343: Organic Chemistry I Laboratory

2. Assessing SLOs

The primary responsibility for assessing SLOs will remain with the Curriculum Committee in the Department. First the SLOs proposed for B.S. degree in Chemistry or Biochemistry concentrations will be mapped to the courses offered in the Department of Chemistry and Chemical Biology. Then plans on assessing Undergraduate SLOs will be proposed and then be circulated amongst the teaching faculty for comments.

Assessment of Student Learning
Department of Computer and Information Science
Indiana University-Purdue University Indianapolis

2010-11 Progress Report
for the Six-Stage Assessment Strategy

Submitted by Joshua Morrison, M.S.
July 2011

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1. Introduction

The IUPUI School of Science Assessment Committee endorsed the following six-stage plan in 2005 to assess the academic programs of its eight undergraduate programs (Biology, Chemistry, Computer Science, Earth Science, Forensic and Investigative Sciences, Mathematics, Physics, and Psychology).

Stage 1 → Identify the program's student learning outcomes (SLOs).
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Stage 6 → Repeat Stage 4 to determine if the curricular changes were effective.

Stage 1 → Identify the program's student learning outcomes (SLOs).

2010-2011, Student Learning Outcomes
Computer and Information Science
The Department's Undergraduate Committee states the following Student Learning Outcomes. After graduation, a student should be able to:

1. Write software programs in multiple programming languages.
2. Understand the theoretical foundations of computer science, including the study of discrete computational structures.
3. Understand and use different programming language paradigms such as procedural, object-oriented, etc.
4. Use different data structures such as linked lists, arrays, stacks, trees, graphs, hash tables, etc to improve efficiency of software, and mathematically or experimentally analyze them and operations on them.
5. Know a diverse array of computational algorithms and their analysis techniques, as related to searching, sorting, optimization, and graph problems.
6. Know fundamental limitations of designing efficient algorithms and the theoretical meaning of the P?=NP problem.
7. Know the basic concepts in formal language theory and their application to compiler design.
8. Understand the basic design of computer architecture and their relationship to software design.

9. Understand and design the basic functionalities of different computer operating systems.
10. Acquire knowledge in multiple advanced areas of computer science, such as databases, data mining, multimedia, graphics, computing security, networking, software engineering, bio-computing, etc.
11. Design, develop, and test small scale software projects.
12. Write scientific project reports and software documentation.

Current State of Assessment in the IUPUI Computer Science Undergraduate Program in Regard to These Stages

The Computer Science Department has finished Stage 5 of the assessment this year and is now working on Stage 6. As in prior years, the Department has engaged undergraduate seniors in the Bachelor of Science program in a senior capstone course that requires, as part of the curriculum, the completion of the Major Field Test (MFT) in Computer Science. The MFT is a standardized exam that covers topics in programming concepts, discrete structures and algorithms, and computer systems, norm-referenced to a large set of college seniors. After implementing the test in the capstone course for two consecutive years, the Department started data analysis and discussion of future improvement of the undergraduate curriculum. The Department determined that we should add an additional course to the core requirements, CSCI 48400, Computational Theory. This course was active many years ago, and will be taught once yearly by a returning former faculty member (part-time), Dr. Judith Gersting. The course includes topics in computational theory, complexity, and algorithms. These areas have been shown to be lacking in our senior-level students for the past two MFT cycles. This deficit persists when viewing the results of the MFT as compared with the overall group, as well as a selected peer group of universities. Happily, our results have been stronger than both the peer and the national group for both years. Even so, our curriculum could be strengthened, and student outcomes improved, by adding this theory course.

2. Major Field Test

The ETS Major Field Tests are comprehensive undergraduate assessments designed to measure the basic, critical knowledge obtained and understanding achieved by students in a major field of study. The Major Field Tests go beyond the measurement of factual knowledge by helping you evaluate your students' ability to analyze and solve problems, understand relationships and interpret material from their major field of study.

ETS offers comprehensive national comparative data gathered from all Major Field Tests taken, enabling the Department to evaluate students' performance and compare the program's effectiveness to those at similar institutions nationwide.

- prepare students to succeed by using test results to improve curricula
- demonstrate the strengths of the program to prospective students and faculty
- compete for performance funding
- help ensure students have mastered their field of study
- use Department faculty time to focus on other aspects of accreditation

The Major Field Test for Computer Science consists of 66 multiple-choice questions, some of which are grouped in sets and based on materials such as diagrams, graphs and program fragments.

3. Performance in Major Field Test

Near the end of the Spring 2011 term, thirteen seniors completed the Major Field Test in Computer Science as part of CSCI 49500, the senior capstone course. These students did very well, scoring an average of 155 on a scale of 120-200. This placed the Department's average in the 62nd percentile of all institutions, eight points lower than the 2010 results. The exam measures performance in three core areas of computer science: Programming, Discrete Structures and Algorithms, and Systems (Architecture, Operating Systems, Networking, Databases). Percentile scores for IUPUI when compared to the full MFT group and comparing with a group of 10 peers are listed below:

Part of Exam	IUPUI %ile Compared to Group (All)	IUPUI %ile for Peer Group
Programming	63	50
Discrete Structures and Algorithms	70	80
Systems	90	99
Total Score	60	62

These results indicate that IUPUI Computer Science majors score better relative to the overall group that took the MFT in Computer Science, and a group of peer institutions. Peers included: East Carolina University, Kent State University, University of Akron, University of Alabama Birmingham, University of Illinois Chicago, University of Memphis, University of Missouri Kansas City, University of Missouri St. Louis, University of New Orleans, Wayne State University. Unfortunately, many other Urban 13-type institutions do not participate in the MFT,

and thus cannot be included for comparison. The Department recognizes that this group of peers is not a perfect match.

4. Planning Next Stage for Improvement

The next step for the Department is to continue to conduct MFT exams each spring for the CSCI 49500 class and determine the effectiveness of the new course in theory and algorithms. Many students taking the Spring 2011 MFT were not required to complete this course, and thus the results on the Discrete Structures & Algorithms section of the exam are unreliable as a measure of improvement in the curriculum. It will take at least 1-2 more years in order to ensure students are completing CSCI 48400, the new required theory course.

Assessment of Student Learning
Department of Earth Sciences
Indiana University – Purdue University Indianapolis

2010-2011 Progress Report
For the Six-Stage Assessment Strategy

Submitted by Jennifer Nelson, M.S., Lecturer
August 2011

Introduction

The IUPUI School of Science Assessment Committee endorsed the following six-stage plan in 2005 to assess the academic programs of its eight undergraduate programs (Biology, Chemistry, Computer science, Earth Sciences, Forensic and Investigative Sciences, Mathematics, Physics, and Psychology).

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5. What are the assessment findings?
6. What improvements have been made based on assessment findings?

Current State of Assessment in the IUPUI Earth Sciences Department in Regard to These Stages

The Earth Sciences Department has accomplished the first stage and is in the process of accomplishing the second and third stage as we assess SLO's and PUL's in each of our courses. The following sections describe this progress.

Stage 1 → Identify the department's student learning outcomes (SLOs).

The Earth Sciences Department synthesized IUPUI's Principles of Undergraduate Learning with new Student Learning Outcomes (SLOs). In the Spring 2011, the faculty decided on 10 new student learning outcomes (SLO's) for the B.S., B.A. and B.A. Earth Sciences Teaching (BAEST) degrees in Earth Sciences, as well as for the 7 new SLO's (with 2-3 concentration-specific SLO's) B.S. degree in Environmental Science (BSES). These new SLO's represent the knowledge a student will attain upon completion of a degree in this department.

Broadly, **upon graduating, students with an undergraduate degree in Geology (B.S., B.A., and BAEST) or Environmental Science (BSES) will**:

- gain access to employment in professions of their choosing related to Earth Science, Science Education, and/or Environmental Science (B.S., B.A., BSES, BAEST).
- gain acceptance to reputable graduate programs in the Earth Sciences, Environmental Sciences, or a program of their choosing (B.S., BSES)
- successfully complete state and/or national professional competency examinations in Earth Sciences (B.S., B.A.)

