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

2009-2010 Progress Report
for the Six-Stage Assessment Strategy

Submitted Patricia Clark, Ph.D., Trustee's Lecturer
(Edited by Joseph L. Thompson)
June 2010

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 Science, 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, changes in course offerings, and changes in methods of student assessment within courses, the Biology Department has recently made major revisions in the identification of SLOs and linking these 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. 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. 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. These include:

A. Biological Concepts: "Biology graduates will have an understanding of fundamental concepts from each of the biological areas listed below, as well as the relationships among them, i.e. the continuum from the ecosystem to the molecular level. This does not imply that the student will be equally well versed in all areas, because the individual's interest in a particular part of Biology is expected to drive him or her to greater achievement in an area."

    1) *Molecular Biology and Genetics*: biomolecular functions, control process, and roles in inheritance

    2) *Cell Developmental Biology:* cell structure and function, mechanisms of regulation and development

    3) *Physiology:* operation and interaction of systems to maintain short-term homeostasis of the organism and long term survival of the species

    4) *Ecology:* interactions of organisms with each other and their physical environement

    5) *Evolution:* evolution of life on Earth

B. Applied skills

    1) *Scientific Inquiry:* understand and be able to apply the scientific method in a biological context

    2) *Biotechnology:* experience with selected techniques and equipmentcommonly used in biological studies

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 a 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

The Department would to develop a more refined survey for students to be able to provide written feedback on the SLOs they experienced - for example, identifying particular classes or assignments that helped them to accomplish certain SLOs and to provide feedback to the Department that would help future biology majors to accomplish the SLOs that they indicated they had not successfully accomplished. These data would provide the Department with information to answer the following questions.

1) Do Biology majors perceive an assignment or course as helpful with regards to achieving the Department's SLOs identified within the course?
2) How does the student's assessment of an assignment compare to the faculty member's expectations of mastery of SLOs in their course?
3) How could the Biology Department curriculum be examined or revised in light of these perceptions and potential differences?
4) Could the disparity between student and faculty perceptions of the SLOs and student suggestions be used to improve the Biology curriculum in ways that would increase student identification and achievement of SLOs?

The answers to these questions could be used to fine tune the Department of Biology's SLOs and improve the curriculum to be more effective.

Ensuring Student Attainment of the PULs

IUPUI has begun an initiative to evaluate undergraduate student attainment of the Principles of Undergraduate Learning (PULs) in preparation for our campus-wide 2012 accreditation process. (http://iport.iupui.edu/selfstudy/tl/puls/) **As a first step**, in Spring 2009, each SOS faculty member identified one, two, or three key PULs addressed in their class activities and assignments, with a "3" designation being given to the PUL with the **major** emphasis or focus in a course.

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 assigned to Spring 2010 PUL assessment were responsible for identifying an existing tool or producing a new tool appropriate for assessing student acheivement of the major emphasis PUL, (this may also apply to a minor emphasis PUL, and a some emphasis PUL, if identified). As a result of the alignment of course SLOs with the university PULs, assessment of student achievement of the identified PUL 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 achievement of SLOs will also progress.

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	Biology	BIOL-K 101	CONCEPTS OF BIOLOGY I					3			
Spring 2010	Biology	BIOL-K 103	CONCEPTS OF BIOLOGY II				3				
Spring 2010	Biology	BIOL-N 100	CONTEMPORARY BIOLOGY						3		
Spring 2010	Biology	BIOL-N 200	BIOLOGY OF WOMEN						3		
Spring 2010	Biology	BIOL-N 214	HUMAN BIOLOGY				2	3			
Spring 2010	Biology	BIOL-N 215	HUMAN BIOLOGY LAB ⌃ PUL Varies by Class								

	Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
	20016	Spring 2010					3			
	20017	Spring 2010					3			
	20018	Spring 2010					3			
	20019	Spring 2010					3			
	20020	Spring 2010					3			
	23691	Spring 2010					3			
	25537	Spring 2010					3			
	25596	Spring 2010					3			

Plans to Accomplish the Next Stage During School Year 2010 – 2011

Effort in assessing PULs will continue as scheduled. Experiences and comments from initial assessments in Spring 2010 will be communicated among faculty members who will assess PULs in their courses during school year 2010-2011.'

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 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	Biology	BIOL-K 322	GENETICS & MOLECULAR BIOLOGY ⌃ PUL Varies by Class								

		Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
		19961	Spring 2010								
		1146	Fall 2010					3			

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Biology	BIOL-K 323	GENETICS & MOLEC BIOLOGY LAB					3			
Fall 2010	Biology	BIOL-N 107	EXPLORING THE WORLD OF ANIMALS					3			
Fall 2010	Biology	BIOL-N 212	HUMAN BIOLOGY				2	3			
Fall 2010	Biology	BIOL-N 213	HUMAN BIOLOGY LAB ⌃ PUL Varies by Class								

		Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
		14351									
		1199	Fall 2010					3			
		1200	Fall 2010					3			
		1201	Fall 2010					3			
		1202	Fall 2010					3			
		1203	Fall 2010					3			
		1204	Fall 2010					3			
		1205	Fall 2010					3			
		4651	Fall 2010					3			
		6080	Fall 2010					3			

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	Biology	BIOL-K 324	CELL BIOLOGY ⌃ PUL Varies by Class								

		Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
		19962	Spring 2010					2	3		
		28766	Fall 2010								

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2011	Biology	BIOL-K 325	CELL BIOLOGY LABORATORY		2			3			
Spring 2011	Biology	BIOL-K 331	EMBRYOLOGY					3			
Spring 2011	Biology	BIOL-K 333	EMBRYOLOGY LABORATORY					3			
Spring 2011	Biology	BIOL-N 251	INTRODUCTION TO MICROBIOLOGY		3						
Spring 2011	Biology	BIOL-N 261	HUMAN ANATOMY		1			3	2		
Spring 2011	Biology	BIOL-N 322	INTRO PRINCIPLES OF GENETICS				3				

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

I. Biological Concepts

A. Molecular Biology & Genetics: biomolecular functions, control process, and roles in inheritance

B. Cell Developmental Biology: cell structure and function, mechanisms of regulation and development

C. Physiology: operation and interaction of systems to maintain short-term homeostasis of the organism and long term survival of the species

D. Ecology: interactions of organisms with each other and their physical environment

E. Evolution: evolution of life on Earth

II. Applied Skills

A. Scientific Inquiry: understand and be able to apply the scientific method in a biological context

B. Biotechnology: experience with selected techniques and equipment commonly used in biological studies

Course	Title	Cr	I.A	I.B	I.C	I.D	I.E	II.A	II.B
K101	Concepts of Bio. I	5	B	B			B	B	B
K103	Concepts of Bio. II	5	B	B	B	B	B		
K322	Genetics	3	I	B					
K323	Genetics Lab	2	I	B				I	I
K324	Cell Biology	3	B	I	B		B	I	I
K325	Cell Biology Lab	2	B	I	B			I	I
K331	Embryology	3	I	A				A	
K333	Embryology Lab	2		A				A	B
K338	Intro. Immunology	3	B	I					
K339	Intro. Immunology Lab	2	B						B
K341	Principles of Ecol. & Evol.	3			I	I	I	I	
K342	Prin. of Ecol. & Evol. Lab	2			B	I	I	B	B
K350	Comp. Animal Physiology	3		I	I				
K356	Microbiology	3	I	I			B	I	B
K357	Microbiology Lab	2	I		B	B		I	
K483	Biological Chemistry	3	I	B	B			I	
K484	Cellular Biochemistry	3	A	A	A			A	A
K295	Special Assignments	Arr							
K490	Capstone	1							
K493	Independent Research	1 to 3							
K494	Senior Thesis	1							

Key	
B	Beginning
I	Intermediate
A	Advanced

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

2009-2010 Progress Report
for Assessing Student Attainment of PULs

Submitted by Hongqiu Zhao
June 2010

Introduction

Outcome based assessment is the current trend in higher education. 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).

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

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

During 2007 to 2008 school year, SLOs of each branch of Chemistry were devised and approved by Chemistry department (**stage 1**). These detailed SLOs were further mapped to six basic Principles of Undergraduate Learning (PULs) (**stage 2**).

PULs summarize the general education outcomes and abilities we want all undergraduate students to have opportunities to achieve, regardless of major. To ensure that our students are developing the knowledge, abilities, and attributes embodied in the PULs, IUPUI developed a process for assessing, gathering and presenting evidence of student learning of the PULs at IUPUI. This is related to **stage 3** of School of Science's six-stage assessment plan.

There are three steps to evaluate student attainment of PULs:

Step 1: Identify the PULs that are targeted in class activities and assignments for each class in a department or program's curriculum.

Step 2: Develop a schedule for evaluating student attainment of the skills and knowledge embodied in PULs.

Step 3: Identify and record a level of PUL attainment for each student enrolled in each course that has been scheduled to have its PULs assessed.

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

Step 1: Identify PULs in each class

As a first step, PULs in all courses offered in Department of Chemistry and Chemical Biology were identified and the following matrix was created and submitted to School of Science.

Principles of Undergraduate Learning

1A = Language Skills (Core Communication and Quantitative Skills)
1B = Quantitative Skills (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

Component	Subject (dept)	Cat Nbr (course #)	PUL has Major Emphasis	PUL has Moderate Emphasis	PUL has Some Emphasis
			Required	*Optional*	*Optional*
LEC	**CHEM-C**	**100**	2		
LEC	**CHEM-C**	**101**	2		
LEC	**CHEM-C**	**105**	2		
LEC	**CHEM-C**	**106**	2		
LEC	**CHEM-C**	**110**	2		
LAB	**CHEM-C**	**115**	2	3	
LAB	**CHEM-C**	**121**	2	3	
LAB	**CHEM-C**	**125**	2	3	
LAB	**CHEM-C**	**126**	2	3	
IND	**CHEM-C**	**209**	4		
IND	**CHEM-C**	**309**	4		
LEC	**CHEM-C**	**310**	2		

LAB	**CHEM-C**	**311**	2	3	
LEC	**CHEM-C**	**341**	2		
LEC	**CHEM-C**	**342**	2		
LAB	**CHEM-C**	**343**	2	3	
LAB	**CHEM-C**	**344**	2	3	
LEC	**CHEM-C**	**360**	2	1B	
LEC	**CHEM-C**	**361**	2	1B	
LEC	**CHEM-C**	**362**	2	1B	
LAB	**CHEM-C**	**363**	2	3	
LEC	**CHEM-C**	**372**	2		
IND	**CHEM-C**	**409**	4		
LEC	**CHEM-C**	**410**	2		
LAB	**CHEM-C**	**411**	2	3	
LEC	**CHEM-C**	**430**	2		
LAB	**CHEM-C**	**435**	2	3	
LEC	**CHEM-C**	**484**	2		
LEC	**CHEM-C**	**485**	2		
LAB	**CHEM-C**	**486**	2	3	
LEC	**CHEM-C**	**494**	1A	1C	
LEC	**CHEM-C**	**495**	1A	3	
LAB	**CHEM-C**	**496**	2	3	
LAB	**CHEM-S**	**125**	2	3	
LAB	**CHEM-S**	**126**	2	3	

Step 2: Develop a schedule for evaluating PULs

With six volunteering faculty members who were willing to assess their classes in Spring 2010, the following PULs assessment schedule was developed. Different branches of Chemistry were factored into our consideration, and this schedule was approved by all faculty members and passed on to School of Science.

Semesters and courses to be assessed:

Spring 2010: C105, C110, C125, C310, C360, C485, C486
Fall 2010:   C121, C106, C342, C411, C494
Spring 2011: S126, C341, C372, C363, C430
Fall 2011:   C115, C126, C410, C484
Spring 2012: C100, C311, C343
Fall 2012:   C101, S125, C362, C495
Spring 2013: C361, C435,
Fall 2013:   C344, C496

Step 3: Assessing PULs and record PUL attainment for each student in courses

Step 3 will be a continuing effort for the next a few years as scheduled in step 2. The initial assessment efforts were done in Spring 2010, and a total of six faculty members in Department of Chemistry and Chemical Biology volunteered to assess their seven courses. Though different faculty members were using different assignments to assess PULs, but exams and quizzes are major assignments used.

Only the PULs given major or moderate emphasis in each course were assessed, and each student was given one of the following rating scales on each of the relevant PULs based on each student's class performance:

V = Very Effective
E = Effective
S = Somewhat Effective
N = Not Effective

Overall assessments in these initial courses were very successful and PUL assessment results for each student in these courses were reported to Registrar's Office at the end of the Spring semester.

Filter by Semester: Spring 2010 — by Unit: IUPUI - Science — by Department:
SCI - Chemistry and Chemical Biology [IUPUI] — Export:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2010	Chemistry and Chemical Biology	CHEM-C 105	PRINCIPLES OF CHEMISTRY I				3				
Spring 2010	Chemistry and Chemical Biology	CHEM-C 110	THE CHEMISTRY OF LIFE				3				
Spring 2010	Chemistry and Chemical Biology	CHEM-C 125	EXPERIMENTAL CHEMISTRY I				3	2			
Spring 2010	Chemistry and Chemical Biology	CHEM-C 310	ANALYTICAL CHEMISTRY		2		3				
Spring 2010	Chemistry and Chemical Biology	CHEM-C 360	INTRODUCTORY PHYSICAL CHEM		2		3				
Spring 2010	Chemistry and Chemical Biology	CHEM-C 485	BIOSYNTHESIS AND PHYSIOLOGY				3				
Spring 2010	Chemistry and Chemical Biology	CHEM-C 486	BIOL CHEMISTRY LABORATORY				3	2			

Plans to Accomplish the Next Stage During School Year 2010 – 2011

Effort in assessing PULs will continue as scheduled. Experiences and comments from initial assessments in Spring 2010 will be communicated among faculty members who will assess PULs in their courses during school year 2010-2011.'

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 2010

Filter by Semester: Fall 2010   by Unit: IUPUI - Science   by Department:
SCI - Chemistry and Chemical Biology [IUPUI]   Export:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Chemistry and Chemical Biology	CHEM-C 106	PRINCIPLES OF CHEMISTRY II				3				
Fall 2010	Chemistry and Chemical Biology	CHEM-C 121	ELEMENTARY CHEMISTRY LAB 1				3	2			
Fall 2010	Chemistry and Chemical Biology	CHEM-C 342	ORGANIC CHEMISTRY LECTURES 2				3				
Fall 2010	Chemistry and Chemical Biology	CHEM-C 410	PRIN OF CHEM INSTRUMENTATION				3				
Fall 2010	Chemistry and Chemical Biology	CHEM-C 411	PRIN OF CHEM INSTRUMENTATN LAB				3	2			
Fall 2010	Chemistry and Chemical Biology	CHEM-C 494	INTRO TO CAPSTONE IN CHEMISTRY 〈PUL Varies by Class〉								

	Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
	23578	Spring 2010	3		2					
	4843	Fall 2010	3							

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	Chemistry and Chemical Biology	CHEM-C 341	ORGANIC CHEMISTRY 1 LECTURES				3				
Spring 2011	Chemistry and Chemical Biology	CHEM-C 363	EXPERIMENTAL PHYSICAL CHEM				3	2			
Spring 2011	Chemistry and Chemical Biology	CHEM-C 372	CHEM INFO II: MOLEC MODELING				3				
Spring 2011	Chemistry and Chemical Biology	CHEM-C 430	INORGANIC CHEMISTRY				3				
Spring 2011	Chemistry and Chemical Biology	CHEM-S 126	EXP CHEMISTRY II HONORS				3	2			

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

2009-10 Progress Report
for the Six-Stage Assessment Strategy

Submitted by Xukai Zou, Ph.D.
(Edited by Josh Morrison)
October 2010

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1. Introduction

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Stage 6 → Repeat Stage 4 to determine if the curricular changes were effective.

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. The Stage 6 for the Computer Science Department is to test basic understanding of students on computer architecture, the interrelations among structure and functionality of hardware and software components, and understanding of the utmost necessity for exploiting the capabilities offered by modern computer systems. The Department has decided to use ETS Major Field Test to examine student learning outcomes. The Major Field Test 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 2010 term, thirteen seniors completed the Major Field Test in Computer Science as part of CSCI 495, the senior capstone course. These students did very well, scoring an average of 159 on a scale of 120-200. This placed the Department's average in the 70th percentile of all institutions. 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	Not Reported	95
Discrete Structures and Algorithms	Not Reported	95
Systems	Not Reported	95
Total Score	70	95

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: CSU – Los Angeles, East Carolina University, Kent State University, Old Dominion University,

South Dakota State University, University of Alabama - Birmingham, University of Alaska - Fairbanks, University of Missouri - Kansas City, University of Missouri - St. Louis, University of New Orleans. 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 2010 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.