Students who graduate with a B.A., B.S., or BAEST degree will achieve the following objectives:

1) Solve earth science problems using the scientific method and critical thinking.
2) Describe spatial and temporal variations in Earth processes through modeling, mapping, observation and measurement.
3) Understand the evolution of physical Earth and life as reflected in the geologic time scale.
4) Understand the structural and chemical controls on the physical properties and behavior of Earth materials.
5) Evaluate how physical, chemical and biological cycles are integrated into Earth systems from the local to global scale.
6) Understand how events of the geologic past control the current distribution of resources.
7) Assess the impact of physical and chemical cycles on human health and welfare.
8) Evaluate impacts and potential mitigation strategies for natural hazards, resource utilization, climate and environmental change.
9) Demonstrate competence in communicating Earth science problems to a broad audience through written, oral and visual means.
10) Understand the interdependence of the diverse sub-disciplines of Earth science.

Students who graduate with a BSES degree will achieve the following objectives:

1) Solve environmental science problems using the scientific method and critical thinking.
2) Evaluate physical, chemical and biological cycles related to surficial earth processes and how they operate to describe integrated earth systems from a local to global scale.

3) Demonstrate competence in communicating environmental science problems to a broad audience through written, oral, and visual means.
4) Describe the structure and function of major environmental systems.
5) Effectively apply analytical skills, including basic measurement and monitoring skills, and use of appropriate technology.
6) Understand current thinking and research on the nature, causes, and solutions of environmental problems as they affect human health and the environment
7) Develop knowledge in advanced disciplines of environmental sciences and evaluate inter-relationships between disciplines.

Specialization leading to an advanced understanding of one of the three component areas that are central to the BSES program:

Earth and Water Resources:

1) Understand interactions between land, soil, and water and quantitatively assess processes in soils, hydrogeology, and biogeochemistry.
2) Describe physical, chemical, and biological interactions and processes affecting soil and water resources.
3) Apply advanced analytical techniques related to environmental quality assessments.

Environmental Management:

1) Apply skills needed to characterize hazards, track the fate and transport of pollutants.
2) Identify health and environmental effects of pollutants and plan and manage programs to control environmental hazards.
3) Identify and solve problems in solid and hazardous waste, water quality and wastewater treatment, and air quality.

Environmental Remote Sensing and Spatial Analysis:

1) Develop spatial analytical techniques using remote sensing (satellite and airborne sensors), geographic information system (GIS), and global positioning system (GPS) technologies.
2) Integrate technologies of remote sensing and spatial analysis to problems of environmental modeling and analysis.

Stage 2 → Link these SLOs to specific components of the department's curriculum

Mapping the SLO's to our curriculum will be a goal for the 2011-2012 academic year. The Department of Earth Sciences will next audit our required courses to determine in what courses and at what developmental levels it's SLOs are being taught and assessed. We had begun this process in 2007, but with the updates to the SLO we must revisit and restart this process. These will be reviewed using a similar method as one used by the Department of Psychology who used "The Three Levels of the Developmentally Coherent Curriculum" based on the work of Anderson & Krathwohl, 2001.

Ensuring Student Attainment of the PULs

In preparation for the 2012 reaccreditation, we created a matrix of courses and solicited faculty feedback on the Principles of Undergraduate Learning (PULs) assessed in each of our courses. The matrix below summarizes the results of faculty feedback on the PUL assessment. To date, the rows shaded gray have been assessed per the IUPUI PULs Assessment: http://planning.iupui.edu/pul/matrix/

Spring 2010

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2010	Geology	GEOL-G 115	INTRO TO OCEANOGRAPHY	1			3		2		
Spring 2010	Geology	GEOL-G 117	ENVIRONMENTAL GEOLOGY LAB			1	3	2			
Spring 2010	Geology	GEOL-G 136	INDIANA GEOLOGY LABORATORY	2		1	3				

Fall 2010:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Geology	GEOL-G 107	ENVIRONMENTAL GEOLOGY	1			3	2			
Fall 2010	Geology	GEOL-G 120	PHYSICAL GEOLOGY LABORATORY			1	2	3			
Fall 2010	Geology	GEOL-G 135	INDIANA GEOLOGY			1	3	2			

Spring 2011:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2011	Geology	GEOL-G 109	FUNDAMENTALS OF EARTH HISTORY				1	2	3		
Spring 2011	Geology	GEOL-G 110	PHYSICAL GEOLOGY				2	3	1		
Spring 2011	Geology	GEOL-G 119	FUNDAMENTALS OF EARTH HIST LAB				2	3	1		

Effort in assessing PULs will continue as scheduled. At the same time, assessment data will be collected. These data will be circulated among faculty members and may be used to determine if the SLOs are accomplished successfully. That is the stage 4 of School of Science's six-stage assessment plan.

Fall 2011:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2011	Geology	GEOL-G 130	SHORT COURSE IN EARTH SCIENCE				3	2		1	
Fall 2011	Geology	GEOL-G 335	EVOLUTION OF THE EARTH & LIFE				2	3	1		
Fall 2011	Geology	GEOL-G 495	SENIOR THESIS IN GEOLOGY				1	2	3		

Spring 2012:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2012	Geology	GEOL-G 199	SERVICE LEARNING IN GEOLOGY	1						2	3
Spring 2012	Geology	GEOL-G 304	PRINCIPLES OF PALEONTOLOGY								

Stage 3 → Identify or create methods to measure these SLOs.

As we work towards completion of the PUL Assessment process, we are identifying key assignments in each class that exemplify the PUL's of major and moderate emphasis for that course. This information will also be used to identify methods to measure our SLO's.

Resource

Anderson, L.W., & Krathwohl, D.R. (Eds.) (2001). A taxonomy of learning, teaching, and assessment: A revision of Bloom's taxonomy of educational objectives. New York: Longman.

Assessment of Student Learning
Department of Mathematical Sciences
Indiana University-Purdue University Indianapolis

2010-2011 Progress Report
for the Six-Stage Assessment Strategy

Submitted Jeffrey Watt, Ph.D.
(Edited by Joseph L. Thompson)
August 2011

During the 2010-2011 academic year, the Department of Mathematical Sciences worked on creating an assessment instrument and scoring rubric for the capstone experience for graduating seniors in the department. All seniors in actuarial science, pure mathematics, and applied mathematics are required to complete a capstone experience and make a 15-minute presentation to the students and faculty in the department. The math education majors are required to complete student teaching as their capstone experience, but do not make a presentation to the department.

Each of the seniors (except math education majors) selected a faculty member as a mentor for their capstone experience. The mentor helped the student select a research question to explore for the capstone experience, and then mentored the student as they researched the topic. The student then wrote up their findings and prepared a power point presentation. The department has prepared guidelines and elements that the presentation must include, and provides the scoring rubric (attached) to the student in advance. After the presentation, the faculty mentor assigns a core grade for MATH 49200 Capstone Experience and completes the assessment rubric.

At the end of the Spring 2011 semester, 12 students completed their capstone experience and made a presentation. The name of the students, their presentation titles, and mentors are:

Bill Karr, Mentor: Dr. Joglekar, "Level Density and Level Spacings of Self-Adjoint, non-Hermitian, Random Matrices"

Franck Assogba-Onanga, Mentor: Dr. Kitchens, "Kepler's Laws"

Hadea Hummeid, Mentor: Dr. Worth, "Parkinson's Disease and Beta Synchronization"

Elena Cherepanova, Mentor: Dr. Martin, "Math and Terrorism"

Aaron Kremer, Mentor: Dr. Martin, "Longevity Risk"

Chang Lee, Mentor: Dr. Cross, "Mortgage Backed Security"

Theresa Niehaus, Mentor: Dr. Cowen, “Common Denominator: Using Pop Culture Context to Influence Math Test Motivation”

Shao Chen Teoh, Mentor: Dr. Martin, “Multiple Hypotheses Testing in Mutual Funds Performance”

Ashley Wichman, Mentor: Dr. Cross, “Retirement Systems: Private Pensions”

Stephanie Woehr, Mentor: Dr. Cowen, “Making Optimal Decisions through Linear Programming”

Marianne McKenzie, Mentor: Dr. Cowen, “Bipartite Graphs and Hall’s Marriage Theorem”

Jason Miller, Mentor: Dr. Cowen, “Variational Principles in Geometry”

The table below is the assessment rubric used to evaluate each student's capstone presentation. The Student Learning Outcomes (SLOs) determined by the department are listed on the next page and are included in the rubric table. The description of the "Three Levels of Developmentally Coherent Curriculum" used in the rubric to rate each student are also described on the next page. The numbers in this table represent the number of students scoring in that category at that level of development.