Ensuring Student Attainment of the PULs

IUPUI has begun an initiative to evaluate undergraduate student attainment of the Principles of Undergraduate Learning (PULs) in preparation for our campus-wide 2012 accreditation process. (http://iport.iupui.edu/selfstudy/tl/puls/) **As a first step**, in Spring 2009, each SOS faculty member identified one, two, or three key PULs addressed in their class activities and assignments, with a "3" designation being given to the PUL with the **major** emphasis or focus in a course.

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	Computer Science	CSCI 36200	DATA STRUCTURES		2		3				
Spring 2010	Computer Science	CSCI 45200	OBJECT-ORIENTED ANALYS & DES	1			3				2
Spring 2010	Computer Science	CSCI 48700	ARTIFICIAL INTELLIGENCE		2		3		1		
Spring 2010	Computer Science	CSCI-N 201	PROGRAMMING CONCEPTS				3	2	1		
Spring 2010	Computer Science	CSCI-N 207	DATA ANALYS USING SPREADSHEETS		3	2		1			
Spring 2010	Computer Science	CSCI-N 241	FUNDAMENTALS WEB DEVELOPMENT			2	3				
Spring 2010	Computer Science	CSCI-N 301	FUNDAMENTAL COMP SCI CONCEPTS		2		3				1
Spring 2010	Computer Science	CSCI-N 341	INTRO CLIENT-SIDE WEB PRGMING			2	3				

Plans to Accomplish the Next Stage During School Year 2010 – 2011

Effort in assessing PULs will continue as scheduled. Experiences and comments from initial assessments in Spring 2010 will be communicated among faculty members who will assess

PULs in their courses during school year 2010-2011.'

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 2010

Filter by Semester: Fall 2010 — by Unit: IUPUI - Science — by Department: SCI - Computer Science [IUPUI]
Export:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Computer Science	CSCI 23000	COMPUTING I		2		3			1	
Fall 2010	Computer Science	CSCI 34000	DISCRETE COMPUTATNL STRUCTURES		2		3				
Fall 2010	Computer Science	CSCI 40200	ARCH OF COMPUTERS		2		3				
Fall 2010	Computer Science	CSCI 44300	DATABASE SYSTEMS		2		3				
Fall 2010	Computer Science	CSCI 45000	PRINCIPLES OF SOFTWARE ENGR	3			2	1			
Fall 2010	Computer Science	CSCI-N 100	INTRO TO COMPUTERS & COMPUTING (PUL Varies by Class)								

Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
23868	Spring 2010	1	2	3					
24001	Spring 2010	1	2	3					
25154	Spring 2010	1	2	3					
14338									
3370		1	2	3					
3371		1	2	3					
1664	Fall 2010	1	2	3					
5209	Fall 2010	1	2	3					
6608	Fall 2010	1	2	3					
6709	Fall 2010	1	2	3					

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Computer Science	CSCI-N 211	INTRODUCTION TO DATABASES				2	3	1		
Fall 2010	Computer Science	CSCI-N 300	MOBILE COMPUTING FUNDAMENTALS (PUL Varies by Class)								

Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
28704	Spring 2010					3			
30973	Fall 2010		1						

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Computer Science	CSCI-N 305	C LANGUAGE PROGRAMMING		2			3	1		
Fall 2010	Computer Science	CSCI-N 355	INTRO TO VIRTUAL REALITY	2	1			3			

Spring 2011

Filter by Semester: Spring 2011 — by Unit: IUPUI - Science — by Department: SCI - Computer Science [IUPUI]
Export:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2011	Computer Science	CSCI 24000	COMPUTING II		2		3				1
Spring 2011	Computer Science	CSCI 30000	SYSTEMS PROGRAMMING						3		
Spring 2011	Computer Science	CSCI 40300	INTRO TO OPERATING SYSTEMS		2		3				
Spring 2011	Computer Science	CSCI 48400	THEORY COMPUTATION				3				
Spring 2011	Computer Science	CSCI-N 342	SERVER-SIDE PGMING FOR THE WEB (PUL Varies by Class)								

Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
22574	Spring 2010		2		3				
28701	Spring 2010		2		3				
4748			2		3				
30974	Fall 2010		1						

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2011	Computer Science	CSCI-N 451	WEB GAME DEVELOPMENT (PUL Varies by Class)								

Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
22921	Spring 2010	1	2		3				
25434	Spring 2010	1	2		3				
6145									
31832	Fall 2010	1	2		3				
32709	Fall 2010	1	2		3				

Assessment of Student Learning
Forensic and Investigative Sciences (FIS)
Indiana University-Purdue University Indianapolis

2009-2010 Progress Report
for the Six-Stage Assessment Strategy

Submitted Kristin A. Shea, M.S.
(Edited by Joseph L. Thompson)
June 2010

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 Science, 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 Forensic and Investigative Sciences Undergraduate Program in Regard to These Stages

The Forensic and Investigative Sciences Program (FIS) has completed Stages 1 and 2 and is actively working on Stages 3 and 4. The FIS Program has created an Assessment Committee that includes the entire program faculty and staff. The Committee decided it needed to define the direction of the FIS Program before it could create student learning outcomes. The Committee did this by creating the FIS mission, vision and values statements.

Mission
To develop professional, ethical graduates with the highest quality education in the natural, physical, and forensic sciences, law and criminal justice to successfully prepare them for advanced degrees, employment and research in forensic science and related fields.

Vision
To become a leading forensic science educational program that has regional, national and international recognition for excellence.

Values
The Forensic and Investigative Sciences Program at IUPUI is committed to the highest standards for our students, faculty, and staff. We value the highest ethical and professional behavior with high standards of excellence and objectivity in academic work and lifelong commitment to education. For our faculty and staff we value striving for the highest standards of excellence in teaching and learning and a commitment to providing the best education to every student. We value commitments to continuing professional development and for continuous improvement of our programs and services. For all the members of the FIS Program, students, faculty and staff, we value a commitment to excellence in developing collaborative and mutually beneficial relationships with our criminal justice constituents and the community as a whole.

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

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

The FIS Assessment Committee chose to organize its subject matter into eight categories that each has their own set of SLOs, which were then linked to the specific courses within the program's curriculum. This was accomplished 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. These three levels were used to analyze the syllabi of the FIS program and then link the SLOs with specific courses by placing them into one of three categories (see below).

A. Basic Level → Retaining and Understanding
1. the ability to <u>retain</u> specific information in the way it was originally presented
    a. being able to recognize or recall the definitions of psychological terms and concepts in an accurate manner
    b. questions it can be used to answer: Who, what, where, and when?

2. the ability to <u>understand</u> information when it is presented in a different manner than it has been originally presented
   a. being able to identify a principle or concept when presented with an example that has not been previously encountered
   b. questions it can be used to answer: How and why?

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 break down a complex whole into its component parts and explain 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 to one another?
2. the ability to produce and <u>apply</u> original and useful solutions to solvable problems
   a. being able to use psychological concepts, theories, and methods to solve real world problems
   b. questions it can be used to answer: How can this problem be solved?

C. Advanced Level → Evaluating and Creating
1. the ability to <u>evaluate</u> the effectiveness and/or merit of the products of application
   a. being able to used established criteria to judge the success of problem-solving methods (e.g., the scientific method and psychotherapy)
   b. questions it can be used to answer: What is the validity or value of a particular principle, theory, or method?
2. the ability to <u>create</u> (i.e., synthesize) new wholes from previously unrelated parts
   a. being able to combine previously unassociated elements into new, creative, meaningful, and/or useful wholes
   b. questions it can be used to answer: What new conclusions can you reach on the basis of what you have learned?

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.

In the following table, **B** refers to the Basic Level of retaining and understanding, **I** refers to the Intermediate Level of analyzing and applying and **A** refers to the Advanced Level of evaluating and creating.

1. Forensic Science System - Understand the general overview of the forensic science system	B	I	A
a. Explain and describe areas in forensic science	205	206	490(I)
b. Understand the fundamentals of crime laboratory culture and organization	205		305,490(I)
c. Understand the role of forensic science in crime scene investigation	205		490(I)
d. Explain and be able to classify evidence	205	206	490(I)
e. Explain and describe quality assurance and control used in forensic science laboratories	205		305,490(I)
f. Prepare a résumé and cover letter for a job in forensic science	305	305,490(I)	
g. Demonstrate proper interviewing skills for a job in forensic science	305	305,490(I)	
2. Forensic Chemistry - Understand how chemical and instrumental techniques can be applied to forensic chemical evidence			
a. Describe the possible job functions of a chemist in a forensic science laboratory	205	206	490(I)
b. Describe how statistical techniques can be used to describe the quality of data, classify samples or determine proper sampling protocol	401		
c. Explain the chemical principles behind acid-base, liquid-liquid, liquid-solid and solid-vapor extractions		401	
d. Explain the principles, instrumentation and applications of chromatographic techniques such as TLC, HPLC, and GC		401	
e. Explain the principles, instrumentation and applications of spectroscopic techniques such as UV/vis/fluorescence, FTIR and Raman		401	
f. Explain the principles, instrumentation and applications of mass spectrometry using EI and ESI ionization		401	
g. Demonstrate the ability to prepare and examine samples using analytical techniques such as TLC, GC/MS, Pyrolysis-GC/FID, LC/MS, FTIR, Raman, and UV/vis/fluorescence		401	404
h. Explain the principles, instrumentation and applications of microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry	206		406
i. Demonstrate the ability to prepare and examine samples using microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry			406
j. Describe the chemical composition, origins and significance of the most commonly encountered types of trace evidence such as ink, paint, fibers, explosives, ignitable liquids, glass and hairs		401	
k. Determine the appropriate chemical analytical scheme to be used on physical evidence			404,490(I)
l. Successfully apply the chemical and instrumental techniques described above on mock case work			404
3. Pattern Evidence - Understand pattern evidence in forensic science and the appropriate analytical techniques			
a. Explain, evaluate, and identify characteristics of fingerprints	205	401	404
b. Understand the application of firearm and toolmark analysis used in forensic science	205	401	404
c. Describe forensic techniques used on questioned documents	205	206,401	404
d. Understand the application of impression evidence such as tiretreads and footwear	205	401	404

	B	I	A
4. Forensic Biology - Understand how to identify and analyze forensic biological evidence			
a. Describe the possible job functions of a forensic biologist in a forensic science laboratory	206	402	403,490(I)
b. Describe how to recognize, collect and preserve biological evidence	206	402	490(I)
c. Describe the principles and techniques of blood spatter pattern analysis	206	402	
d. Describe the principles and techniques of identification of body fluids	206	402	
e. Describe the principles and techniques of identification of the species of biological evidence		402	
f. Describe the principles and techniques of DNA isolation from various biological evidence	206		403
g. Explain the principles, instrumentation and applications of DNA typing techniques	206		403
h. Describe how statistics and population genetics can be used for data interpretation			403
5. Photography and Imaging - Explain and implement the basic and advanced principles of photography and imaging in the processing of a crime scene			
a. Describe the basic elements of the theory of photography	250	251	251
b. Understand and describe the photographic process	250	251	251
c. Describe and apply the principles of photography to crime scene analysis	251		251,490(I)
d. Describe how the techniques and methods of processing images are used on photographic evidence obtained at a crime scene	260	261	261,490(I)
6. Ethics - Understand the importance of ethics in the practice of forensic science			
a. Define ethics	205		
b. Describe how ethics are applied in the analysis of forensic evidence	205	305	305
c. Describe how ethics are applied to the presentation of expert testimony in court	305	415	305,415
d. Describe the major features of the Code of Ethics of the American Academy of Forensic Sciences and of other major forensic science organizations	205		
7. Forensic Science and the Law - Understand how criminal and civil laws and procedures are applied to Forensic Science			
a. Apply the evidentiary rules and law of evidence in the collection of evidence, examination of the evidence, and preparation of scientific reports and testimony	415	415	415
b. Describe the kinds of evidence that require a scientific foundation for its admission	415	415	415
c. Demonstrate the ability to conduct accurate, comprehensive and focused scientific investigations and apply appropriate rules of evidence	415	415	415
d. Interpret and implement standards of forensic practice as established by the rules of evidence	415	415	415
e. Apply knowledge of forensic science to case scenarios	415	415	415
8. Research - Understand how to conduct forensic science research			
a. Conduct a literature search on a forensic science research topic	SCI-I120, 305	415, 409, 490	
b. Participate in the design of a research project	409, 490	409, 490	
c. Carry out experiments to properly collect data	409, 490	409, 490	
d. Ability to document research data	409, 490		
e. Ability to evaluate and interpret research data	409, 490	409, 490	
f. Effectively communicate research results through written, oral and visual presentations		409, 490	

The program went a step further and mapped the Student Learning Outcomes to the University's Principles of Undergraduate Learning (PULs).

The Principles of Undergraduate Learning are the essential ingredients of the undergraduate educational experience at Indiana University Purdue University Indianapolis. These principles form a conceptual framework for all students' general education but necessarily permeate the curriculum in the major field of study as well. More specific expectations for IUPUI's graduates are determined by the faculty in a student's major field of study. Together, these expectations speak to what graduates of IUPUI will know and what they will be able to do upon completion of their degree.

Core Communication and Quantitative Skills
The ability of students to express and interpret information, perform quantitative analysis, and use information resources and technology – the foundational skills necessary for all IUPUI students to succeed.

Outcomes: Core communication and quantitative skills are demonstrated by the student's ability to
- express ideas and facts to others effectively in a variety of written formats, particularly written, oral and visual formats;
- comprehend, interpret, and analyze ideas and facts;
- communicate effectively in a range of settings;
- identify and propose solutions for problems using quantitative tools and reasoning;
- make effective use of information resources and technology.

Critical Thinking
The ability of students to engage in a process of disciplined thinking that informs beliefs and actions. A student who demonstrates critical thinking applies the process of disciplined thinking by remaining open-minded, reconsidering previous beliefs and actions, and adjusting his or her thinking, beliefs and actions based on new information.

Outcomes: The process of critical thinking begins with the ability of students to remember and understand, but it is truly realized when the student demonstrates the ability to
- apply,
- analyze,
- evaluate, and
- create

knowledge, procedures, processes, or products to discern bias, challenge assumptions, identify consequences, arrive at reasoned conclusions, generate and explore new questions, solve challenging and complex problems, and make informed decisions.

Integration and Application of Knowledge
The ability of students to use information and concepts from studies in multiple disciplines in their intellectual, professional, and community lives.

Outcomes: Integration and application of knowledge are demonstrated by the student's ability to
- enhance their personal lives;
- meet professional standards and competencies;
- further the goals of society; and
- work across traditional course and disciplinary boundaries.

Intellectual Depth, Breadth, and Adaptiveness
The ability of students to examine and organize disciplinary ways of knowing and to apply them to specific issues and problems.

Outcomes: Intellectual depth, breadth, and adaptiveness are demonstrated by the student's ability to
- show substantial knowledge and understanding of at least one field of study;
- compare and contrast approaches to knowledge in different disciplines;
- modify one's approach to an issue or problem based on the contexts and requirements of particular situations.

Understanding Society and Culture
The ability of students to recognize their own cultural traditions and to understand and appreciate the diversity of the human experience.

Outcomes: Understanding society and culture is demonstrated by the student's ability to
- compare and contrast the range of diversity and universality in human history, societies, and ways of life;
- analyze and understand the interconnectedness of global and local communities; and
- operate with civility in a complex world.

Values and Ethics
The ability of students to sound decisions with respect to individual conduct, citizenship, and aesthetics.

Outcomes: A sense of values and ethics is demonstrated by the student's ability to
- make informed and principled choices and to foresee consequences of these choices; explore, understand, and cultivate an appreciation for beauty and art;
- understand ethical principles within diverse cultural, social, environmental and personal settings.

Implementation of the Principles of Undergraduate Learning
The faculty in each school is responsible for implementation of the Principles of Undergraduate Learning (PULs) in its programs, curricula and courses. Students will typically be introduced to the PULs in First-Year Experience courses and Learning Communities, continue to develop PUL-related knowledge and skills in coursework, with demonstration of baccalaureate-level competencies expected in the capstone course/s or culminating experience/s students complete in the school.

Resource
http://uc.iupui.edu/uploadedFiles/Deans/IUPUI-PUL.pdf

FIS Student Learning Outcomes	IUPUI Principles of Undergraduate Learning
1. Forensic Science System - Understand the general overview of the forensic science system	
a. Explain and describe areas in forensic science	**Integration & Application of Knowledge -** meet professional standards and competencies
b. Understand the fundamentals of crime laboratory culture and organization	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
c. Understand the role of forensic science in crime scene investigation	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
d. Explain and be able to classify evidence	**Integration & Application of Knowledge -** meet professional standards and competencies.
e. Explain and describe quality assurance and control used in forensic science laboratories	**Integration & Application of Knowledge -** meet professional standards and competencies.
f. Prepare a resume and coverletter for a job in forensic science.	**Core Communication and Quantitative Skills** - express ideas and facts to others effectively in a variety of written formats; **Integration and Application of Knowledge** - enhance their personal lives.
g. Demonstrate proper interviewing skills for a job in forensic science.	**Core Communication and Quantitative Skills** - communicate orally in one-on-one and group settings; **Integration and Application of Knowledge** - enhance their personal lives; **Understanding Society and Culture** - operate with civility in a complex social world.
2. Forensic Chemistry - Understand how chemical and instrumental techniques can be applied to forensic chemical evidence	
a. Describe the possible job functions of a chemist in a forensic science laboratory	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
b. Describe how statistical techniques can be used to describe the quality of data, classify samples or determine proper sampling protocol	**Critical Thinking -** evaluate the logic, validity, and relevance of data.
c. Explain the chemical principles behind acid-base, liquid-liquid, liquid-solid and solid-vapor extractions	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
d. Explain the principles, instrumentation and applications of chromatographic techniques such as TLC, HPLC, and GC	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
e. Explain the principles, instrumentation and applications of spectroscopic techniques such as UV/vis/fluorescence, FTIR and Raman	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
f. Explain the principles, instrumentation and applications of mass spectrometry using EI and ESI ionization	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
g. Demonstrate the ability to prepare and examine samples using analytical techniques such as TLC, GC/MS, Pyrolysis-GC/FID, LC/MS, FTIR, Raman, and UV/vis/fluorescence	**Integration & Application of Knowledge -** meet professional standards and competencies.
h. Explain the principles, instrumentation and applications of microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
i. Demonstrate the ability to prepare and examine samples using microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry	**Integration & Application of Knowledge -** meet professional standards and competencies.
j. Describe the chemical composition, origins and significance of the most commonly encountered types of trace evidence such as ink, paint, fibers, explosives, ignitable liquids, glass and hairs	**Intellectual Depth, Breadth, & Adaptiveness -** Intellectual depth describes the demonstration of substantial knowledge & understanding of at least one field of study.
k. Determine the appropriate chemical analytical scheme to be used on physical evidence	**Critical Thinking -** analyze complex issues & make informed decisions.
l. Successfully apply the chemical and instrumental techniques described above on mock case work	**Critical Thinking -** analyze complex issues & make informed decisions; **Intellectual Depth, Breadth & Adaptiveness -** Intellectual adaptiveness is demonstrated by the ability to modify one's approach to an issue or problem based on the contexts and requirements of particular situations.
3. Pattern Evidence - Understand pattern evidence in forensic science and the appropriate analytical techniques	
a. Explain, evaluate, and identify characteristics of fingerprints	**Critical Thinking -** analyze complex issues & make informed decisions.
b. Understand the application of firearm and toolmark analysis used in forensic science	**Critical Thinking -** analyze complex issues & make informed decisions; **Intellectual Depth, Breadth & Adaptiveness -** Intellectual breadth is demonstrated by the ability to compare & contrast approaches to knowledge in different disciplines.
c. Describe forensic techniques used on questioned documents	**Intellectual Depth, Breadth & Adaptiveness -** Intellectual breadth is demonstrated by the ability to compare & contrast approaches to knowledge in different disciplines.
d. Understand the application of impression evidence such as tiretreads and footwear	**Critical Thinking -** analyze complex issues & make informed decisions; **Intellectual Depth, Breadth & Adaptiveness -** Intellectual breadth is demonstrated by the ability to compare & contrast approaches to knowledge in different disciplines.

4. Forensic Biology - Understand how to identify and analyze forensic biological evidence	
a. Describe the possible job functions of a forensic biologist in a forensic science laboratory	**Integration & Application of Knowledge -** meet professional standards and competencies.
b. Describe how to recognize, collect and preserve biological evidence	**Critical Thinking -** use knowledge & understanding in order to generate & explore new questions; **Intellectual Depth, Breadth & Adaptiveness -** Intellectual breadth is demonstrated by the ability to compare & contrast approaches to knowledge in different disciplines.
c. Describe the principles and techniques of blood spatter pattern analysis	**Critical Thinking -** use knowledge & understanding in order to generate & explore new questions.
d. Describe the principles and techniques of identification of body fluids	**Critical Thinking -** analyze complex issues & make informed decisions.
e. Describe the principles and techniques of identification of the species of biological evidence	**Critical Thinking -** synthesize information in order to arrive at reasoned conclusions.
f. Describe the principles and techniques of DNA isolation from various biological evidence	**Critical Thinking -** synthesize information in order to arrive at reasoned conclusions.
g. Explain the principles, instrumentation and applications of DNA typing techniques	**Critical Thinking -** analyze complex issues & make informed decisions.
h. Describe how statistics and population genetics can be used for data interpretation	**Critical Thinking -** evaluate the logic, validity, and relevance of data.
5. Photography and Imaging - Explain and implement the basic and advanced principles of photography and imaging in the processing of a crime scene	
a. Describe the basic elements of the theory of photography	**Core Communication and Quantitative Skills -** make efficient use of information resources and technology for personal and professional needs.
b. Understand and describe the photographic process	**Core Communication and Quantitative Skills -** make efficient use of information resources and technology for personal and professional needs.
c. Describe and apply the principles of photography to crime scene analysis	**Core Communication and Quantitative Skills -** make efficient use of information resources and technology for personal and professional needs; **Critical Thinking:** synthesize information in order to arrive at reasoned conclusions.
d. Describe how the techniques and methods of processing images are used on photographic evidence obtained at a crime scene	**Core Communication and Quantitative Skills -** solve problems that are quantitative in nature, and make efficient use of information resources and technology for personal and professional needs; **Critical Thinking -** evaluate the logic, validity, and relevance of data.
6. Ethics - Understand the importance of ethics in the practice of forensic science	
a. Define ethics	**Core Communication and Quantitative Skills -** express ideas and facts to others effectively in a variety of written formats.
b. Describe how ethics are applied in the analysis of forensic evidence	**Critical Thinking -** evaluate the logic, validity, and relevance of data; **Integration and Application of Knowledge -** meet professional standards and competencies; **Values and Ethics -** make informed and principled choices regarding conflicting situations in their personal and public lives and to foresee the consequences of these choices.
c. Describe how ethics are applied to the presentation of expert testimony in court	**Critical Thinking -** evaluate the logic, validity, and relevance of data; **Integration and Application of Knowledge -** meet professional standards and competencies; **Values and Ethics:** make informed and principled choices regarding conflicting situations in their personal and public lives and to foresee the consequences of these choices.
d. Describe the major features of the Code of Ethics of the American Academy of Forensic Sciences and of other major forensic science organizations	**Integration and Application of Knowledge -** meet professional standards and competencies; **Critical Thinking -** synthesize information in order to arrive at reasoned conclusions.
7. Forensic Science and the Law - Understand how criminal and civil laws and procedures are applied to Forensic Science	
a. Apply the evidentiary rules and law of evidence in the collection of evidence, examination of the evidence, and preparation of scientific reports and testimony.	**Integration & Application of Knowledge -** meet professional standards and competencies.
b. Describe the kinds of evidence that require a scientific foundation for its admission.	**Critical Thinking -** analyze complex issues & make informed decisions.
c. Demonstrate the ability to conduct accurate, comprehensive and focused scientific investigations and apply appropriate rules of evidence.	**Critical Thinking -** analyze complex issues & make informed decisions.
d. Interpret and implement standards of forensic practice as established by the rules of evidence.	**Critical Thinking -** evaluate the logic, validity, and relevance of data.
e. Apply knowledge of forensic science to case scenarios.	**Critical Thinking -** analyze complex issues & make informed decisions.

8. Research - Understand how to conduct forensic science research	
a. Conduct a literature search on a forensic scinece research topic.	**Core Communication and Quantitative Skills** - comprehend, interpret, and analysis; make efficient use of infomration resources and technology for personal and professional needs.
c. Carry out experiments to properly collect data.	**Core Communication and Quantitative Skills** - express ideas and facts to others effectively in a variety of written formats; **Critical Thinking** - synthesize information in order to arrive at reasoned conclusions.
d. Ability to document research data.	**Critical Thinking** - synthesize information in order to arrive at reasoned conclusions.
e. Ability to evaluate and interpret research data.	**Critical Thinking** - evaluate the logic, validity, and relevance of data; use knowledge and understanding in order to generate and explore new questions.
f. Effectively communicate research results through written, oral and visual presentations.	**Core Communication and Quantitative Skills** - express ideas and facts to others effectively in a variety of written formats; communicate orally in one-on-one and group settings; make efficient use of information resources and technology for personal and professional needs; **Intellectual Depth, Breadth, and Adaptiveness** - Intellectual depth describes the demonstration of substantial knowledges and understanding of at least one field of study.

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

The FIS program created its first method of measurement by listing the SLOs taught in a specific course and having the students rate their knowledge of each SLO by using the following scale:
- Never heard of it
- Need to brush up
- Neutral
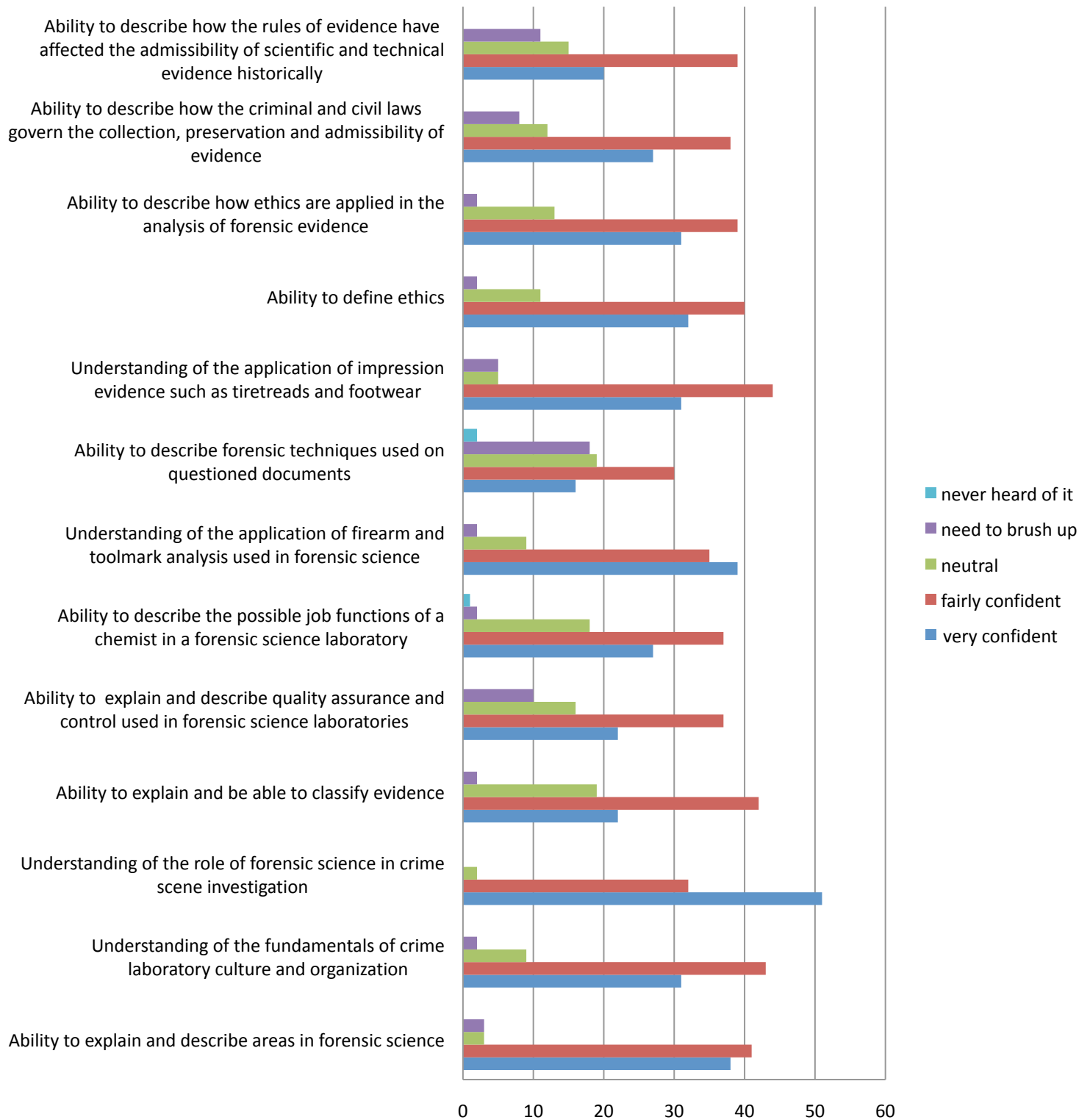- Fairly confident
- Very confident

The FIS program will also continue to explore new methods of measurement to ensure breadth and depth in the data collection process. One new method will be implemented in the Summer of 2009. All students who are completing FIS 49000 *Capstone Experience* with an internship will receive a survey in August to rate their internship experience. The host agency will also receive a mid-term survey as well as a survey at the end of the internship to rate the student's performance. The FIS 49000 Internship SLOs will be included in the surveys.

Stage 4 → Collect data to determine if the SLOs are being accomplished successfully.
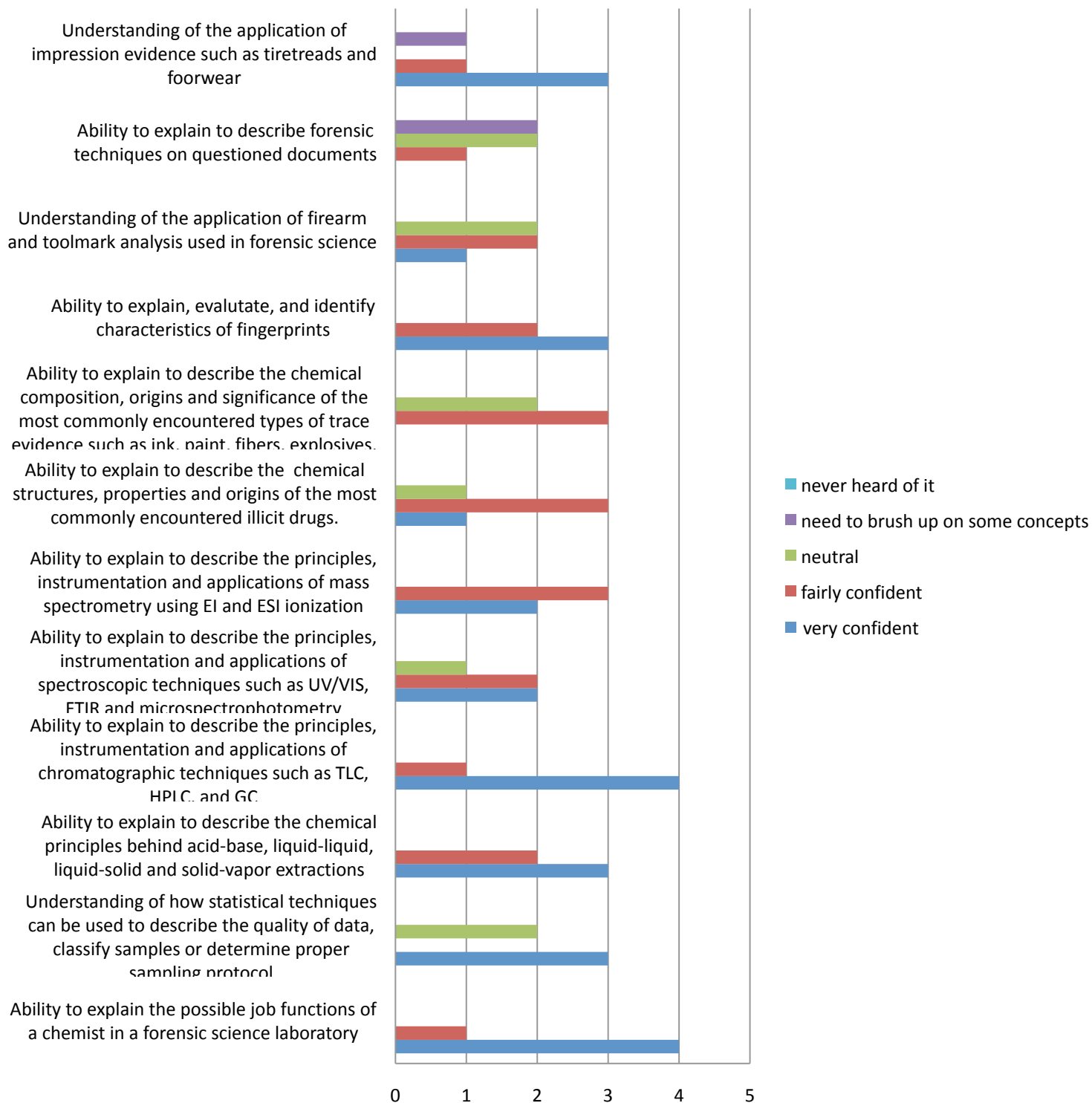
The method of measurement referred to in the previous section was used in the Fall 2008 for two courses: FIS 20500 *Concepts of Forensic Science I* and FIS 40100 *Forensic Chemistry I*; and the Spring 2009 for three courses: FIS 20600 *Concepts of Forensic Science II*, FIS 30500 *Professional Issues in Forensic Science* and FIS 40600 *Forensic Microscopy*. The data collected can be found in the following pages.