The Number of Students Out of 12 Scoring at that Level

	SLO	Level A	Level B	Level C	N/A
Shows ability to formulate problems, solve them, and interpret their solution	SLO: 1, 8		**7**	**5**	
Shows understanding of nature of proof	SLO: 5, 9	**1**	**2**	**5**	**4**
Shows mastery of diverse math ideas	SLO: 6		**3**	**6**	**3**
Shows ability to communicate mathematical ideas					
orally	SLO: 9	**1**	**6**	**5**	
in writing	SLO: 9	**1**	**5**	**6**	
Gives experience in applying knowledge					
from one branch of math to another	SLO: 2	**1**	**1**	**5**	**5**
from mathematics to other disciplines	SLO: 3	**1**	**4**	**7**	
Makes efficient use of					
technological tools	SLO: 10	**2**	**4**	**5**	**1**
scientific resources (e.g., journals)	SLO: 5	**1**	**2**	**5**	**4**
Shows knowledge of contemporary and ethical issues in science and their relation to society	SLO: 7	**1**	**5**	**4**	**2**
Displays appreciation of the historical development of an area of mathematics	SLO: 4	**2**	**2**	**3**	**5**

For the 2011-2012 academic year, the department plans to use this information to work with the next cohort of seniors in order to strengthen Level As to Level Bs, and increase the number of students scoring at Level C.

The Student Learning Outcomes

The Department of Mathematical Sciences synthesized the IUPUI's Principles of Undergraduate Learning, the National Council of Teachers of Mathematics Standards, and the Mathematics Association of America's competencies for undergraduate mathematics majors to create the following 10 SLOs for the department.

1. Understand and critically analyze mathematical arguments.
2. Understand, appreciate, and identify connections between different areas of mathematics.
3. Understand, appreciate, and solve some applications of mathematics to other subjects.
4. Develop a deeper knowledge and competence of at least one area of mathematics.
5. Develop and demonstrate abstract reasoning in a mathematical context.
6. Develop and demonstrate the principle modes of discovery in mathematics.
7. Develop and demonstrate careful and ethical analysis of data.
8. Develop and demonstrate problem-solving skills.
9. Demonstrate effective communication skills of mathematical ideas precisely and clearly, both orally and in writing.
10. Utilize a variety of technological tools (CAS, statistical packages, programming languages, etc.) in analyzing and solving mathematical problems.

Three Levels of the Developmentally Coherent Curriculum

A. Basic Level → Retaining and Understanding

1. the ability to <u>retain</u> specific information in the way it was originally presented
   a. being asked to recognize the definition of a bold-faced term in a textbook
   b. questions it can be used to answer: Who, what, where, and when?
   c. Bloom calls this "knowledge"
2. the ability to <u>understand</u> information when it is presented in a different manner than originally presented
   a. being asked to recognize a concept or method when presented as a new example not previously encountered
   b. questions it can be used to answer: How and why?
   c. Bloom calls this "comprehension"

B. Intermediate Level → Analyzing and Applying

1. the ability to <u>analyze</u> (i.e., reduce) a complex whole into its constituent parts and their functional relationships
   a. being able to recognize the parts of a complex whole and how they interact or are related to one another
   b. questions it can be used to answer: Of what is this complex whole composed, and how are its parts related?
   c. Bloom calls this "analysis"
2. the ability to produce and <u>apply</u> original and useful solutions to solvable problems
   a. being able to recognize how the products of comprehension and analysis can be used to solve world problems

b. questions it can be used to answer: How can this problem be solved?
c. Bloom calls this "application"

C. Advanced Level → Evaluating and Creating

1. the ability to evaluate the effectiveness and/or merit of the products of application
   a. being able to recognize how established criteria can be used to judge the success of problem-solving methods
   b. questions it can be used to answer: What is the validity or value of a particular principle, theory, or method?
   c. Bloom calls this "evaluation"
2. the ability to create (i.e., synthesize) new wholes from previously unrelated parts
   a. ability to recognize how elements previously unassociated can be combined into new and meaningful wholes
   b. questions it can be used to answer: What new conclusions can be reach on the basis of what has been learned?
   c. Bloom calls this "synthesis"

Resource

Bloom B. S. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain.* New York: David McKay Co Inc.

Assessment of Student Learning
Department of Physics
Indiana University-Purdue University Indianapolis

2010-2011 Progress Report
for the Six-Stage Assessment Strategy

Submitted by Brian A. Woodahl, Ph.D.
(Edited by Joseph L. Thompson)
August 2011

Introduction

The IUPUI School of Science Assessment Committee endorsed the following six-stage plan in 2005 to assess the academic programs of its eight undergraduate programs (Biology, Chemistry, Computer Science, Earth Science, Forensic and Investigative Sciences, Mathematics, Physics, and Psychology).

Stage 1 → Identify the program's student learning outcomes (SLOs).
Stage 2 → Link these SLOs to specific components of the program's curriculum.
Stage 3 → Identify or create methods to measure these SLOs.
Stage 4 → Collect data to determine if the SLOs are being accomplished successfully.
Stage 5 → Use the data collected in Stage 4 to make curricular changes.
Stage 6 → Repeat Stage 4 to determine if the curricular changes were effective.

These stages are comparable to the following stages in the Planning for Learning and Assessment table that has been approved and distributed by IUPUI's Program Review and Assessment Committee,

1. What general outcome are you seeking?
2. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)
3. How will you help students learn it? (in class or out of class)
4. How could you measure each of the desired behaviors listed in #2?
5. What are the assessment findings?
6. What improvements have been made based on assessment findings?

Assessment in the IUPUI Department of Physics

During 2007-2008, the Physics Department completed Stage 1, identifying eight unique Department-specific SLOs:

Stage 1 → Identify the Department's Student Learning Outcomes (SLOs)

The Physics Department's Student Learning Outcomes:

1. Understand the basic and advanced concepts of classical and modern physics.
2. Master the mathematical skills relevant to the study of physics.
3. Apply his or her knowledge of physics and mathematics to solve physical problems.
4. Design and perform laboratory experiments in physics.
5. Use computers and software to solve physics problems and to obtain and analyze experimental data.
6. Successfully collaborate with peers, attain the necessary skills, and develop the work ethic to perform and complete physics research.
7. Prepare a written technical document and deliver an oral presentation relevant to physics.
8. Apply his or her skills to other areas or problems.

Then during early 2008, the Department identified physics courses that specifically address these SLOs. Therefore, in following the School of Science's strategy, the Department had completed Stage 2.

Stage 2 → Link These SLOs to Specific Components of the Department's Curriculum

The Physics Student Learning Outcomes linked to physics courses are detailed in the table on the next page. Beginning-level skills are denoted by the letter "B," intermediate-level skills are denoted by the letter "I," and the advanced-level skills are denoted by the letter "A."

Physics Student Learning Outcomes (SLOs) Linked to Courses

1 -- Understand basic and advanced concepts of classical and/or modern physics
2 -- Master the mathematical skills relevant to physics
3 -- Apply the knowledge of physics and mathematics to solve problems in physics
4 -- Design and perform laboratory experiments
5 -- Use computers and software to solve problems and/or obtain experimental data
6 -- Develop skills and work ethic to independently perform physics research
7 -- Prepare and orally deliver technical presentations
8 -- Apply the skills from the field of physics to solve problems in other areas

Course	Title	Cr Hrs	1	2	3	4	5	6	7	8
PHYS 15200	Mechanics	4	B	B	B	B				
PHYS 25100	Heat, Electricty, & Optics	5	B	B	B	B				
PHYS 30000	Mathematical Physics	3	I	I	I		B	B		
PHYS 31000	Intermediate Mechanics	4	I	I	I			B		
PHYS 33000	Intermediate E&M	3	I	I	I			B		
PHYS 34200	Modern Physics	3	I	I	I			B		
PHYS 35300	Electronics Lab	2				I	B	B	B	
PHYS 40000	Physical Optics	3	I	A	A			I		
PHYS 40100	Optics Lab	2				I	B	I	B	
PHYS 41600	Thermal Physics	3	A	A	A			I		
PHYS 44200	Quantum Mechanics	3	A	A	A			I		
PHYS 49000	Capstone	1-3			A	A	I	I	I	I

Key	
B	Beginning
I	Intermediate
A	Advanced

Stage 3 → Identify or Create Methods to Measure These SLOs

Recently, Fall 2008, the Department began to identify those courses that would benefit the most by implementing methods to measure the success of the course-related SLOs. PHYS 15200 and PHYS 25100 are likely to have the greatest impact on the largest number of students. Because of this, the PHYS 15200 course is undergoing a new restructuring, which was first implemented in the Fall 2008 semester. The course is now broken up into two different sections, an Honors section and the normal (non-honors) section. With this change, the Department is hoping to present the material in a format that is best suited for each group of students. The challenge will be to identify new techniques of data collection to measure the success of this curriculum change.