The FIS program will continue to collect data for all of its courses in the 2009-2010 academic year.
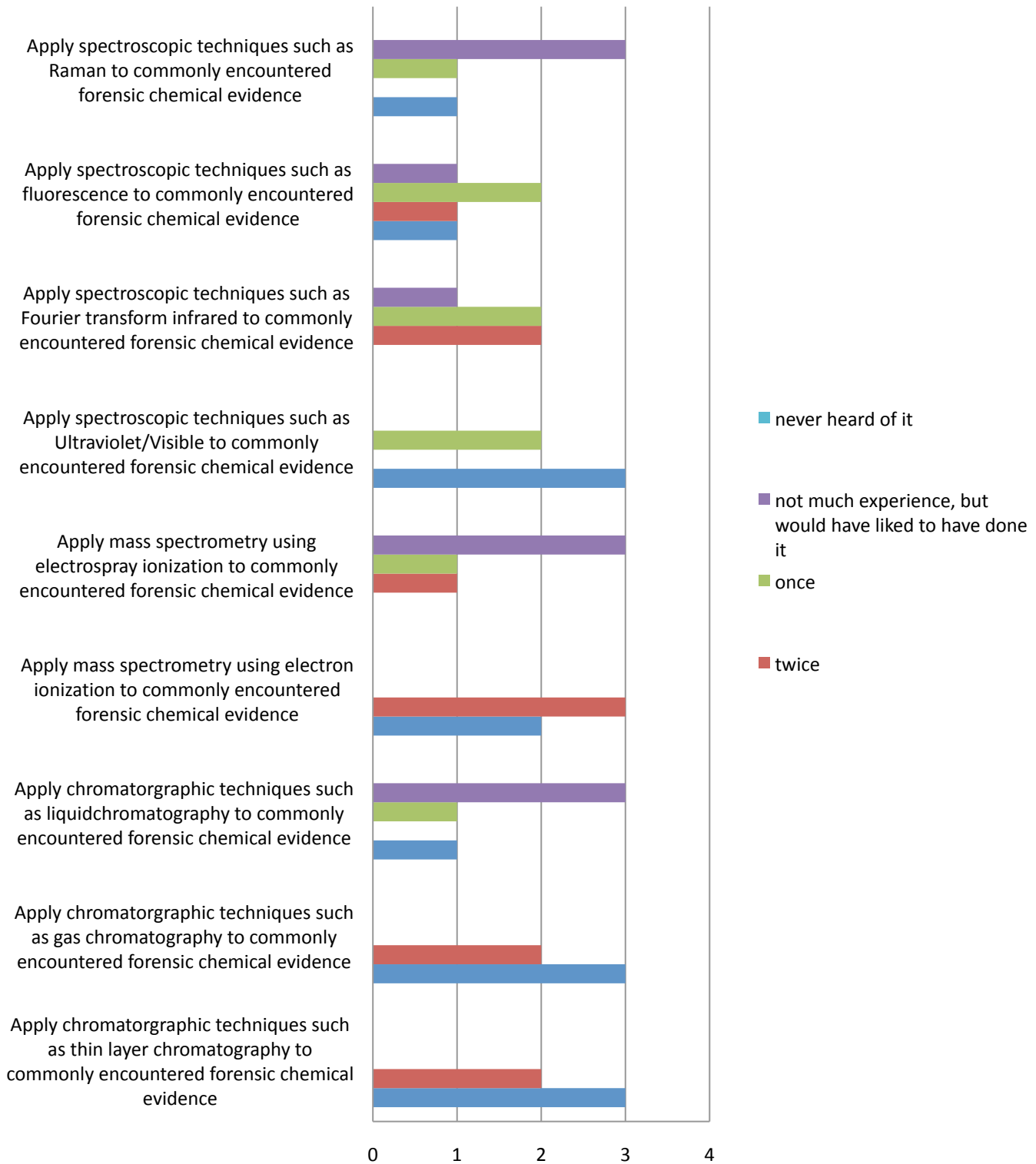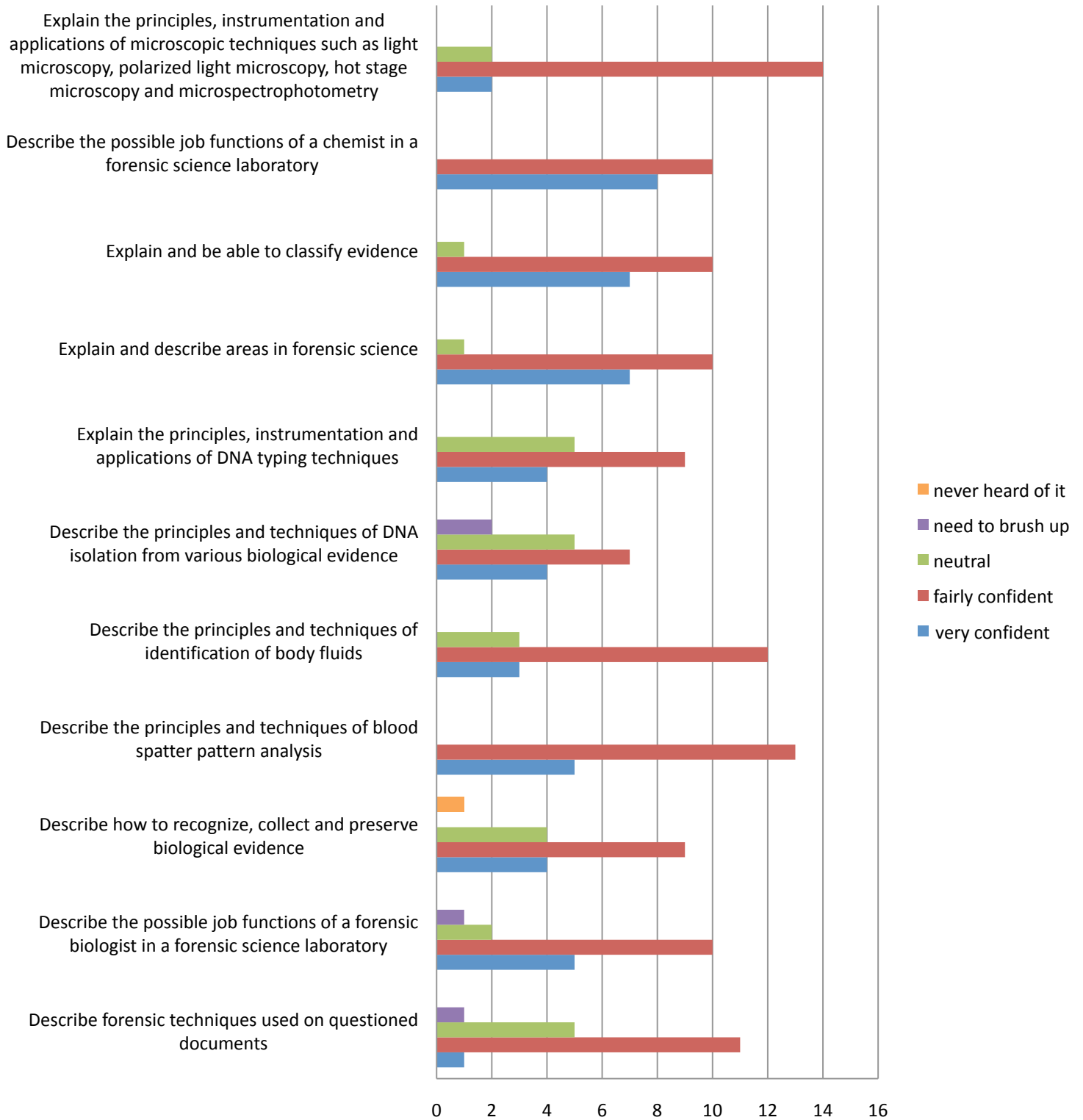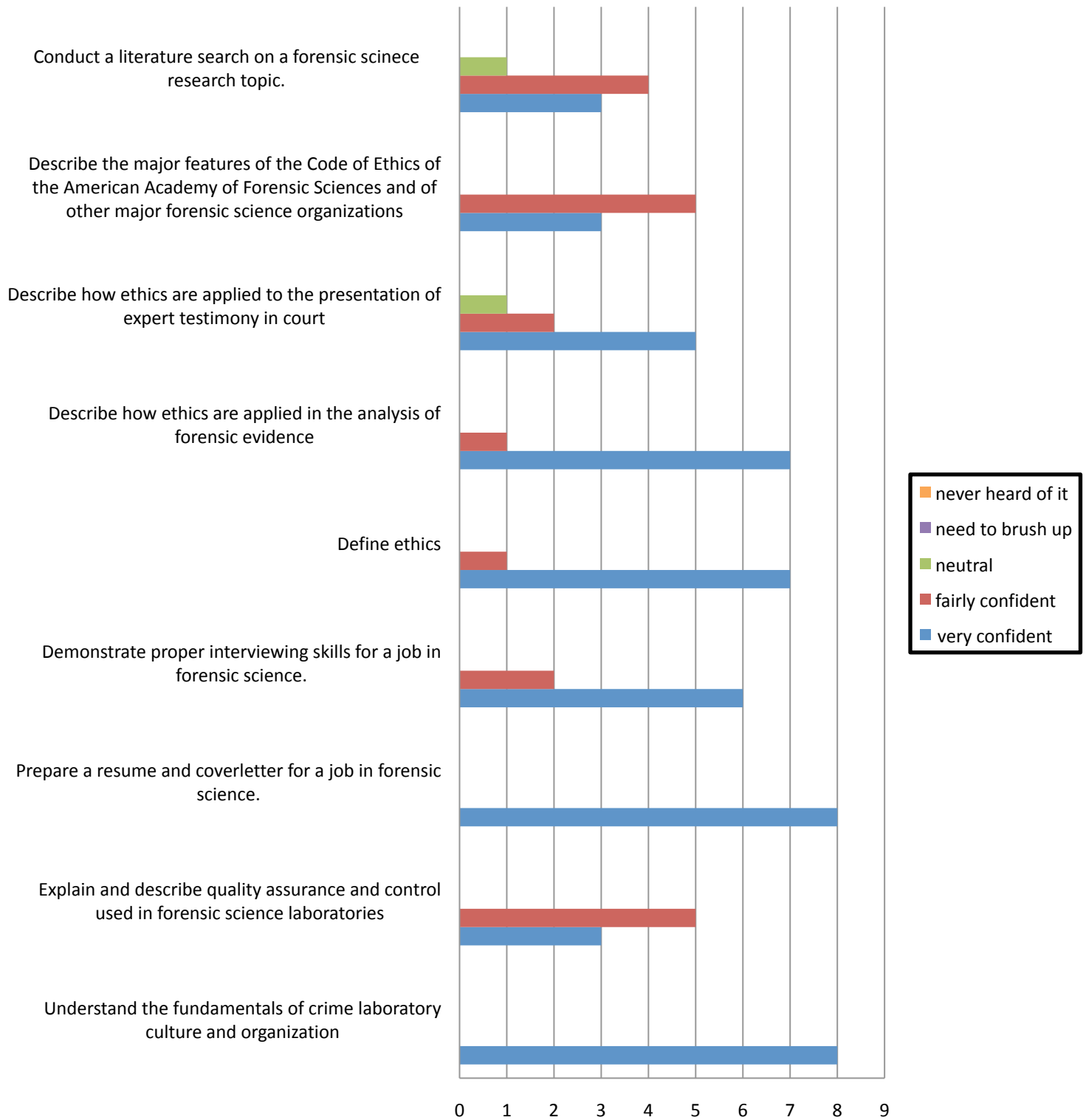
FIS 205 Fall 2008

Categories (bottom to top):
- Ability to explain and describe areas in forensic science
- Understanding of the fundamentals of crime laboratory culture and organization
- Understanding of the role of forensic science in crime scene investigation
- Ability to explain and be able to classify evidence
- Ability to explain and describe quality assurance and control used in forensic science laboratories
- Ability to describe the possible job functions of a chemist in a forensic science laboratory
- Understanding of the application of firearm and toolmark analysis used in forensic science
- Ability to describe forensic techniques used on questioned documents
- Understanding of the application of impression evidence such as tiretreads and footwear
- Ability to define ethics
- Ability to describe how ethics are applied in the analysis of forensic evidence
- Ability to describe how the criminal and civil laws govern the collection, preservation and admissibility of evidence
- Ability to describe how the rules of evidence have affected the admissibility of scientific and technical evidence historically

Legend:
- never heard of it
- need to brush up
- neutral
- fairly confident
- very confident

FIS 401 Fall 2008

Legend:
- never heard of it
- need to brush up on some concepts
- neutral
- fairly confident
- very confident

Categories (top to bottom):
- Understanding of the application of impression evidence such as tiretreads and foorwear
- Ability to explain to describe forensic techniques on questioned documents
- Understanding of the application of firearm and toolmark analysis used in forensic science
- Ability to explain, evalutate, and identify characteristics of fingerprints
- Ability to explain to describe the chemical composition, origins and significance of the most commonly encountered types of trace evidence such as ink, paint, fibers, explosives,
- Ability to explain to describe the chemical structures, properties and origins of the most commonly encountered illicit drugs.
- Ability to explain to describe the principles, instrumentation and applications of mass spectrometry using EI and ESI ionization
- Ability to explain to describe the principles, instrumentation and applications of spectroscopic techniques such as UV/VIS, FTIR and microspectrophotometry
- Ability to explain to describe the principles, instrumentation and applications of chromatographic techniques such as TLC, HPLC, and GC
- Ability to explain to describe the chemical principles behind acid-base, liquid-liquid, liquid-solid and solid-vapor extractions
- Understanding of how statistical techniques can be used to describe the quality of data, classify samples or determine proper sampling protocol
- Ability to explain the possible job functions of a chemist in a forensic science laboratory

FIS 401 Fall 2008

Apply spectroscopic techniques such as Raman to commonly encountered forensic chemical evidence

Apply spectroscopic techniques such as fluorescence to commonly encountered forensic chemical evidence

Apply spectroscopic techniques such as Fourier transform infrared to commonly encountered forensic chemical evidence

Apply spectroscopic techniques such as Ultraviolet/Visible to commonly encountered forensic chemical evidence

Apply mass spectrometry using electrospray ionization to commonly encountered forensic chemical evidence

Apply mass spectrometry using electron ionization to commonly encountered forensic chemical evidence

Apply chromatorgraphic techniques such as liquidchromatography to commonly encountered forensic chemical evidence

Apply chromatorgraphic techniques such as gas chromatography to commonly encountered forensic chemical evidence

Apply chromatorgraphic techniques such as thin layer chromatography to commonly encountered forensic chemical evidence

Legend:
- never heard of it
- not much experience, but would have liked to have done it
- once
- twice

0   1   2   3   4

FIS 20600 Spring 2009

Legend:
- never heard of it
- need to brush up
- neutral
- fairly confident
- very confident

FIS 30500 Spring 2009

Legend:
- never heard of it
- need to brush up
- neutral
- fairly confident
- very confident

Categories (top to bottom):
- Conduct a literature search on a forensic scinece research topic.
- Describe the major features of the Code of Ethics of the American Academy of Forensic Sciences and of other major forensic science organizations
- Describe how ethics are applied to the presentation of expert testimony in court
- Describe how ethics are applied in the analysis of forensic evidence
- Define ethics
- Demonstrate proper interviewing skills for a job in forensic science.
- Prepare a resume and coverletter for a job in forensic science.
- Explain and describe quality assurance and control used in forensic science laboratories
- Understand the fundamentals of crime laboratory culture and organization

FIS 40600 Spring 2009

Demonstrate the ability to prepare and examine samples using microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry

Explain the principles, instrumentation and applications of microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry

Prepare and examine samples using techniques such as light microscopy, polarized light microscopy and hot stage microscopy

Legend:
- never heard of it
- need to brush up
- neutral
- fairly confident
- very confident

0 1 2 3 4 5 6 7 8

Ensuring Student Attainment of the PULs

IUPUI has begun an initiative to evaluate undergraduate student attainment of the Principles of Undergraduate Learning (PULs) in preparation for our campus-wide 2012 accreditation process. (http://iport.iupui.edu/selfstudy/tl/puls/) **As a first step**, in Spring 2009, each SOS faculty member identified one, two, or three key PULs addressed in their class activities and assignments, with a "3" designation being given to the PUL with the **major** emphasis or focus in a course.

In preparation for the 2012 reaccreditation, faculty members in FIS 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 assigned to Spring 2010 PUL assessment were responsible for identifying an existing tool or producing a new tool appropriate for assessing student achievement of the major emphasis PUL, (this may also apply to a minor emphasis PUL, and a some emphasis PUL, if identified). As a result of the alignment of course SLOs with the university PULs, assessment of student achievement of the identified PUL allowed the faculty member to also assess the student's achievement relative to the SLOs. As faculty continue to assess student attainment of PULs in additional courses, the tools for assessing student achievement of SLOs will also progress.

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	Forensic & Investigative Sci	FIS 20600	CONCEPTS OF FORENSIC SCI II *PUL Varies by Class*								

		Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
		24137	Spring 2010				2	3			
		13680									

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2010	Forensic & Investigative Sci	FIS 30500	PROF ISSUES-FORENSIC SCIENCE	2				1			3

Plans to Accomplish the Next Stage During School Year 2010 – 2011

Effort in assessing PULs will continue as scheduled. Experiences and comments from initial assessments in Spring 2010 will be communicated among faculty members who will assess PULs in their courses during school year 2010-2011.'

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 2010

Filter by Semester: Fall 2010   by Unit: IUPUI - Science   by Department: SCI - Forensic & Investigative Sci [IUPUI]
Export:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Fall 2010	Forensic & Investigative Sci	FIS 20500	CONCEPTS OF FORENSIC SCIENCE I					2	3		1
Fall 2010	Forensic & Investigative Sci	FIS 40100	FORENSIC CHEMISTRY I				2		3		

Spring 2011

Filter by Semester: Spring 2011   by Unit: IUPUI - Science   by Department: SCI - Forensic & Investigative Sci [IUPUI]
Export:

EVAL SEMESTER	DEPARTMENT	COURSE	COURSE TITLE	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
Spring 2011	Forensic & Investigative Sci	FIS 40300	FORENSIC BIOLOGY II				3		2		
Spring 2011	Forensic & Investigative Sci	FIS 40400	FORENSIC CHEMISTRY II				3	1	2		

Assessment of Student Learning
Earth Sciences
Indiana University-Purdue University Indianapolis

2009-2010 Progress Report
for the Six-Stage Assessment Strategy

Submitted Jennifer A. Nelson, M.S.
June 2010

The cumulative format of this report
This report is cumulative. It began in 2005 when 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. The information added for the current year is <mark>highlighted</mark>.

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 Science, 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 Earth Sciences 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 review existing and new course curriculum. 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 2007, as a faculty the Department agreed the current learning objectives were out of date and not reflective of the outcomes expected of students. As part of this process, the required curriculum was revised for students earning a B.S. or B.A. in Geology. This new curriculum will be aligned with these new learning objectives. Ten new outcomes were agreed upon, which also incorporated some old outcomes. These ten outcomes are broken down into further detail in Appendix A.

1. Appraise the significance of fossil material and interpret the ancient environments in which the organisms lived.
2. Relate and understand geologic timescales and Earth history.
3. Explain fundamental processes of tectonics and deformation and relate them to surficial processes and features.
4. Identify common earth materials and describe how crystal chemistry predicts their behavior.
5. Evaluate surficial and near-surface processes as a function of geochemical cycles and systematic processes.
6. Relate and interpret processes of the Rock Cycle to modern and historical environments.
7. Solve earth science problems using the scientific method and advanced technologies of earth science.
8. Spatially describe Earth processes through modeling, mapping, observation, and measurement.
9. Demonstrate competence in communicating earth science problems to a broad audience.
10. Compile and demonstrate competence in advanced disciplines of earth sciences.

To revise the curriculum, the Department decided to change the status of some required courses to elective courses, and to eliminate some required courses completely. To replace the dropped required courses, three new courses will be created (tentatively titled Earth Evolution and History, Earth Materials, and Earth Processes) that will provide students with appropriate depth and focus on all the key concepts of Earth Sciences. These three courses will prepare students to follow a tract or choose ala carte a set of advanced courses that will prepare them for graduate school or the job market.

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

The Department of Earth Sciences is currently performing an audit of its required courses and new required courses to determine in what courses and at what developmental levels its SLOs are being taught and assessed. Currently, faculty are determining which courses accomplish the stated learning objectives from Stage 1. The current status of this audit is given in Appendix B. Additionally, faculty are debating how these objectives will translate into course-specific learning objectives and assignments in our new courses. The next stage is to examine syllabi and assignments in each course and categorize by the critical thinking skill(s) required to successfully complete it.

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

The Department has reached this stage yet; however, as the revision of the curriculum is finished, the Department will move into this stage in the 2008-09 academic year.

Appendix A

2007-2008 Draft for Curriculum Revision

IUPUI Department of Earth Sciences Learning Objectives

These objectives are drafted for a B.S. in Geology starting in 2007-08 School Year

1. **Appraise the significance of fossil material and interpret the ancient environments in which the organisms lived.**
    a. Describe and illustrate fundamentals of biological evolution as revealed by the fossil record.
    b. Recognize the range, quality, and quantity of information preserved in the fossil record, particularly the fundamental similarities of all living things through geologic history, as well as the systematic differences that distinguish major groups.
    c. Explain basic genetics and evolutionary theory, including the Darwin/Wallace concept of natural selection as well as neo-Darwinian reformulations and the impact of molecular biology.
    d. Describe the concepts of microevolution and macroevolution, and comparisons (timing, patterns, & possible causes) between normal, background, and mass extinction events that have punctuated the history of life.

2. **Relate and understand geologic timescales and Earth history.**
    a. Describe the nature of the temporal and spatial variations in transfers of mass and energy at Earth's surface as they relate to Earth's history.
    b. Relate geologic features to the geologic time scale and the true length of geologic time, including methods of relative and absolute dating.
    c. Appraise the fossil record for relative age dating of the rocks in which they occur, hence for corroborating the succession of events comprising the physical evolution of our planet.
    d. Evaluate changes to both the physical and biological structure of the earth within a geologic framework in order to demonstrate the rate of change of earth processes, patterns of change of the physical world, relationships of developing life forms, and patterns of sedimentation through time.
    e. Summarize the theoretical foundations of material behavior as it pertains to the short- and long-term deformation processes occurring in the Earth.

3. **Explain fundamental processes of tectonics and deformation and relate them to surficial processes and features.**
    a. Identify the earth processes that sustain plate tectonics and differentiate the surficial processes and features that result.
    b. Apply the concept of stress (how the internal state of stress is related to external loadings).
    c. Apply the concept of strain (the physical and chemical phenomena related to deformation).
    d. Explain the mechanics of fracture (from small-scale crack growth to large-scale development of joints and faults).

e. Explain the mechanics of folding (the physical and chemical changes related to buckling of layered media).

4. **Identify common earth materials and describe how crystal chemistry predicts their behavior.**
   a. Apply principles of inorganic chemistry to describe the formation and behavior of mineral crystals.
   b. Use crystal chemistry to predict how a mineral will form or evolve in different contexts (crystallization, weathering, soil development, metamorphism) to create rocks, sediment, and soils.
   c. Identify and describe the most abundant minerals in Earth's crust, including the mineralogy of common igneous, sedimentary, and metamorphic rocks.

5. **Evaluate surficial and near-surface processes as a function of geochemical cycles and systematic processes.**
   a. Define the transfers of mass and energy at or near the Earth's surface.
   b. Differentiate the erosion and deposition of sediments by mass movements, glaciers, rivers, and wind.
   c. Explain the physical interactions between the atmosphere, hydrosphere and lithosphere, and chemical fractionation associated with incongruent weathering reactions leading to the diversity of sediments.
   d. Diagram and interpret the cycling of major and trace elements in the particulate and aqueous phases.
   e. Use the hydrologic cycle to describe the movement of water over short- and long-term time scales.
   f. Relate the fundamental ways that life impacts modern geochemical cycles and systems, and describe how ancient life influenced Earth's geochemical environment (origin of the oxidizing atmosphere, biogeochemical cycles, sedimentary cycles of erosion and deposition).

6. **Relate and interpret processes of the Rock Cycle to modern and historical environment**s.
   a. Apply basic chemical thermodynamics and actualistic principles to interpret environments of rock formation.
   b. Diagram and interpret the physical processes of material transfer and chemical fractionation involved in the Earth's formation and differentiation, as illustrated by the rock cycle.
   c. Describe the mechanical and chemical weathering of rocks and minerals into sediment and soils.
   d. Explain the processes of partial melting and fractionation leading to the formation of igneous rocks.
   e. Apply actualistic analogy to interpret environments of deposition of sedimentary rocks.
   f. Associate the dynamics of the rock cycle with orogenesis and lithospheric plate kinematics.

g. Use solid-state chemical reactions to describe environments of isochemical metamorphism.

7. **Solve earth science problems using the scientific method and advanced technologies of earth science.**
    a. Demonstrate competence at applying each step of the scientific method through a major project or several minor projects
    b. Operate or apply modern geologic field and laboratory instrumentation, such as high precision mapping with GPS and total stations, remote imagery, physical and geochemical analytic instrumentation.
    c. Operate and apply fundamental computational technologies for data collection, processing, analysis, and presentation (e.g., GIS or CAD, data-sheet and statistical manipulations, construction of graphical representations of data and analytic results).
    d. Search, evaluate, and compile geologic literature using information technologies and databases.

8. **Spatially describe Earth processes through modeling, mapping, observation, and measurement.**
    a. Measure, describe, and interpret earth materials in context, meaning the ability to analyze rock and sediment in the field and laboratory, and to relate those observations to natural processes and environments of formation.
    b. Conceptualize geologic relationships and processes in three-dimensions and through time, meaning the ability to visualize geologic phenomena (e.g., crystallography, geomorphology, earth structure, sedimentology) at many spatial and temporal scales, and to manipulate data in three-dimensions.
    c. Create and interpret geologic problems by constructing maps and cross sections.
    d. Analyze remotely sensed data and describe how geologic phenomena can be remotely measured and mapped.

9. **Demonstrate competence in communicating earth science problems to a broad audience**.
    a. Create graphs, diagrams, and maps that reduce complex geologic concepts into simplified and clear visual representations.
    b. Summarize geologic problems in professional abstract, poster, and/or oral presentation format.
    c. Describe geologic problems using professional writing skills.

10. **Compile and demonstrate competence in advanced disciplines of earth sciences.**
    a. Develop a knowledge base of advanced disciplines of earth sciences and evaluate interrelationships between disciplines.
    b. Demonstrate competence to create, evaluate, and apply earth sciences to discipline specific problems in graduate school or industry.

Ensuring Student Attainment of the PULs

IUPUI has begun an initiative to evaluate undergraduate student attainment of the Principles of Undergraduate Learning (PULs) in preparation for our campus-wide 2012 accreditation process. (http://iport.iupui.edu/selfstudy/tl/puls/) **As a first step**, in Spring 2009, each SOS faculty member identified one, two, or three key PULs addressed in their class activities and assignments, with a "3" designation being given to the PUL with the **major** emphasis or focus in a course.

In preparation for the 2012 reaccreditation, faculty members of the School of Science were asked to identify the Principles of Undergraduate Learning (PULs) most closely aligned with the SLOs of their courses (for a listing of the 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 assigned to Spring 2010 PUL assessment were responsible for identifying an existing tool or producing a new tool appropriate for assessing student acheivement of the major emphasis PUL, (this may also apply to a minor emphasis PUL, and a some emphasis PUL, if identified). As a result of the alignment of course SLOs with the university PULs, assessment of student achievement of the identified PUL 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 achievement of SLOs will also progress.

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				

Plans to Accomplish the Next Stage During School Year 2010 – 2011

Effort in assessing PULs will continue as scheduled. Experiences and comments from initial assessments in Spring 2010 will be communicated among faculty members who will assess PULs in their courses during school year 2010-2011.'

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 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		

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

2009-2010 Progress Report
for the Six-Stage Assessment Strategy

Submitted by Brian A. Woodahl
(Edited by Joseph L. Thompson)
June 2010

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 Science, Mathematics, Physics, and Psychology).

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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?
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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	Hrs	1	2	3	4	5	6	7	8
Phys 152	Mechanics	4	B	B	B	B				
Phys 251	E&M, Optics	5	B	B	B	B				
Phys 300	Mathematical Physics	3	I	I	I		B	B		
Phys 310	Intermediate Mechanics	4	I	I	I		B			
Phys 330	Intermediate E&M	3	I	I	I		B			
Phys 342	Modern Physics	3	I	I	I		B			
Phys 353	Electronics Lab	2			I	B	B	B		
Phys 400	Physical Optics	3	I	A	A		I			
Phys 401	Optics Lab	2			I	B	I	B		
Phys 416	Thermal Physics	3	A	A	A		I			
Phys 442	Quantum Mechanics	3	A	A	A		I			
Phys 490	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. Physics 152 and Physics 251 are likely to have the greatest impact on the largest number of students. Because of this, the Physics 152 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:

Physics 10000
Physics P201
Physics 21800
Physics 25100
Physics 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.

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	Physics	PHYS 10000	PHYSICS IN THE MODERN WORLD		2			3			
Spring 2010	Physics	PHYS 21800	GENERAL PHYSICS I		2			3			
Spring 2010	Physics	PHYS 25100	HEAT ELECTRICITY & OPTICS		2			3	1		
Spring 2010	Physics	PHYS 30000	INTRO TO ELEM MATH PHYSICS		3			2			
Spring 2010	Physics	PHYS-P 201	GENERAL PHYSICS 1 *PUL Varies by Class*								

	Class Number	Class Semester	PUL 1A	PUL 1B	PUL 1C	PUL 2	PUL 3	PUL 4	PUL 5	PUL 6
	22099	Spring 2010		2			3			
	22100	Spring 2010		2			3			
	22101	Spring 2010		2			3			
	22102	Spring 2010		2			3			
	22103	Spring 2010		2			3			
	22104	Spring 2010		2			3			
	22105	Spring 2010		2			3			
	22106	Spring 2010		2			3			
	22107	Spring 2010		2			3			
	4038			2			3			

Plans to Accomplish the Next Stage During School Year 2010 – 2011

Effort in assessing PULs will continue as scheduled. Experiences and comments from initial assessments in Spring 2010 will be communicated among faculty members who will assess PULs in their courses during school year 2010-2011.'