A continuation of stage 3 occurred this past spring, the Department, collectively among the faculty that teach the introductory courses, identified and mapped all physics courses to the University-wide Principles of Undergraduate Learning (PULs). Each course was identified as having major emphasis, moderate emphasis, and/or minor emphasis for the possible six PULs: 1) Core Communication and Quantitative Skills; 2) Critical Thinking; 3) Integration and Application of Knowledge; 4) Intellectual Depth, Breadth and Adaptiveness; 5) Understanding Society and Culture; and 6) Values and Ethics. Further, following the University's newer restructuring of the PULs, the Core Communication and Quantitative Skills were broken into the three subfields: 1A) Language Skills; 1B) Quantitative Skills; and 1C) Information Resources Skills. Below is the matrix of these results:

Component	Subject	Course	PUL has Major Emphasis	PUL has Moderate Emphasis	PUL has Some Emphasis
LAB	**PHYS**	**10000**	3	1B	
LEC	**PHYS**	**14000**	1B		
LAB	**PHYS**	**15200**	3	1B	4
LAB	**PHYS**	**20000**	3		
LAB	**PHYS**	**21800**	3	1B	
LAB	**PHYS**	**21900**	3	1B	
LAB	**PHYS**	**25100**	3	1B	4
LEC	**PHYS**	**30000**	1B	3	
LEC	**PHYS**	**31000**	4	3	1B
LEC	**PHYS**	**33000**	4	3	1B
LEC	**PHYS**	**34200**	4	3	
LAB	**PHYS**	**35300**	3		
LEC	**PHYS**	**40000**	4	3	
LAB	**PHYS**	**40100**	3	4	
LEC	**PHYS**	**41600**	4		
LEC	**PHYS**	**44200**	4	3	
IND	**PHYS**	**49000**	2	4	3
LAB	**PHYS-P**	**201**	3	1B	
LAB	**PHYS-P**	**202**	3	1B	

LEC	**AST-A**	**100**	1A
LEC	**AST-A**	**105**	1A
LEC	**AST-A**	**130**	1A

Stage 3 (Continued) → Measure the Attainment of Particular PULs

During the Spring of 2010, the Physics Department identified five courses to measure student competency of major emphasis on PUL #3 (Integration & Application of Knowledge) and moderate emphasis on PUL #1B (Quantitative Skills), these courses were:

PHYS 10000
PHYS P201
PHYS 21800
PHYS 25100
PHYS 30000

The instructor for each of the five courses, listed above, ranked the attainment of the PULs for each student using a simple scale:

(VE) = Very Effective
(E) = Effective
(SE) = Somewhat Effective
(NE) = Not Effective
The instructors were free to choose any method of measuring the student's success. In some cases, instructors selected one or more assignments that emphasize a particular PUL and used those assignments in determining a student's success (or lack of). In addition, other instructors chose exam grades, overall course grades, test problems, etc, to determine the student's scores. Results of PUL attainment were kept confidential -- students did/do not have access to these scores.

Stage 4 → Collect data to determine if the SLOs are being accomplished successfully.

Physics Student Learning Outcomes (SLOs) Linked to Courses

1 -- Understand basic and advanced concepts of classical and/or modern physics
2 -- Master the mathematical skills relevant to physics
3 -- Apply the knowledge of physics and mathematics to solve problems in physics
4 -- Design and perform laboratory experiments
5 -- Use computers and software to solve problems and/or obtain experimental data
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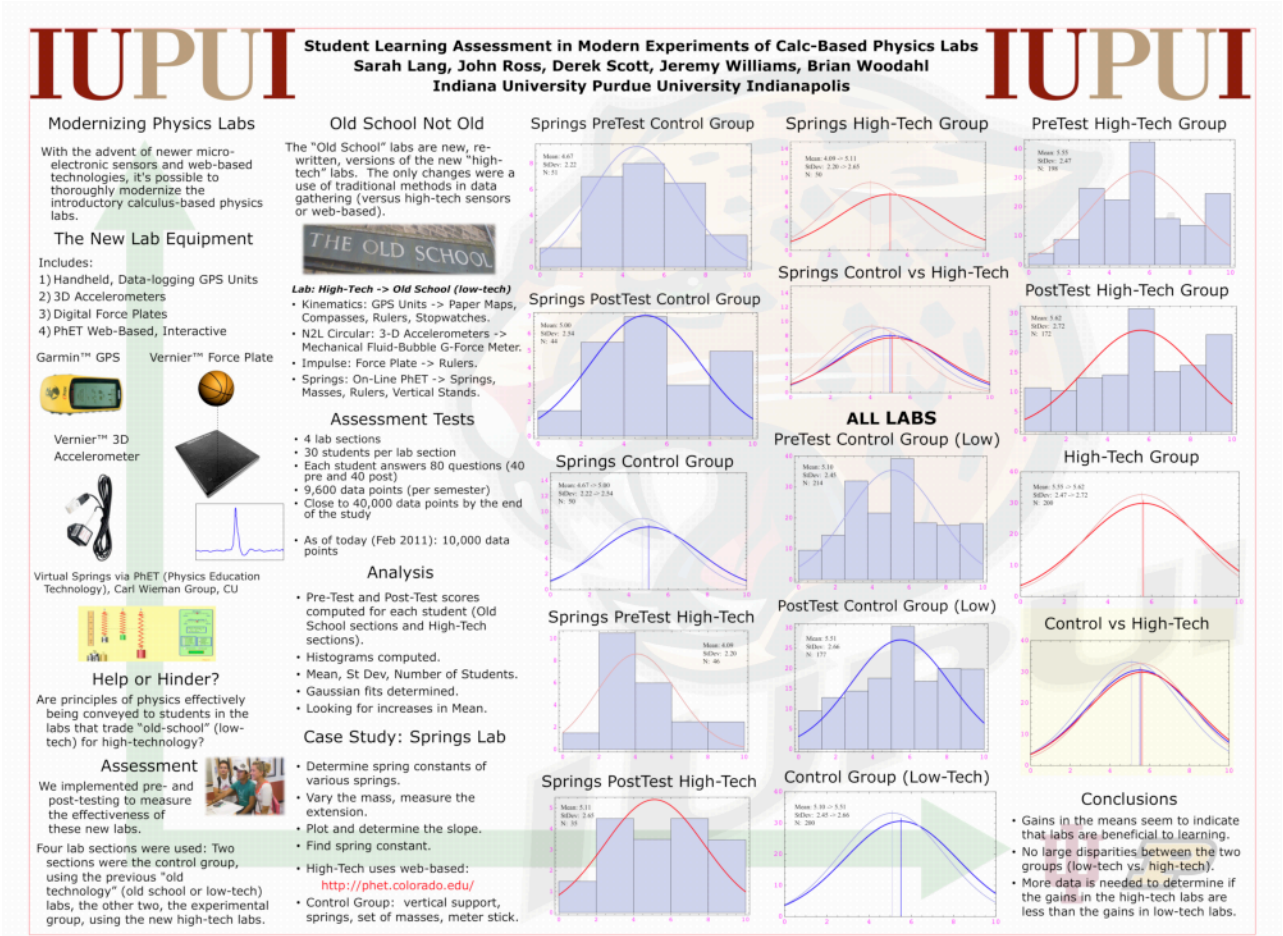
PHYS 35300	Electronics Lab	2				I	B	B	B	
PHYS 40000	Physical Optics	3	I	A	A			I		
PHYS 40100	Optics Lab	2				I	B	I	B	
PHYS 41600	Thermal Physics	3	A	A	A			I		
PHYS 44200	Quantum Mechanics	3	A	A	A			I		
PHYS 49000	Capstone	1-3			A	A	I	I	I	I

Key	
B	Beginning
I	Intermediate
A	Advanced

During the previous academic year (2010-2011), members in the Department began to develop assessment tools to be used specifically in the evaluation of their courses. Two members, Brian Woodahl and John Ross, performed a systematic review of our Department's introductory lab courses (PHYS-P201, PHYS 15200, and PHYS 21800). Four particular labs in each course were identified as being significantly outdated and particularly weak in terms of enhancing a student's learning of the material. These labs were removed and replaced with updated, newer labs. Major equipment purchases were made to enhance these new labs, the latest sensors and data acquisition devices were procured. During the Summer of 2010, the labs were re-written, implementing the benefits of the new equipment, and a set of pre- and post- learning-assessment tests were developed to determine the effectiveness of the new labs. These assessment tests were administered during Fall of 2010 and Spring of 2011. In particular, the assessment data gathered, measured the overall effectiveness of our SLO #4 (Design and perform laboratory experiments in physics), on each of the new labs relative to the previous (old) labs, in other words, a gain in SLO #4. To measure this gain (or loss), two groups were assembled, a control group (using the old labs) and an experiment group (using the new labs). Quantitatively, the gain was minimal, at best. Qualitatively, the students expressed in written form, favoritism for the new labs, so there is at least a qualitative improvement in that the new labs are more desirable to perform. Results of the assessment data were presented by Brian Woodahl at this year's AAPT (Amer. Assoc. of Physics Teachers) Winter National Meeting in Jacksonville, FL on Jan 15, 2011. In addition, a poster session highlighting the assessment data and the changes in the lab, was also presented by Brian and John during the E.C. Moore Symposium at IUPUI, on Feb 25, 2011:



Stage 5 → Use the data collected in Stage 4 to make curricular changes.

Physics Student Learning Outcomes (SLOs) Linked to Courses

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Key	
B	Beginning
I	Intermediate
A	Advanced

As mentioned in the Stage 4 discussion above, a systematic review of our Department's introductory lab courses (PHYS-P201, PHYS 15200, and PHYS 21800) occurred during the previous academic year (2010-2011). Four particular labs in each course were identified as being significantly outdated and particularly weak in terms of enhancing a student's learning of the material. These labs were removed and replaced with updated, newer labs and assessment was performed. The assessment data taken during Fall of 2010, was used to improve the labs, by re-writing certain sections of the lab.

Assessment of Student Learning
Department of Psychology
Indiana University-Purdue University Indianapolis

2010-2011 Progress Report
for the Six-Stage Assessment Strategy

Submitted Dennis Devine, Ph.D.
(Edited by Joseph L. Thompson)

Introduction

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These stages are comparable to the following stages in the Planning for Learning and Assessment table that has been approved by IUPUI's Program Review and Assessment Committee**:**

1. What general outcome are you seeking?
2. How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)
3. How will you help students learn it? (in class or out of class)
4. How could you measure each of the desired behaviors listed in #2?
5. What are the assessment findings?
6. What improvements have been made based on assessment findings?

These two rubrics provide a conceptual framework for Departmental efforts to assess student learning. In general, over the last several years, the Psychology Department has made notable progress on the first three stages of the School of Science's assessment framework and focal efforts are planned regarding the fourth and fifth stages. The following sections of this report describe assessment-related efforts using the School of Science's rubric.

Stage 1 → Identify the Department's Student Learning Outcomes (SLOs)

Several years ago, a draft set of SLOs was created by the Psychology Department for the B.S. and B.A. undergraduate degrees. This set included 15 core competencies (see Appendix A) consistent with IUPUI's *Principles of Undergraduate Learning* (PULs) and the American Psychological Association's *Competencies for Undergraduate Psychology Majors*.

A major focus of assessment-related efforts within the Department during the 2010-2011 academic year was on revising the undergraduate SLOs and identifying SLOs for the Department's graduate programs as well. The latter include the M.S. and Ph.D. in Clinical Psychology, the M.S. in Industrial/Organizational (I/O) Psychology, and the Ph.D. in Psychobiology of Addictions. SLOs identified for these programs are as follows:

Undergraduate B.A./B.S. in Psychology:
Students graduating with the B.A./B.S. in Psychology from IUPUI will demonstrate competence in the following domains:

1. Content of Psychology**:** to show familiarity with the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology. In particular, students should understand:
    - Psychology is a science aimed at describing, explaining, predicting, and changing behavior.
    - Behavior is influenced by person variables, environment variables, and their interaction. $B = f(P + E + PE)$.
    - Psychology has evolved in a socio-historical context and it is characterized by a variety of theoretical perspectives.
    - Our experience of the world is highly subjective and influenced by our cultural heritage.

2. Research in Psychology**:** Understand and use basic research methods in psychology, including design, data analysis, and interpretation
3. Application of Psychology**:** Understand and generate applications of psychology to individual, social, and organizational issues
4. Ethics in Psychology**:** Understand and abide by the ethics of psychology, including those that encourage the recognition, understanding, and respect for the complexity of socio-cultural and international diversity
5. Personal Development**,** Relationship Building, and Career Planning**:** Understand themselves and others, acquire effective collaboration skills, and develop realistic ideas about how to pursue careers in psychology and related fields
6. Communication Skills, Information Competence, and Technological Proficiency: to write and speak effectively, demonstrate information competence, and utilize technology for many purposes

7. Critical and Creative Thinking and Problem Solving**:** to use critical and creative thinking in the scientific approach to problem solving.

Ph.D. in Psychobiology of Addictions:
Graduate students earning a Purdue University Ph.D. in Psychobiology of Addictions will demonstrate the following abilities in keeping with the research focus of the degree:

1. Knowledge of key concepts in the psychological and brain sciences, including the methods, history, and theoretical and empirical foundations, with special emphasis on the neuroscience of addiction.
2. Knowledge and skills necessary to conduct, analyze, interpret, and communicate original research and scholarship in behavioral neuroscience, particularly in addiction neuroscience.
3. Understanding of the neural mechanisms and processes associated with the causes and consequences of substance abuse, including integration across genetic, neurobiological, developmental, and behavioral levels.
4. Ability to think critically and creatively to solve problems and generate new knowledge in behavioral neuroscience, with focus on and application to problems of drug abuse and addiction.
5. Conduct research in the behavioral and addiction neurosciences in an ethical and responsible manner.

Ph.D. in Clinical Psychology:
Graduate students earning the Ph.D. in Clinical Psychology will demonstrate:

1. Knowledge in the breadth of scientific psychology, including historical perspectives of its foundations and development.
2. Knowledge in the theory, methodology, and data analytic skills related to psychological research.
3. The ability to generate new scientific knowledge and theory related to the field of psychology.
4. Knowledge and skills in the assessment of individual strengths and weaknesses, as well as the diagnosis of psychological problems and disorders.
5. Knowledge and skills in the conceptualization, design, implementation, delivery, supervision, consultation, and evaluation of empirically-supported psychosocial interventions for psychological problems and disorders.
6. Sensitivity, knowledge, and skills in regard to the role of human diversity in the research and practice of clinical psychology.
7. Working knowledge of the APA ethical code and will demonstrate their ability to apply ethical principles in practical contexts.

M.S. in Clinical Psychology:
Graduate students earning the M.S. in Clinical Psychology will demonstrate:

1. Knowledge in the breadth of scientific psychology, including historical perspectives of its foundations and development.
2. Knowledge in the theory, methodology, and data analytic skills related to psychological research.
3. The ability to synthesize and to critically evaluate new scientific knowledge and theory related to the field of psychology.
4. Knowledge and skills in the assessment of individual strengths and weaknesses, as well as the diagnosis of psychological problems and disorders.
5. Knowledge and skills in the conceptualization, design, implementation, delivery, supervision, consultation, and evaluation of empirically-supported psychosocial interventions for psychological problems and disorders.
6. Sensitivity, knowledge, and skills in regard to the role of human diversity in the research and practice of clinical psychology.
7. Working knowledge of the APA ethical code and will demonstrate their ability to apply ethical principles in practical contexts.