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 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	Physics	PHYS 15200	MECHANICS		2			3	1		
Fall 2010	Physics	PHYS 21900	GENERAL PHYSICS II		2			3			
Fall 2010	Physics	PHYS 31000	INTERMEDIATE MECHANICS		1			2	3		
Fall 2010	Physics	PHYS 44200	QUANTUM MECHANICS					2	3		
Fall 2010	Physics	PHYS-P 202	GENERAL PHYSICS 2		2			3			

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	Physics	PHYS 20000	PHYSICAL ENVIRONMENT					3			
Spring 2011	Physics	PHYS 33000	INTER ELECTRICITY & MAGNETISM		1			2	3		
Spring 2011	Physics	PHYS 34200	MODERN PHYSICS					2	3		
Spring 2011	Physics	PHYS 35300	ELECTRONICS LABORATORY					3			

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

2009-2010 Progress Report
for the Six-Stage Assessment Strategy

Submitted by Drew Appleby, PhD
Director of Undergraduate Studies in Psychology
(Edited by Joseph L. Thompson)
June, 2010

The cumulative format of this report
This report is cumulative. It began in 2005 when 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. The information added for the current year is highlighted.

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 Science, 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 Psychology Undergraduate Program in Regard to These Stages

The Psychology Department has accomplished the first three stages of the School of Science's strategies and is in the process of accomplishing the fourth and fifth stages. The following sections of this report describe this progress.

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

The Psychology Department synthesized IUPUI's Principles of Undergraduate Learning and the American Psychological Association's Competencies for Undergraduate Psychology Majors to create the following 16 SLOs for the Department.

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 problem-solving skills.
15. Demonstrate the critical thinking skills of retention, comprehension, application, analysis, evaluation, and creation.

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

An extensive audit of the Department's course syllabi was undertaken by the students of Drew Appleby's PSY-B454 *Capstone Seminar in Psychology* (in collaboration with the faculty who produced these syllabi) 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.

This audit enabled the Department to determine (1) where its SLOs are being taught and assessed and (2) if its curriculum is "developmentally appropriate" so that students who progress through it are required to experience its SLOs in a manner that requires ever-increasing levels of critical thinking. The model that was used to define this developmental coherence is contained in Appendix A. The full results of this curriculum audit appear in Appendix B, a summary table of these results are presented in Appendix C, and a discussion of these results appears in Appendix D.

Stage 3 → Identify or Create Methods to Measure These SLOs

Method 1

The Psychology Department offers the following three types of capstone experiences.
- An <u>empirical research project</u>, which can be conducted (a) in a laboratory class dedicated to the study of a particular sub-discipline of psychology (e.g., social or developmental) or in an honors research class in which students choose their own research topics. The classes that will currently satisfy the research capstone requirement are PSY-B461 *Capstone Laboratory in Developmental Psychology*, PSY-B471 *Capstone Laboratory in Social Psychology*, PSY-B481 *Capstone Laboratory in Clinical Rehabilitation Psychology*, and PSY-B499 *Honors Capstone Research*.
- An <u>on-the-job practicum</u>, which allows students to apply what they have learned about a particular sub-disciple of psychology (e.g., industrial/organizational or clinical rehabilitation psychology) in the workplace. The classes that will satisfy the practicum capstone requirement are PSY-B462 *Capstone Practicum in Industrial/Organizational Psychology* and PSY-B482 *Capstone Practicum in Clinical Rehabilitation Psychology*.
- A <u>scholarly seminar</u>, which provides students with the opportunities to (a) perform an in-depth examination of a sub-discipline of psychology in which they have an occupational interest, (b) engage in a collaborative research project with their classmates, and (c) create a professional planning portfolio designed to facilitate their transition to life after college (i.e., employment or graduate school). The class that will satisfy the seminar capstone requirement is PSY-B454 *Capstone Seminar in Psychology*.

While it is important to use subjective, self-report data from our students to assess our SLOs (e.g., Method 2), it is also important to involve faculty evaluations of student performance because these measures are assumed to be more objective. To do this, a matrix has been created (see Appendix F) that will be completed by each capstone instructor for each student in her/his class after the class has been completed. The data from this matrix for all capstone classes will be aggregated and used to identify the degree to which capstone faculty believe that senior psychology majors have accomplished the Department's SLOs.

Method 2

All students enrolled in psychology capstone classes were surveyed to determine the "grade" they would give themselves in regard to their accomplishment of each of the department's SLOs. The instrument used to collect this data appears in Appendix E, the data collected appears in the right column of the table presented in Appendix C, and a discussion of these data is included in Appendix D.

Method 3

The School of Science has been using a paper-and-pencil senior exit survey for many years. One component of this survey requires students to write one or two paragraphs about how they have experienced the university's six Principles of Undergraduate Learning (PULs) during their undergraduate education at IUPUI. While this has produced an abundance of data, it has never been fully utilized because of the time-intensive nature of the qualitative research methods necessary to analyze these data. The Psychology Department collaborated with the School of Science office to create an electronic version of this survey. This survey will enable the Psychology Department to incorporate its unique set of SLOs into this survey by asking its seniors to use a Likert scale to indicate how successfully they have accomplished each of these SLOs. Students will then be asked to identify the experiences that helped them to accomplish the SLOs they indicated that they had successfully accomplished and to 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. These data will provide our Department with information to answer the following questions.
1. How do psychology majors perceive their ability to accomplish the Department's SLOs?
2. Which of the SLOs do our students perceive they have accomplished successfully, and what aspects of their undergraduate educations enabled them to do so?
3. Which of the SLOs do our students perceive they have not accomplished successfully, and how can we use their suggestions to enable future students to accomplish them more successfully?

We can use the answers to these questions to make data-driven changes to our curriculum. It will be interesting to compare the results of this method to results of Method 1 to determine the similarities and differences between how students and their faculty assess the accomplishment of the Department's SLOs.

Method 4

Students enrolled in PSY-B311 *Introductory Laboratory in Psychology* and PSY-B454 *Capstone Seminar in Psychology* were surveyed to determine their experience with the transition from PSY-B305 *Statistics* to PSY-B311. PSY-B305 is a prerequisite for PSY-B311, and certain statistical skills are assumed to exist in students who enter PSY-B311 after successfully completing PSY-B305. One of these skills is the ability to use SPSS to analyze statistical data. The purpose of this method was to determine the validity of the assumption that students entering PSY-B311 possess this skill.

Method 5

Using information from the course syllabus audit presented in Appendix B, members of Drew Appleby's Fall 2007 PSY-B454 *Capstone Seminar in Psychology* worked with psychology faculty to identify one assignment in each of their courses that can provide data to be used to assess one of the SLOs at a particular level of critical thinking (as presented in Appendix C). The purpose of this study was to evaluate how successfully psychology students have accomplished

the Student Learning Outcomes (SLOs) from the Psychology Department at IUPUI. This assessment project consisted of three goals: to identify specific assignments in each undergraduate psychology class at IUPUI that address a particular SLO; to determine at which cognitive level each SLO was achieved; and to find evidence showing whether instructors modified their curriculums to improve students' accomplishment of the SLOs. To achieve these goals, 28 full-time psychology professors were contacted for interviews regarding SLO accomplishment. Of these 28, 6 participated in the study, some providing data from 10 classes. The data collected was arranged in table form and is presented in Appendix H.

Method 6

The 2009-2010 school year marked the University's initial attempt to collect and synthesize assessment data pertaining to its Principles of Undergraduate Learning (PULs) in an organized, institution-wide manner. As part of this strategy, individual psychology faculty were requested to

1. identify one, two, or three of the PULs they wish their students to master 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 a semester between now and the fall of 2014 during which they would assess one of their classes, and
4. report the results of their assessments to the university with a special SIS reporting system created within Oncourse.

In classes with multiple sections, only one section was required to report these data. To facilitate the accomplishment of step #1 above, Drew Appleby created a table in which he mapped the university's PULs to the student learning outcomes (SLOs) of the Psychology Department's undergraduate program, which are based on the American Psychological Association's Guidelines for the Undergraduate Psychology Major. This table (see Appendix L) provided the faculty with a more psychologically-oriented set of learning outcomes that they could identify more easily in their classes than the often more academically generic university PULs. Appendix M contains the table compiled by Appleby that contains 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 classes. Appleby contacted his four colleagues who volunteered to assess their classes during Spring semester with an offer to provide them with individual consultation about the process. Three of them accepted his offer, and during their meetings he shared with them the institutional instructions for assessing the PULs (see Appendix N) and an excerpt from one of his syllabi that explained to students the PULs that he targets in his class, the reason for assessing these PULs, and the way in which the results of this assessment will be used to improve the class (see Appendix O). Because no other faculty volunteered to assess the PULs in their classes during semesters past Spring 2010 (other than those included in Appendix M), Appleby created a revised schedule (see Appendix P) that would allow the department to complete the PUL assessments in all its courses by the end of the 2010-2011 school year so it would have a complete set of PUL assessment data to work with prior to the 2012 visit of the North Central accreditation team. Faculty will be provided with this revised schedule during the annual department retreat in August, 2010 I hopes that they will comply with this schedule.

In an attempt to accomplish Stage #2 of the School of Science's assessment plan (i.e., to link the PULs to specific components of the program's curriculum), Appleby performed an analysis of all the PULs listed in Appendix M in order to determine the coverage of all the PULs in the psychology curriculum. These data (see Appendix Q) indicate that some PULs are emphasized much more frequently across the curriculum (e.g., PUL #3 Integration and Application of Knowledge and PUL #4 Intellectual Depth, Breath, and Adaptiveness) than other (e.g., PUL #6 Values and Ethics, PUL #3B Quantitative Skills, and PUL #1C Information Resource Skills). how psychology faculty in the Psychology Department's. These data have been shared with the psychology faculty at a recent faculty meeting and may be used during the department's annual retreat during which assessment and curriculum issues will be addressed.

The emphasis on assessment during the 2009-2010 school year was on the successfully implementation of the process described in Method 6, which corresponds to the first four stages of the School of Science's assessment process (see below) described in the beginning of this report.

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.

Appleby is also in the process of creating a form (see Appendix O) for psychology faculty to record the results of their assessments, identify PULs whose accomplishment could be improved, and provide pedagogical strategies that could bring about these improvement in further classes.

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

Data Collected with Method 1
Only 28 capstone templates were completed and returned by June 15. The data from these templates are presented in Appendix G.

Data Collected with Method 2
Data collected from the senior self-grading project are presented in the far right column of Appendix C.

Data Collected with Method 3
Data collected from 121 psychology majors who completed the electronic senior exit survey concerning the Department's SLOs are presented in Appendix J.

Data Collected with Method 4
Data collected from students entering PSY-B311 *Introductory Laboratory in Psychology* indicated a very wide range of competency in the ability to use SPSS to analyze data. PSY-B305 *Statistics* is a prerequisite for PSY-B311 and is the course in which data analysis is learned.

Data Collected with Method 5
The data collected are presented in Appendix H and summarized in Appendix I. Not a great deal can be safely deduced from these data because they represent a sample of only 21% of the faculty and 31% of the classes offered. However, several conclusions can be drawn from the data that was collected.
1. The assignments used to assess the SLOs were most frequently (12) at Level 1 (retaining and understanding), less frequently (8) at Level 3 (evaluating and creating), and infrequently (3) at Level 2 (analyzing and applying).
2. Some of the SLOs are being assessed more often than others in psychology classes.
    a. Content was assessed with 6 assignments.
    b. Ethics was assessed with 3 assignments.
    c. Research, Application, Career Planning, and Speaking Skills were assessed with 2 assignments each.
    d. Diversity, Self-Awareness, Understanding Others, Collaboration, Writing Skills, and Critical Thinking were assessed with 1 assignment each.
    e. The remaining SLOs were not assessed.
3. 87% of the SLOs that were assessed with assignments were being accomplished successfully.
4. 3 of SLOs were judged not to be accomplished on the basis of assignment results.
5. 3 interventions were initiated to bring about positive changes in assignment results.

Stage 5 → Use the Data Collected in Stage 4 to Make Curricular Changes

Curricular Changes Made on the Basis of Data Collected with Method 3

- A set of standardized SPSS modules was created and required in all sections of PSY-B305 *Statistics* during the 2006-07 school year to insure that all students who enroll in PSY-B311 *Introductory Laboratory in Psychology* in the future will enter the course with a fundamental competence in SPSS.

- An in-depth discussion was implemented in PSY-B310 *Lifespan Development* on a topic that only 4% of the class were knowledgeable of during the previous semester. After the in-depth discussion, 90% were knowledgeable the next semester.

- Three items on the PSY-B104 *Psychology as a Social Science* end-of-semester evaluation were rated lower than desired. After the implementation of a new teaching technique called "5-minute trainer," the scores on all three of these items increased the following semester.

- The number of PSY-B105 *Psychology as a Biological Science* students not passing the cumulative final exam was not acceptable. A more active learning approach to the class was introduced, and this transformation was piloted in 2 out of 5 sections during both the Fall 07 and Spring 08 semesters. For the two semesters, the average on the cumulative final exam has been no different for the traditional vs. transformed sections: 73.1% vs. 72.8%, respectively. It must be kept in mind that all sections take the same exams. These exams are based on material from the textbook and the multiple-choice questions are generated from the publisher's test bank. The traditional sections are given this material in lecture format during class periods, whereas the transformed sections do not receive traditional lectures over the material. The students are responsible for reading the material and instructors go over some of the material during one session per week, and the students engage in application exercises during the other weekly session. The next step in the course transformation is to adapt the exams to more closely assess the objectives of the transformed course. This should provide a better measure of the success of the transformation in improving retention and understanding of course material. Dr. Neal-Beliveau taught one traditional and one transformed section in Fall 2007. The overall class average was higher for the transformed section (81% vs. 76%); however, those sections have 200 more points available to them during the semester (700 vs. 500) and exams make up 46% of their final grade compared to 64% for the traditional sections. The DFW rate was 19.7% for the transformed section vs. 21.4% for the traditional section. Class attendance was also much higher for the transformed sections, which has been shown to be very important for success in gateway courses.

Curricular Changes Made on the Basis of Data Collected with Method 5

Three instructors reported that an assignment in their class produced data that indicated an SLO was not being accomplished. All of these instructors implemented or are in the process of implementing interventions to increase their students' accomplishment of an SLO. The two interventions that have been implemented (the introduction of an in-depth classroom discussion and the implementation of a new technique called "5-minute trainer") resulted in improved performance on assignments. The intervention that is in the process of being implemented has not yet produced data that can confirm or disconfirm the efficacy of the intervention.

Appendix A

Three Levels of the Developmentally Coherent Curriculum

(based on the work of Anderson & Krathwohl, 2001)

A. **Basic Level → Retaining and Understanding**
1. the ability to <u>retain</u> specific information in the way it was originally presented
   a. being able to recognize or recall the definitions of psychological terms and concepts in an accurate manner
   b. questions it can be used to answer: Who, what, where, and when?

2. the ability to <u>understand</u> information when it is presented in a different manner than it has been originally presented
   a. being able to identify a principle or concept when presented with an example that has not been previously encountered
   b. questions it can be used to answer: How and why?

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 break down a complex whole into its component parts and explain 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 to one another?

2. the ability to produce and <u>apply</u> original and useful solutions to solvable problems
   a. being able to use psychological concepts, theories, and methods to solve real world problems
   b. questions it can be used to answer: How can this problem be solved?

C. **Advanced Level → Evaluating and Creating**
1. the ability to <u>evaluate</u> the effectiveness and/or merit of the products of application
   a. being able to used established criteria to judge the success of problem-solving methods (e.g., the scientific method and psychotherapy)
   b. questions it can be used to answer: What is the validity or value of a particular principle, theory, or method?

2. the ability to <u>create</u> (i.e., synthesize) new wholes from previously unrelated parts
   a. being able to combine previously unassociated elements into new, creative, meaningful, and/or useful wholes
   b. questions it can be used to answer: What new conclusions can you reach on the basis of what you have learned?

Appendix B

Results of the Psychology Department's Syllabus Audit to Determine the Developmental Coherence of Its Curriculum

	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

Summary Table of Curriculum Audit and Self-Reported GPA

Learning Outcome	Number of Total Assignments	Beginning Level	Intermediate Level	Advanced Level	Mean Self-Reported GPA
Application	47	7	25	15	3.41
Career Exploration	15	8	2	5	3.32
Collaboration Skills	28	7	14	7	3.37
Content	45	15	17	13	3.10
Creative Thinking	34	5	15	14	3.20
Diversity	20	10	8	2	3.10
Ethics	36	21	12	3	3.54
Information Competence	37	11	18	8	3.41
Problem Solving	36	4	16	16	3.24
Research	31	13	9	9	2.98
Self-Awareness	32	6	12	14	3.56
Speaking skills	22	7	13	2	3.07
Technological Competence	40	11	25	4	3.20
Understand Others	31	13	13	5	3.39
Writing Skills	44	8	21	15	3.34
	Total = 498	Total = 146	Total = 220	Total = 132	Mean = 3.28

Appendix D

Discussion of the Results of the Syllabus Audit and Self-Grading Data Presented in Appendices B and C

Data Gathered During the Syllabus Audit
It appears that the Department's SLOs are being addressed in many classes and at all three cognitive levels. 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). Some potential concerns about the cognitive level at which the SLOs are targeted emerged when it was discovered that Speaking Skills, Diversity, Ethics, Understand Others, and Career Exploration were all targeted fewer than six times at the Advanced level. These results have not yet been addressed by the Department, so no curriculum changes have been recommended at this time.