MS in Industrial/Organizational Psychology:
Graduate students earning the M.S. in I/O psychology will demonstrate:

1. Knowledge of the historical foundations of I/O psychology.
2. Knowledge of the theory, methodologies, and data analytic procedures used to conduct research in organizational settings.
3. Ability to synthesize and critically evaluate psychological theory and research as they relate to human cognition and behavior in organizations.
4. Knowledge related to the two core content domains within the field: *personnel psychology* (e.g., selection, training, and performance management) and *organizational psychology* (e.g., motivation, leadership, job attitudes, and group/team performance).
5. Knowledge and skills related to the conceptualization, implementation, and evaluation of scientifically based interventions intended to improve organizational functioning.
6. Awareness of, and appreciation for, the many aspects of human diversity in the workplace.
7. Knowledge of the American Psychological Association's code of ethics and the ability to apply ethical principles in the conduct of research and the application of knowledge in workplace settings.

Stage 2 → Link SLOs to Specific Components of Department Curriculum

Based on the initial set of student SLOs, an extensive audit of the Department's course syllabi was undertaken several years ago to determine in what courses and at what developmental levels the Department's SLOs are being taught and assessed. Each assignment that provided data for these assessments was categorized by the critical thinking skill(s) required to successfully complete it.

- Assignments requiring retention and comprehension were labeled Basic.
- Assignments requiring application and analysis were labeled Intermediate.
- Assignments requiring evaluating and creating were labeled Advanced.

The results of this curriculum audit appear in Appendix B. In general, the curriculum audit data suggest that the Department's SLOs have been systematically addressed and at all three cognitive levels via the undergraduate curriculum. Each SLO was taught an average of 33 times across all audited psychology classes and levels. The SLOs were taught at the Beginning level an average of 9.7 times, 14.6 times at the Intermediate level, and 8.8 times at the Advanced level. The three SLOs addressed the least number of times were Career Exploration (15 times**),** Diversity (20 times), and Speaking Skills (22 times). All the other SLOs were addressed 28 times or more. The three most often targeted SLOs were Application (47 times), Content (45 times), and Technological Competence (40 times). Of note, however, several SLOs were targeted relatively rarely at the Advanced level (i.e., Speaking Skills, Diversity, Ethics, Understand Others, and Career Exploration). However, it is important to recognize that the exposure of individual students to the Departmental SLOs will vary somewhat depending on the specific courses they take.

Stage 3 → Identify or Create Methods to Measure the SLOs

Several operational methods have been identified that allow for a convergent strategy of assessment with regard to student attainment of SLOs associated with the B.A./B.S. degree.

Method 1: Capstone Coursework

The Psychology Department offers several capstone courses that provide a potential setting for holistic assessment of student SLO attainment by capstone instructors. A template has been created for use by capstone instructors in rating each student in her/his class on each Department SLO after the course has been completed (see Appendix C). The data that results from this process has the potential to be aggregated across capstone classes and used to ascertain the degree to which capstone faculty perceive senior psychology majors *in general* to be accomplishing the Department's SLOs.

Method 2: Electronic Exit Survey

The School of Science has been using a paper-and-pencil senior exit survey for many years, but the Psychology Department has recently collaborated with the School to create an electronic version of the exit survey. This conversion will enable the Psychology Department to incorporate its unique set of SLOs into the survey by asking its graduating seniors to rate how successfully they have accomplished each of these SLOs. Students are also asked to identify the experiences that contributed to their perceived SLO accomplishment and provide suggestions to

the Department that would help future psychology majors to accomplish the PULs and SLOs that they indicated they had not successfully accomplished. Although students are not in the best position to evaluate their own learning in some respects, this methodology allows for holistic assessments of all SLOs and thus is a potentially useful element of a more comprehensive assessment strategy.

Method 3: Faculty Ratings of PUL Attainment

The *Principles of Undergraduate Learning* (PULs) represent a broad set of learning outcomes ideally intended to characterize the academic experience of all IUPUI undergraduate students. The 2009-2010 academic year marked the University's initial attempt to collect and synthesize assessment data pertaining to its Principles of Undergraduate Learning in an organized, institution-wide manner. As part of this strategy, individual psychology faculty members were asked to do the following:

1. Identify one, two, or three of the PULs that are specifically targeted in each of their courses,
2. Create methods or identify existing assignments they could use to assess how effectively their students accomplished each of these PULs,
3. Identify an academic semester during which they would be willing to assess the students in one of their classes, and
4. Report the results of their assessments to the university via a special SIS reporting system housed within Oncourse.

The above efforts pertain to the assessment of SLOs at the undergraduate level, but the recent identification of SLOs for the Department's various graduate degree programs calls attention to the need for the Department to identify and/or develop methods to assess SLO attainment by its graduate students as well. Historically, the accomplishment of graduate student SLOs has been implicitly inferred from satisfactory completion of graduate coursework and other required elements of the degree (i.e., thesis and dissertation), but the close associations and working relationships that Department faculty typically have with their graduate students may allow for the possibility of obtaining explicit SLO ratings by members of graduate students' primary committees in a fashion somewhat like that associated with Method 1 (i.e., ratings made by capstone instructors). The capability to have multiple faculty members rate each graduate student represents an added measure of reliability important to establishing the validity of such data.

Stage 4 → Collect Data to Determine if the SLOs Are Being Accomplished Successfully

Given the critical importance of SLOs in guiding assessment efforts, and the recent finalization of those SLOs, data collection efforts have been relatively limited thus far.

Data Collected via Capstone Coursework (Method 1)

In a pilot study undertaken in 2009-2010, Psychology capstone instructors provided SLO student ratings for 28 capstone students (24 enrolled in PSY-B461 *Capstone Lab in Developmental Psychology* and 4 enrolled in PSY-B499 *Honors Research*). Mean (and modal) SLO ratings for the 28 students are presented in the right-hand column of Appendix C. Two of the SLOs were

generally ranked as "not addressed in these classes" by the instructors. (Self-Awareness was ranked as "not addressed" for 24 students and Career Planning was ranked as "not addressed" for 26 students.) A mean accomplishment rating was computed for the remaining 14 SLOs by assigning a 0 to "Did Not Accomplish this SLO," a 1 to "Accomplished this SLO at an Acceptable Level," and a 3 to "Accomplished this SLO at an Exemplary Level. As evident from the means and modes, capstone faculty generally felt that most of their students were performing at an acceptable level or better on the vast majority of SLOs. Perhaps most importantly, this pilot study demonstrated the viability of providing direct ratings of SLO attainment by Departmental faculty.

Data Collected via Self-Report on the Senior Exit Survey (Method 2)
Data collected from 121 psychology majors who have completed the electronic senior exit survey concerning the Department's SLOs are presented in Appendix D. In general, these data suggest that Psychology undergraduate students are confident in their attainment of our SLOs, particularly those pertaining to self-awareness, understanding others, acting ethically, and communicating in writing. At the same time, it is important to recognize that student ratings are likely to be somewhat lenient (i.e., inflated). It will be necessary to compare these subjective, self-reported data with more objective data gathered from faculty observations of student performance. In addition, it would be more pedagogically appropriate in the future to develop and use a response scale that was absolute (as opposed to relative) in nature. In other words, students should be provided with clear, behaviorally-oriented scale anchors that reference how well they can perform tasks associated with each SLO.

Data Collected via Faculty Ratings of PUL Attainment through Oncourse (Method 3)
Given the close correspondence between the IUPUI's Principles of Undergraduate Learning and the Department's Student Learning Outcomes, efforts to assess student PUL attainment are relevant to the assessment of student learning. Appendix E contains a table listing all the classes offered by the Psychology Department, the names of the faculty who volunteered to assess their classes, the classes they volunteered to assess, the semester in which they volunteered to assess them, and the PULs they volunteered to assess in each of their courses. As evident in the table, PUL-related assessment data have been obtained for a majority of the courses in the Department. Unfortunately, to this point, it has not been possible to obtain or otherwise analyze aggregated data from this computer-mediated process. In addition, understandable (but somewhat artificial) constraints imposed by the University with regard to the number of focal PULs to be identified and assessed may ultimately limit the value of these data when they become available to the Department. This does not negate the value of PUL-related assessment data, but does underscore the need to consider it as one component of a larger, multi-faceted approach to assessment.