Data Gathered When Capstone Students "Graded" Themselves
The average grades students gave themselves for the extent to which they had successfully accomplished each of the SLOs were high. All were above a 3.0 (B, which indicated above average attainment) with the exception of Research, which was a 2.98. Although this data reflect that our students are confident in their attainment of our SLOs, they may not necessarily reflect their actual level of attainment of our SLOs. As Kruger and Dunning (1999, p. 1121) found in research on the relationship between competence and confidence, "People tend to hold overly favorable views of their abilities in many social and intellectual domains." It will be necessary to compare these subjective, self-reported data with more objective data gathered from faculty observations of student performance.

Appendix E

Please grade yourself on your attainment of each of the following 15 student learning outcomes of the IUPUI Psychology Department. Use the grading scale of A-F as described below.

A = Outstanding
B = Above Average
C = Average
D = Below Average
F = Unacceptable

Please perform this task as honestly as possible. The grade you give yourself in this situation should reflect <u>both</u> the Department's ability to provide opportunities for you to develop these sets of knowledge and skills <u>and</u> your willingness to take advantage of these opportunities.

Essential Skills	**Grade** (A-F)
Understand the major concepts, theoretical perspectives, empirical findings and historical trends in psychology.	
Understand and use basic research methods in psychology, including design, data analysis, and interpretation.	
Understand and generate applications of psychology to individual, social, and organizational issues.	
Understand and abide by the ethics of psychology.	
Recognize, understand, and respect the complexity of socio-cultural and international diversity.	
Develop self-awareness by identifying your own personal strengths, weaknesses, values, goals, etc.	
Understand the behavior and mental processes of others.	
Work effectively as a member of a group to accomplish a task.	
Identify and prepare for a career in psychology or a related field.	
Demonstrate effective writing skills.	
Demonstrate effective speaking skills.	
Demonstrate information competence by identifying, locating, and retrieving written and electronic information sources.	
Utilize technology for many purposes.	
Demonstrate creative thinking skills.	
Demonstrate problem-solving skills.	

Appendix F

IUPUI Psychology Department Capstone Assessment Template

<u>Instructions to the Capstone Instructor:</u>

Please make a copy of this double-sided document for each student who completed your capstone class. Fill in each of the four lines below and complete the Capstone Assessment Template that appears on the other side of this page for each of your students. Please return your completed templates to Drew Appleby at your earliest convenience.

Class Number and Title:

Instructor's Name:

Semester and Year:

Student's Name:

Place an X in the box below the descriptor that most accurately describes the extent to which this student accomplished each of the Psychology Department's 16 SLOs in your capstone course.

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
Content of Psychology → Student shows familiarity with the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology.				
Research in Psychology → The student understands and uses basic research methods in psychology, including design, data analysis, and interpretation.				
Application of Psychology → The student understands and generates applications of psychology to personal, social, and organizational issues.				
Ethics in Psychology → The student understands and abides by the ethics of psychology.				
Diversity → The student recognizes, understands, and respects the complexity of socio-cultural and international diversity.				
Self-Awareness → The student has developed self-awareness by identifying her/his personal strengths, weaknesses, values, and goals.				
Understanding Others → The student understands the behavior and mental processes of others.				
Collaboration → The student can work effectively as a member of a group to accomplish a task.				
Career Planning → The student has developed realistic ideas about how to pursue careers in psychology and related fields.				
Writing Skills → The student demonstrates effective writing skills.				
Speaking Skills → The student demonstrates effective speaking skills.				
Information Competence → The student demonstrates information competence by identifying, locating, and retrieving written and electronic information sources.				
Technological Proficiency → The student can utilize technology for many purposes.				
Creative Thinking → The student can demonstrates the ability to combine existing information into new, creative, and useful ideas and hypotheses.				
Problem Solving → The student can use the scientific method to solve problems.				
Critical Thinking → The student can retain, comprehend, apply, analyze, synthesize, and evaluate information.				

Data Collected With the Capstone Templates

Completed templates were collected from 28 students (24 enrolled in PSY-B461 *Capstone Lab in Developmental Psychology* and 4 enrolled in PSY-B499 *Honors Research*). 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 <u>Not</u> Accomplish this SLO," a 1 to "Accomplished this SLO at an <u>Acceptable</u> Level," and a 3 to "Accomplished this SLO at an <u>Exemplary</u> Level. These mean ratings appear in descending order of magnitude below.

1.71 = Information Competence   1.25 = Application of Psychology   0.98 = Critical Thinking
1.68 = Technological Proficiency   1.21 = Research in Psychology   0.96 = Speaking Skills
1.44 = Collaboration   1.15 = Diversity   0.93 = Ethics in Psychology
1.32 = Writing Skills   1.14 = Understanding Others   0.86 = Creative Thinking
1.32 = Problem Solving   1.07 = Content of Psychology

Another way to analyze these data is to use modal scores. When the SLOs are arranged in order of the magnitude of their modes, the results are as follows.

3 = Technological Proficiency   2 = Research in Psychology   2 = Creative Thinking
3 = Information Competence   2 = Problem Solving   2 = Content of Psychology
3 = Collaboration   2 = Ethics in Psychology   2 = Application of Psychology
2 = Writing Skills   2 = Diversity   0 = Speaking Skills
2 = Understanding Others   2 = Critical Thinking

The results of this modal analysis indicate that the plurality of senior psychology majors enrolled in capstone classes are able to demonstrate to their faculty that they have accomplished the following SLOs in an <u>exemplary</u> manner.
- Information Competence
- Technological Proficiency
- Collaboration

These results indicate that the plurality of senior psychology majors enrolled in capstone classes are able to demonstrate to their faculty that they have accomplished the following SLOs in an <u>acceptable</u> manner.
- Writing Skills
- Understanding Others
- Research in Psychology
- Problem Solving
- Ethics in Psychology
- Diversity
- Critical Thinking
- Creative Thinking
- Content of Psychology
- Application of Psychology

These results indicate that the plurality of senior psychology majors enrolled in capstone classes are <u>unable</u> to demonstrate to their faculty that they have accomplished the following SLO in an adequate manner.
- Speaking skills

Data collected from professors concerning accomplishment of SLOs

SLO, Level, Class, & Teacher	Assignment	Data Collected with the Assignment and Interpretation of these Data	Intervention Implemented	Data Collected with the Assignment after the Intervention and Interpretation of these Data
Content Level 1 B310	Self-report…asked the students, "You have a friend who is pregnant. What two pieces of information from the text book or lecture would you like to tell her?"	4% of 200 students during fall 2006 semester were knowledgeable of the positive implications of breastfeeding. This % is too low.	Lead an in-depth discussion on the benefits of breastfeeding.	90% of 200 students were knowledgeable of the positive implications of breastfeeding in the spring 2007 semester.
Content Level 1 B104	Questions on end-of-semester student evaluation: "sessions clarify course content" / "class helps me understand difficult concepts" / "class session helps me learn material."	In fall 2004, scores for these 3 items on a 5-point scale (with 5 as Strongly Agree were 3.96/3.69/3.93.	Implementation of a new teaching technique, "5 minute trainer."	Scores after the intervention rose to 4.08/4.03/4.03.
Content Level 1 B481	Quizzes over reading material.	Average quiz grades: all but 2 of 12 students had an average score of C- or higher. The vast majority of students accomplished the SLO of knowledge base of psychology.		
Ethics Level 1 B454	To pass the IUPUI Human Subjects Protection Test with at least a score of 70%.	15 out of 15 students passed the quiz in the fall of 2006. Students of this class have accomplished the ethics SLO at a very basic level.		

Content Level 3 B454	Students are to write a term paper in a particular area of psychology in which they have an occupational interest; this paper will consist of sections on the history, theories, research methods, and empirical findings of this area.	11 students out of 15 earned an A; 2 students earned a B; 2 students earned grades below C-. The vast majority of students in this class accomplished this SLO.		
Collaboration Level 3 B454	Students and the instructor rate all students in class with a merit pay system that reflects the level of collaboration that each student has reasonably exhibited.	In the fall of 2006, 7 out of 15 students earned a grade of A; 7 earned a grade of B; 1 earned a grade of C. All students accomplished the collaboration SLO.		
Career Planning Level 3 B454	Students are to create a Professional Planning Portfolio in which they gather or create all of the documents they will need to enter the next stage of their professional development (i.e. entering the job market or applying to graduate school).	In the fall of 2006, 13 students earned the grade of A; 1 student earned a B; 1 earned a grade of C. All students accomplished this SLO.		
Oral Communication Level 2.5 (applying and creating) B103	Students are to create and present a collaborative oral report in which they research a campus opportunity for psychology majors, create a PowerPoint presentation, and give the presentation to the class.	In the spring of 2007, 39 out of 42 students earned an A, 2 students earned a C, and one earned an F. The vast majority of students accomplished this SLO.		
Career Planning Level 3 B103	Students wrote a book that identified, examined, and clarified their professional and educational goals and created a comprehensive and realistic plan to accomplish these goals.	In the spring of 2007, 37 out of 42 students who completed the course earned an A; 1 earned a B, 3 earned a C; 1 earned an F. The vast majority of students accomplished this SLO.		

Research Level 3 B481	Students performed a research project of which they designed, collected, analyzed and interpreted data as well as presented this in a professional format.	In the spring of 2006, 8 students out of 12 earned an A; 3 earned a B; 1 earned a C. The vast majority of students accomplished this SLO.		
Ethics Level 1 B307	Students took a quiz over ethics and legal issues. (It should be noted that it was possible to replace one low quiz score with a 100%.)	Out of 18 students, 17 passed with a C or higher. The vast majority of this class understood the ethics in psychology at the basic level of learning.		
Research Level 1.5 B307	Students took 4 quizzes that covered testing procedures, constructing tests, reliability and validity. (It should be noted that it was possible to replace one low quiz score with a 100%.)	Out of 18 students: Testing Procedures: 14 passed with a C or higher Constructing Tests: 11 passed with a C or higher Reliability: 17 passed with a C or higher Validity: 9 passed with a C or higher Although these test scores did not reflect a uniform accomplishment of this SLO, they were an improvement over the more comprehensive test scores obtained during past semesters the same material.		
Understanding Others Level 1 B307	Students took a quiz over special populations. (It should be noted that it was possible to replace one low quiz score with a 100%.)	12 out of 18 students passed with a C or higher. The majority of students accomplished this SLO.		

Diversity Ethics Level 1 B307	Students took one quiz over special populations, and one quiz over technical, ethical and legal issues, which both demonstrate ethics and diversity.	Out of 18 students: Special Populations: 12 students passed with a C or higher Technical…: 16 passed with a C or higher. The majority of students accomplished these SLOs.		
Critical Thinking Level 2 B307	Students took a comprehensive final exam, which required them to retain, understand, comprehend, synthesize, apply, and evaluate information pertaining to psychological testing and measurement.	8 out of 18 students passed with a C or higher.		
Self-Awareness Level 1.5 B307	All students had the opportunity to take the MBTI in lab and have their results interpreted for them, or were taught how to interpret the results themselves.			
Application Level 2 B386	Students were to utilize skills learned in class and practiced in triads. Triads consisted of a listener, person with problem, and observer. Assignment consisted of listening to a person's problem and practicing basic counseling skills, never giving advice, asking open-ended questions, showing empathy, understand what is being said, and paraphrasing when appropriate. This session was to be audiotaped and typed out verbatim.	In spring 2007, 21 out of 35 students received A's, 10 students received B's, and 3 students received C's, with 0 students receiving a C-. All students accomplished SLOs to satisfactory of professor.		
Application , Writing Skills, Speaking Skills Level 3 B482	Students are to come up with a presentation on their experience in their practicum, creating a poster, writing a paper, and presenting it to the class and professor.	In spring 2007, 14 out of 16 students received A's, and 2 students received B's, all successfully accomplishing these SLOs.		

Content Level 1 B380	Students are to take 5 exams covering textbook material.	In spring 2007, 45 out of 48 students received grades of C or better. The vast majority of these students have successfully accomplished this SLO.		
Content Level 1 B105	Students took a cumulative exam over the whole semester.	In fall 2007, although the mean was 75% for the class, the low score was 44 out of 100. The percentage of students who did not pass the cumulative final is not satisfactory.	We have decided to move to a more active learning model for teaching B105 in an attempt to engage our students more fully in the course.	This is the first semester. The professor feels that the students are grasping the material better than with the old model; however, she will not have any data to prove this until the end of the semester.

Appendix I

Student Learning Outcome	Level 1	Level 2	Level 3	SLO Accomplished Satisfactorily	Intervention Implemented	Intervention Successful
Content of Psychology	5	0	1	3	3	2
Research Methods	1	0	1	2	0	0
Application of Psychology	0	1	1	2	0	0
Ethics in Psychology	3	0	0	3	0	0
Diversity	1	0	0	1	0	0
Self-Awareness	1	0	0	1	0	0
Understanding Others	1	0	0	1	0	0
Collaboration	0	0	1	1	0	0
Career Planning	0	0	2	2	0	0
Writing Skills	0	0	1	1	0	0
Speaking Skills	0	1	1	2	0	0
Information Competence	0	0	0	0	0	0
Technological Proficiency	0	0	0	0	0	0
Creative Thinking	0	0	0	0	0	0
Problem Solving	0	0	0	0	0	0
Critical Thinking	0	1	0	1	0	0
Totals	12	3	8	20	3	2

Appendix J

Ratings by 121 Psychology Majors Who Completed the School of Science Senior Exit Survey to the Item "Please use the following scale to rate your current level of proficiency in each of the following skills."

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.

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Appendix K

Running head: PROFESSORS' WILLINGNESS TO ASSESS STUDENT LEARNING

Professors' Perceived Ability and Willingness to Assess Student Learning Outcomes

Rachel J. Alexander
Sara M. Blackburn
Kyle F. Cerk
Harmony M. Godsey
Magen M. Heidenreich
Courtney E. Hitson
Katherine E. Hutson
Denisa J. McIntyre
Laura C. Norfleet
Benjamin J. Seifert
Kathleen C. Strong
Carly M. Waidlich
Morgan E. West
Drew C. Appleby (Instructor)

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Abstract

Past research reveals that college faculty often report difficulty in determining ways of assessing their program's SLOs. This study investigates the IUPUI Psychology Department's SLOs and their use within instructors' syllabi. Twenty-three full-time IUPUI psychology professors were given a survey about a comprehensive assessment strategy to gather evidence about psychology majors' ability to demonstrate the SLOs of the department's curriculum. The data from the 12 respondents indicated a need for further research of assessment of students' demonstration of SLOs.

Professors' Perceived Ability and Willingness to Assess Student Learning Outcomes

Why is it important to assess the amount and the specific types of learning that take place in a classroom? Despite the fact that individual students will ascertain certain material at different levels and at different rates, teachers can discover both general and specific ways to improve their methods of instruction

through assessment. Black and Wiliam define assessment broadly to include "all activities that teachers and students undertake to get information that can be used diagnostically to alter teaching and learning" (1998b, p. 139). The assessment of student performances and the evaluation of teaching methods are critical elements in the teaching-learning environment. Assessment is central to any institute of higher education's duty of preparing students for the future. While a vast knowledge-base exists in the area of good practice in assessment of student learning, change in practice seems to be slow (Balla & Boyle, 1994). The increasing pressure on institutions to review and improve their practice in this area has resulted in the idea for the present study.