Stage 5 → Use Assessment Data Collected to Make Curricular Changes

Extensive use of assessment data gathered via the methods noted above is still in the beginning stage due to the relatively recent revision of the Department's undergraduate SLOs (and adoption of graduate SLOs). However, over the last several years, assessment data collected associated with assessment of the Department's initial set of SLOs have served as the foundation for a number of curricular changes at the undergraduate level. In particular, drastic positive changes have been made to the structure and content of the Department's primary introductory course

(B104). Considerable course-specific assessment data was acquired by the coordinator of the course (Dr. John Kremer) and used to continuously modify and update the course in order to increase student engagement and learning. Unfortunately, much of this fluid, ongoing process is difficult to document here, although the considerable efforts and accomplishments of Dr. Kremer are widely recognized within the Department. Recently, based on a variety of factors that included student exam data, the Department further decided to consolidate its two introductory courses (B104 and B105) and to commission faculty members within the Department to write a textbook for the course to ensure that students were systematically and comprehensively exposed to the information and pedagogical approaches consistent with our SLOs. Assessment data indicating excessive variability in students' experiences related to the Department's introductory statistics course (B305) have also served as the basis for the adoption of a course coordinator with the goal of standardizing some elements of the course. Feedback obtained from psychology majors also served as a trigger for an audit of the frequency and timing of Department course offerings, which led to concerted efforts to make sure Department courses were offered regularly and at least occasionally in the evening. Finally, an ad-hoc Curriculum committee has been meeting over the last year to discuss changes to the Department's undergraduate programs and recommendations of this committee will be addressed by the Department over the course of the 2011-2012 academic year.

Going forward, there is recognition that the assessment of student learning within the Department will benefit from the identification of additional methods for collecting assessment data, the development of mechanisms for centralizing available data and making it available to decision-makers within the Department, and concerted attention to the SLOs associated with the Department's graduate programs.

Appendix A.

Initial Draft of Department SLOs for Undergraduate B.A./B.S. Degree.

1. Understand the major concepts, theoretical perspectives, empirical findings and historical trends in psychology.
2. Understand and use basic research methods in psychology, including design, data analysis, and interpretation.
3. Understand and generate applications of psychology to individual, social, and organizational issues.
4. Understand and abide by the ethical principles of psychology.
5. Recognize, understand, and respect the complexity of socio-cultural and international diversity.
6. Develop self-awareness by identifying your own personal strengths, weaknesses, values, goals, etc.
7. Understand the behavior and mental processes of others.
8. Work effectively as a member of a group to accomplish a task.
9. Identify and prepare for a career in psychology or a related field.
10. Demonstrate effective speaking skills.
11. Demonstrate effective writing skills.
12. Demonstrate information competence by identifying, locating, and retrieving written and electronic information sources.
13. Utilize technology for many purposes.
14. Demonstrate the ability to combine existing information into new, creative, and useful ideas and hypotheses.
15. Demonstrate problem-solving skills.
16. Demonstrate the critical thinking skills of retention, comprehension, application, analysis, evaluation, and creation.

Appendix B.

Results of the Psychology Department's Syllabus Audit to Determine Curriculum Coverage of the SLOs.

	Basic	Intermediate	Advanced
Content	B105a; B105b*; B311a; B344a; B344b*; B356*; B358a; B380c; B360a*; B360b; B368; B396; B422*; B252a; B252c	B104; B105c; B305b*; B310a; B340; B358b; B370a; B380a*; B380b; B322*; B365*; B366; B376; B386; B420; B472; B252b	B305a; B311b; B307*; B310b; B320; B370b; B424; B375; B394; B454; B461; B481*; B499*
Research	B105b*; B305a; B310b; B340; B344a; B358b; B370a; B360b; B365*; B366; B375; B376; B422*	B311a; B310a; B320; B344b*; B370b; B380a*; B322*; B360a*; B396	B305b*; B311b; B307*; B472; B461; B462*; B482; B499*; B252a
Application	B103a; B105c; B310b; B340; B380c; B365*; B482	B103b*; B105a; B105b*; B305a; B311a; B320; B344b*; B356*; B358a; B358b; B370a; B370b; B380b; B424; B360a*; B368; B375; B376; B386; B396; B422*; B472; B481*; B252b; B252c	B305b*; B311b; B307*; B310a; B344a; B380a*; B322*; B360b; B366; B394; B454; B461; B462*; B499*; B252a
Ethics	B103a; B105b*; B305a; B310b; B340; B344b*; B356*; B358b; B370a; B370b; B380b; B360a*; B360b; B365*; B366; B375; B376; B386; B482; B252b; B252c	B103b*; B305b*; B311b; B307*; B310a; B320; B344a; B380a*; B322*; B461; B462*; B499*	B394; B472; B252a
Diversity	B103b*; B305a; B310a; B310b; B340; B358b; B370b; B360a*; B396; B252b	B320; B380a*; B375; B422*; B472; B454; B481*; B499*	B365*; B386
Self-Awareness	B305a; B340; B370b; B360a*; B365*; B376	B104; B310b; B344b*; B358b; B370a; B380a*; B375; B396; B422*; B472; B454; B481*	B103a; B103b*; B380b; B322*; B360b; B366; B368; B386; B394; B461; B482; B499*; B252b; B252c
Understand Others	B103a; B103b*; B305a; B340; B380b; B380c; B424; B360a*; B365*; B366; B368; B482; B252b	B310b; B320; B370b; B380a*; B375; B386; B396; B422*; B472; B454; B462*; B481*; B252c	B344a; B322*; B394; B461; B499*
Collaboration Skills	B105a; B307*; B370a; B360b; B365*; B462*; B482	B104; B305b*; B310b; B320; B344a; B358b; B380a*; B375; B394; B396; B422*; B454; B481*; B499*	B103b*; B310a; B322*; B386; B472; B461; B252a
Career Exploration	B305a; B370a; B380a*; B368; B375; B376; B394; B252c	B360a*; B481*	B103b*; B104; B358b; B461; B499*
Writing Skills	B105a; B105b*; B305a; B356*; B360b; B365*; B481*; B482	B103a; B305b*; B310b; B320; B340; B344a; B344b*; B358a; B358b; B370b; B380b; B360a*; B366; B368; B375; B386; B394; B396; B420; B252b; B252c	B103b*; B104; B311b; B307*; B370a; B380a*; B322*; B376; B422*; B472; B454; B461; B462*; B499*; B252a
Speaking skills	B103b*; B104; B310b; B360b; B376; B422*; B482	B344a; B358b; B370a; B322*; B360a*; B375; B386; B394; B472; B454; B461; B462*; B481*	B499*; B252a
Information Competence	B103a; B311b; B310b; B356*; B358b; B370b; B365*; B366; B376; B454; B481*	B104; B105b*; B305b*; B320; B340; B380b; B322*; B360a*; B360b; B368; B375; B396; B420; B422*; B472; B482; B252b; B252c	B103b*; B307*; B310a; B380a*; B386; B461; B462*; B252a
Technological Competence	B105a; B105b*; B305a; B310b; B360b; B365*; B366; B376; B394; B422*; B454	B103a; B103b*; B104; B305b*; B311a; B311b; B320; B344a; B344b*; B356*; B358b; B370b; B380a*; B380b; B380c; B360a*; B375; B386; B396; B472; B462*; B482; B499*; B252b; B252c	B307*; B322*; B461; B252a
Creative Thinking	B105a; B105b*; B305a; B358b; B365*	B103a; B104; B344b*; B370b; B380a*; B380b; B322*; B360a*; B360b; B375; B420; B481*; B482; B252b; B252c	B103b*; B311b; B307*; B310b; B366; B386; B394; B422*; B472; B454; B461; B462*; B499*; B252a
Problem Solving	B105a; B310b; B370a; B376	B104; B311a; B320; B344b*; B358b; B380a*; B360a*; B360b; B375; B386; B394; B396; B422*; B454; B481*; B482	B103a; B103b*; B305b*; B311b; B307*; B310a; B380b; B322*; B366; B472; B461; B462*; B499*; B252a; B252b; B252c

* Indicates courses whose instructors could not be reached to discuss the students' syllabus audits.

Appendix C.

Capstone Instructor Rating Template for Undergraduate SLO Attainment.

Student Learning Outcome	Did Not Accomplish this SLO	Accomplished this SLO at an Acceptable Level	Accomplished this SLO at an Exemplary Level	This SLO was not addressed in this class	Mean Rating (Mode)
Content of Psychology → Student shows familiarity with the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology.					1.07 (2)
Research in Psychology → The student understands and uses basic research methods in psychology, including design, data analysis, and interpretation.					1.21 (2)
Application of Psychology → The student understands and generates applications of psychology to personal, social, and organizational issues.					1.25 (2)
Ethics in Psychology → The student understands and abides by the ethics of psychology.					0.93 (2)
Diversity → The student recognizes, understands, and respects the complexity of socio-cultural and international diversity.					1.15 (2)
Self-Awareness → The student has developed self-awareness by identifying her/his personal strengths, weaknesses, values, and goals.					N/A
Understanding Others → The student understands the behavior and mental processes of others.					1.14 (2)
Collaboration → The student can work effectively as a member of a group to accomplish a task.					1.44 (3)
Career Planning → The student has developed realistic ideas about how to pursue careers in psychology and related fields.					N/A
Writing Skills → The student demonstrates effective writing skills.					1.32 (2)
Speaking Skills → The student demonstrates effective speaking skills.					0.96 (0)
Information Competence → The student demonstrates information competence by identifying, locating, and retrieving written and electronic information sources.					1.71 (3)
Technological Proficiency → The student can utilize technology for many purposes.					1.68 (3)
Creative Thinking → The student can demonstrates the ability to combine existing information into new, creative, and useful ideas and hypotheses.					0.86 (2)
Problem Solving → The student can use the scientific method to solve problems.					1.32 (2)
Critical Thinking → The student can retain, comprehend, apply, analyze, synthesize, and evaluate information.					0.98 (2)

Appendix D.

SLO Self-Ratings by Psychology Majors Completing the School of Science Senior Exit Survey (N=121)

Student Learning Outcome	Far Below Average	Below Average	Average	Above Average	Far Above Average	Mean Rating
Self-Awareness	0	2	16	59	44	4.20
Understanding Others	0	1	16	62	42	4.20
Ethics in Psychology	0	1	22	52	46	4.18
Writing Skills	0	0	23	58	40	4.14
Diversity	0	1	29	52	39	4.07
Problem Solving	0	1	30	52	38	4.05
Information Competence	0	0	31	54	36	4.04
Creative Thinking	0	2	29	55	35	4.02
Application of Psychology	0	0	25	72	24	4.00
Technological Proficiency	0	4	31	49	37	3.98
Collaboration	0	3	31	54	33	3.97
Content of Psychology	0	1	33	64	23	3.90
Career Planning	1	7	31	47	35	3.89
Speaking Skills	0	4	43	45	29	3.82
Research Methods	1	6	41	51	22	3.72
Critical Thinking*						
Totals	2	33	431	826	523	4.01

*Mistakenly omitted from the survey.

Appendix E.

IUPUI Undergraduate Psychology PUL Assessment Schedule.

Class		PUL 3 (major)	PUL 2 (moderate)	PUL 1 (minor)	Faculty Member Who Will Assess the Class	Spr 2010	Fall 2010	Spr 2011	Fall 2011
B103	Orientation to a Major in Psychology	3	1A	5	Appleby	X			
B104	Psychology as a Social Science	3	2	5	Hansen		X		
B105	Psychology as a Biological Science	4	1A	2	Neal-Beliveau or Herold			?	
B305	Statistics	1B	2	3	Jane			?	
B311	Introductory Laboratory in Psychology	2	1B	3	Ashburn-Nardo		X		
B307	Tests and Measurement	6	4	1B	Chloe Nicksic				?
B310	Life Span Development	4	3	2	Kroupa		X		
B320	Behavioral Neuroscience	4	1A	5	Boehm			X	
B334	Perception	4	1C	1A	Rob Stewart				?
B340	Cognition	4	2	3	Johnson	X			
B344	Learning	4	1A	1B	Nick/Greg		?		
B356	Motivation	4	3	1A	Rob Stewart				?
B358	Introduction to I/O Psychology	2	3	5	Liz P			?	
B370	Social Psychology	5	3	2	Ashburn-Nardo	X			
B380	Abnormal Psychology	4	2	6	John Guare?			?	
B398	Brain Mechanisms of Behavior	2	3	1A	Charlie			?	
B424	Theories of Personality	3	2	4	Melissa				?
B322	Introduction to Clinical Psychology	2	3	5	Lisa				?
B360	Childhood and Adolescence	5	4	6	Terri Tarr			?	
B365	Stress and Health	5	4	6	John Guare			?	
B366	Cons and Apps in Organizational Psychology	2	3	5	Jane?			?	
B368	Cons and Apps in Personnel Psychology	1A	5	6	Hazer		X		
B375	Psychology and Law	2	1A	5	Devine		X		
B376	Psychology of Women	3	4	1C	Kroupa		X		
B386	Introduction to Counseling	1A	5	6	John Guare				?
B394	Drugs and Behavior	3	2	5	Beth				?
B396	Alcohol, Alcoholism, and Drug Abuse	4	2	3	Beth				?
B420	Humanistic Psychology	3	4	6	Roger?				
B421	Internship in Psychology	4	3	1A	Mikki			?	
B422	Professional Practice	3	2	6	Drew/Cindy		?		
B492	Readings and Research in Psychology	3	1C	1B	???				
B433	Capstone Lab in Applied Psychology	2	1A	1B	J. Stewart	X			
B454	Capstone Seminar in Psychology	3	1A	4	Appleby	X			
B462	Capstone Practicum in I/O Psychology	3	6	2	Hazer			X	
B471	Capstone Lab in Social Psychology	4	1A	1C	Bringle	X			
B482	Capstone Practicum in Clinical Psychology	3	5	4	John Guare			?	
B499	Capstone Honors Research	3	1A	1B	Johnson	X			

Note: "?" indicates scheduled PUL assessment..

Appendix F.

Analysis of the Frequency with which Each of the PULs Are Targeted for Emphasis in the 35 Courses that Comprise the IUPUI Undergraduate Psychology Curriculum.

Principle of Undergraduate Learning (PUL)	Major Emphasis	Moderate Emphasis	Minor Emphasis	Total Emphases	Weighted Emphases	Total Weighted Emphases
3 – Integration and Application of Knowledge	12	9	4	25	12x3 + 9x2 + 4x1	58
4 – Intellectual Depth, Breadth, and Adaptiveness	12	5	4	21	12x3 + 5x2 + 4x1	50
2 – Critical Thinking Skills	7	8	5	20	7x3 + 8x2 + 5x1	42
1A – Language Skills	2	8	5	15	2x3 + 8x2 + 5x1	27
5 – Understanding Society and Culture	3	4	8	15	3x3 + 4x2 + 8x1	25
6 – Values and Ethics	1	1	5	7	1x3 + 1x2 + 5x1	10
1B – Quantitative Skills	1	1	5	7	1x3 + 1x2 + 5x1	10
1C – Information Resources Skills	0	2	2	4	0x3 + 2x2 + 2x1	5

1. The 1st column contains the university's Principles of Undergraduate Education.
2. The 2nd, 3rd, and 4th columns represent the number of courses in which each PUL was targeted as a Major Emphasis (2nd column), Moderate Emphasis (3rd column), and Minor Emphasis (4th column).
3. The 5th column (Total Emphases) contains the sum of the previous three columns and represents the total number of times a particular PUL was targeted for emphasis in all 35 courses.
4. The 6th column is similar to the 5th column, except it takes into account the level of emphasis placed on each PUL. The numbers in this column (Total Weighted Emphases) were computed by multiplying each instance of a Major Emphasis by 3, each instance of a Moderate Emphasis by 2, and each instance of a Minor Emphasis by 1 and then summing each of these totals.
5. These data should be taken into consideration by the Psychology Department when they begin to examine their undergraduate curriculum during the Fall semester of 2010.