"When institutions are internally motivated to learn about student learning, assessment moves beyond a periodic activity to an organic and systematic cycle of inquiry involving a shared commitment among faculty, staff, and administrators" (Maki, 2002, p.8). The specific purpose of the present study was to gain feedback from full-time Indiana University-Purdue University Indianapolis (IUPUI) psychology faculty about a comprehensive assessment strategy to gather evidence about psychology majors' ability to demonstrate the student learning outcomes (SLOs) of the department's curriculum. The comprehensive assessment strategy will involve the administration by professors to their students of a short survey twice during the semester, and the use of professors' already existing classroom assignments to collect classroom data. The assessment strategy proposed will use multiple forms of assessment including both summative and formative assessment.

It is important to consider that teachers can assess students over the course of a year and use this information to make advantageous changes in instruction. Formative assessment is the diagnostic use of assessment to provide feedback to teachers over the course of instruction, which stands in contrast to summative assessment which generally takes place after a period of instruction and after learning has occurred (Boston, 2002). The results from a research study done by Schweibert and Bondurant (2000) indicate that well-delineated objectives facilitate the evaluation of students. Further support for the usefulness of formative assessment comes from an extensive research review of 250 journal articles to

determine whether formative assessment raised academic standards in the classroom. Researchers concluded that efforts to strengthen formative assessment produce significant learning gains in students (Black & Wiliam, 1998a).

The present assessment strategy will also propose the inclusion of the IUPUI Psychology Department's SLOs in professors' syllabi. Garavalia, Hummel, Wiley, & Huitt (1999) examined 242 undergraduate student's and 74 faculty member's responses to a survey on the perceived importance of syllabus components. Results indicate that some of the most important syllabus components to students include specific goals and objectives for each topic in the course.

<div align="center">Method</div>

Participants

The population sampled was 23 full-time faculty members of the IUPUI Psychology Department, and, of these, 12 responded. All participants were invited to respond to a survey distributed by students enrolled in B454 Capstone Seminar in Psychology.

Materials

Drew Appleby, Director of Undergraduate Studies in Psychology, developed the survey that was used for this study. Appleby proposed an seven-stage assessment method as a first step in a comprehensive strategy to assess the ability of IUPUI psychology majors to demonstrate the student learning outcomes the psychology department wants them to acquire as they progress through its undergraduate program. The survey was a seven-item measure rated on a five-point scale and participants had to measure the willingness and feasibility of each question (See Appendix A for a complete survey and Appendix B for consent).

Procedure

Each student chose two faculty members that they would survey. Most of the students initially contacted the faculty via email to set up appointment times to issue the surveys. Some of the faculty members were willing to meet with the students, others preferred to participate via email. Therefore, four

students did face-to-face interviews with their chosen faculty members, three responded using interoffice mail, and five simply provided the survey and consent form via email and let the faculty complete the surveys at their own convenience.

Results

Data from all of the responding participants was included in the calculation of results whether the respondents completed all the questions or not. Five participants failed to complete one or more questions. See Table 1 for information regarding specific number of respondents, means, and standard deviations for each question. The means were calculated on a 5.0 scale. We considered scores at 4.0 and above to be high in feasibility and willingness, and scores 3.9 and below to be low in feasibility and willingness. Faculty's feasibility was high in regards to identifying the SLOs in which they wish their students to acquire. Willingness to do this was high as well. Comments from faculty stated that some students only learn specific SLOs in certain courses, and some faculty only teach material in their courses that related to some SLOs and not others. Faculty's feasibility and willingness to provide Dr. Appleby with a list of SLOs implemented in each of their courses was high. Faculty's feasibility to put SLOs in syllabi and to emphasize them in class was high. Their willingness to do this was also high, but it was a bit lower than the feasibility. Faculty commented that they already use IUPUI's PULs in their syllabi instead of the Psychology Department's SLOs. Faculty's feasibility of giving a brief survey at midterm to receive formative feedback in regards to how successfully students are acquiring SLOs, and then make changes in class to enhance the students acquisition of SLOS was low. Their willingness to do this was also low due to reasons such as concern that SLOs would not be developed at this time, time constraints with the structure of the class schedule, and difficulty in making changes at midterm. There were several comments that said feasibility and willingness would depend on the design and execution of the survey to be used. In regards to giving the same survey at the end of the semester, faculty's feasibility was higher than their feasibility at midterm, but not by much. Their willingness to do this was also higher than at midterm, but again not by much. Concerns included having limited interactions with students at the end of the semester, and the

design and execution of the survey to be used. Faculty's feasibility to provide Dr. Appleby with summative feedback on their student's perception of the SLOs was low. However, their willingness to do this was high. Interestingly, the faculty found this task to not be very feasible but said they would be willing to do so. Finally, in regards to providing Dr. Appleby with their student's grades, including a summary of these grades and how well each student acquired the SLOs, faculty's feasibility was low. Their willingness, although higher than the feasibility, was also low. Faculty was concerned that isolating SLOs within assignments would be difficult to do.

Discussion

It is reasonable to consider a number of issues that have arisen from this study, although the small number of respondents makes our conclusions very tentative. The results indicate that some instructors resist tailoring their classes to implement the Psychology Department's SLOs. Perhaps further investigations are needed to determine the cause for such resistance. In addition to this, future research should identify means for including SLOs into instructors' curricula without sacrificing their content. Some instructors may experience more ease in transitioning their curriculum to satisfy the SLOs, based on the courses they teach. It is recommended that further research identify these specific courses and formulate a pilot group to adequately test the function and value of SLOs.

Some instructors questioned whether the Psychology Department's SLOs or the university's Principles of Undergraduate Learning (PUL) should be in used. A small amount of instructors prioritized the PULs over the SLOs when constructing their curriculum. It is recommended that future research source the cause for this belief and its affect on the function and success of the SLOs.

It is a priority for the Psychology Department, that all of its graduates accomplish the SLOs. Levels of mastery, however, will vary student to student. Different students will more readily master some SLOs then others. Additionally, some SLOs will be more easily applied then others. It is recommended that further research identify the students more readily capable of mastering the SLOs. It is also recommended that further studies determine the personal traits which encourage mastery and application of the SLOs.

Additionally, studies are needed to determine which SLOs require more effort and determine the methods needed to reduce their difficulty. Such studies will allow instructors to more easily construct their curricula to meet their specific students' needs in mastering the SLOs.

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Appendix A

Dr. Appleby would like to propose the following seven-stage assessment method as a first step in a comprehensive strategy to assess the ability of IUPUI psychology majors to demonstrate the student learning outcomes (SLOs) the Psychology Department wants them to acquire as they progress through its undergraduate program. Dr. Appleby believes there are two advantages of this strategy. One, it will only involve the administration of a short survey to your students twice during the semester. Two, you will be using your already existing classroom assignments to collect assessment data. However, before Dr. Appleby formally suggests the implementation these activities, he needs to gather data from you to determine how feasible (i.e., possible and/or practical) you believe these strategies are in your classes and, if you believe they are feasible, he also needs to know how willing you would be to implement them. This survey represents an attempt to gather this data. After you have chosen a number on each of the scales that follow each strategy, please feel free to provide comments that would help to clarify your quantitative choice (e.g., this step is not feasible in B495 because I do not use a standard A to F grading scale in this class).

1. Identify the subset of our department's SLOs for each of your classes that reflects the skills and/or knowledge you want your students to acquire as they complete the assignments in your classes.

   Is this feasible in your classes?
   Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

   If it is feasible, how willing would you be to implement it in your classes.
   Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not be willing to do this in my classes

2. Provide these SLOs for each of your classes to Dr. Appleby so he can create a matrix that contains all our psychology classes and the SLOs they target.

   Is this feasible in your classes?
   Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

   If it is feasible, how willing would you be to implement it in your classes?
   Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not be willing to do this in my classes

3. Put these SLOs in your course syllabi and emphasize them on the first day of class to insure that your students are fully aware of the specific types of knowledge and skills you want them to acquire in your classes.

   Is this feasible in your classes?
   Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

   If it is feasible, how willing would you be to implement it in your classes?
   Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not be willing to do this in my classes

4. Give your students a brief survey at midterm that would produce formative feedback about how successfully they perceive they are acquiring the SLOs in your classes and, if you believe it would be beneficial, use this feedback to make changes in your class during the second part of the semester designed to enhance your students' acquisition of the SLOs.

   Is this feasible in your classes?
   Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

   If it is feasible, how willing would you be to implement it in your classes?
   Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not willing to do this in my classes

5. Give your students the same survey at the end of the semester to gain summative feedback about how well they perceive they have acquired the SLOs targeted in your classes.

Is this feasible in your classes?
Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

If it is feasible, how willing would you be to implement it in your classes?
Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not willing to do this in my classes

6. Provide Dr. Appleby with the summative feedback about how well your students perceive they have acquired the SLOs targeted in your classes.

Is this feasible in your classes?
Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

If it is feasible, how willing would you be to implement it in your classes?
Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not willing to do this in my classes

7. Use the grades from the specific assignments that target the SLOs you want your students to acquire to assess how well they have acquired these SLOs as a result of completing your class. Then provide Dr. Appleby with a summary of these grades from each of your classes in the form of how many of your students acquired the SLOs in an "exemplary" manner (a final grade of A), in a "satisfactory" manner (a final grade of B or C), or in an "inadequate manner" (a final grade of D or F).

Is this feasible in your classes?
Yes, this can be done in my classes   5   4   3   2   1   No, this cannot be done in my classes

If it is feasible, how willing would you be to implement it in your classes?
Yes, I am willing to do this in my classes   5   4   3   2   1   No, I am not willing to do this in my classes

Informed Consent Form

Measuring the Feasibility of an Seven-Step Assessment Strategy

PURPOSE AND PROCEDURE OF THE STUDY:
You are invited to participate in a research project to gain feedback from full-time IUPUI psychology faculty about a seven-step assessment strategy to gather evidence about our majors' ability to demonstrate the student learning outcomes of our curriculum, all of which can be mapped to the university's Principles of Undergraduate Learning. This project will require B454 Capstone Seminar in Psychology students to interview each of you to determine your opinions about the feasibility of implementing each of these steps in your classes <u>and</u> your willingness to do so. This process will also allow you to provide a rationale for each of your opinions.

NUMBER OF PEOPLE PARTICIPATING IN THE STUDY:
All of the full-time psychology faculty who have served in the department for at least one year will be

invited to participate in this study.

RISKS OF TAKING PART IN THE STUDY:
The risks of participation in the study are minimal. If you become anxious or uncomfortable at any time during the study, you may choose not to complete the survey. If you feel discomfort or become upset due to the minimal risks involved in this study before or after your participation, please contact the principal researcher (Drew Appleby) whose telephone number is listed below.

BENEFITS OF TAKING PART IN THE STUDY:
The Psychology Department can use the results of this study as part of its strategic plan to implement a

systematic program of evaluating the effectiveness of its undergraduate program.

ALTERNATIVES TO TAKING PART IN THE STUDY:

There are no alternatives to taking part in this study.

VOLUNTARY NATURE OF STUDY:
Taking part in this study is strictly voluntary. You may choose not to take part in this study and may leave the study at any time. Leaving the study will not result in any penalty or loss of benefits to which you are entitled.

CONTACTS FOR QUESTIONS OR PROBLEMS:
For questions about the study, contact Drew Appleby at 274-6767. For questions regarding your rights as a research participant, contact a subject representative who is not involved with the current study in Research Compliance Administration at 274-8289.

_____ _____ _____

Name (Printed)　　　　　　　　Date　　　　　　　　Signature

Table 1

Seven-stage Assessment Method

Question	n	M	SD

1. Identify the subset of our department's SLOs for each of your classes that reflects the skills and/or knowledge you want your students to acquire as they complete the assignments in your classes.

Question	n	M	SD
Is this feasible in your classes?	12	4.67	0.65
If it is feasible, how willing would you be to implement it in your classes.	12	4.20	0.78

2. Provide these SLOs for each of your classes to Dr. Appleby so he can create a matrix that contains all our psychology classes and the SLOs they target.

Question	n	M	SD
Is this feasible in your classes?	11	4.81	0.40
If it is feasible, how willing would you be to implement it in your classes?	10	4.45	0.76

3. Put these SLOs in your course syllabi and emphasize them on the first day of class to insure that your students are fully aware of the specific types of knowledge and skills you want them to acquire in your classes.

Question	n	M	SD
Is this feasible in your classes?	12	4.46	0.84
If it is feasible, how willing would you be to implement it in your classes?	12	4.33	0.89

4. Give your students a brief survey at midterm that would produce formative feedback about how successfully they perceive they are acquiring the SLOs in your classes and, if you believe it would be beneficial, use this feedback to make changes in your class during the second part of the semester designed to enhance your students' acquisition of the SLOs.

Question	n	M	SD
Is this feasible in your classes?	12	3.29	1.66

Question	n	M	SD

If it is feasible, how willing would you be to implement it in your classes?   12   3.41   1.32

5. Give your students the same survey at the end of the semester to gain summative feedback about how well they perceive they have acquired the SLOs targeted in your classes.
Is this feasible in your classes?   12   4.08   1.16

If it is feasible, how willing would you be to implement it in your classes?   11   3.72   1.01

6. Provide Dr. Appleby with the summative feedback about how well your students perceive they have acquired the SLOs targeted in your classes.
Is this feasible in your classes?   12   3.92   1.24

If it is feasible, how willing would you be to implement it in your classes?   11   4.09   0.83

7. Use the grades from the specific assignments that target the SLOs you want your students to acquire to assess how well they have acquired these SLOs as a result of completing your class. Then provide Dr. Appleby with a summary of these grades from each of your classes in the form of how many of your students acquired the SLOs in an "exemplary" manner (a final grade of A), in a "satisfactory" manner (a final grade of B or C), or in an "inadequate manner" (a final grade of D or F).
Is this feasible in your classes?   11   3.09   1.30

If it is feasible, how willing would you be to implement it in your classes?   8   3.375   1.19

Mapping the Student Learning Outcomes of the IUPUI Psychology Department's Undergraduate Program to IUPUI's Principles of Undergraduate Education

Principles of Undergraduate Learning (PULs)	Specific Student Learning Outcomes (SLOs) Derived from the Definitions of the PULs	SLOs of the IUPUI Psychology Undergraduate Program that are Comparable to the SLOs Derived from the Definitions of the PULs
Core Communication and Quantitative Skills	Express ideas and facts to others effectively in a variety of formats, particularly written, oral, and visual formats	• Demonstrate effective writing skills • Demonstrate effective speaking skills • Utilize computers and other technologies for many purposes
	Identify and propose solutions for problems using quantitative tools and reasoning	• Use scientific research methods in psychology including design, data analysis, and interpretation to solve problems related to behaviors and mental processes
	Make effective use of information resources and technology	• Demonstrate information competence by identifying, locating, evaluating, and retrieving written and electronic information • Utilize computers and other technologies for many purposes
Critical Thinking	Remember, understand, apply, analyze, evaluate, and create	• Remember, understand, apply, analyze, evaluate, and create
Integration and Application of Knowledge	Enhance their personal lives	• Develop self-awareness by identifying personal strengths, weaknesses, values, and goals • Develop a realistic plan about how to pursue a career in psychology or a psychology-related field
	Meet professional standards and competencies	• Apply psychological knowledge and methods to personal, social, and organizational issues • Understand and abide by the ethics of psychology
	Further the goals of society	• Apply psychological knowledge and methods to personal, social, and organizational issues
Intellectual Depth, Breadth, and Adaptiveness	Show substantial knowledge and understanding of at least one field of study	• Remember and understand the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology
Understanding Society and Culture	Compare and contrast the range of diversity and universality in human history, societies, and ways of life	• Recognize, understand, and respect the complexity of socio-cultural and international diversity • Understand the behavior and mental processes of others
	Analyze and understand the interconnectedness of global and local communities	• Recognize, understand, and respect the complexity of socio-cultural and international diversity
	Operate with civility in a complex world	• Collaborate civilly and effectively as a member of a diverse group to accomplish a complex task
Values and Ethics	Understand ethical principles within diverse cultural, social, environmental, and personal settings	• Understand and abide by the ethics of psychology

Five-Year IUPUI Undergraduate Psychology Program Assessment Schedule

Class	PUL 3 (major)	PUL 2 (moderate)	PUL 1 (minor)	Faculty Member Who Will Assess the Class	Fall 2009	Spr 2010	Fall 2010	Spr 2011	Fall 2011	Spr 2012	Fall 2012	Spr 2013	Fall 2013	Spr 2014
B103	3	1A	5	Appleby	P	X								
B104	3	2	5	Hansen	P		X							
B105	4	1A	2	Neal-Beliveau or Herold	P									
B305	1B	2	3											
B311	2	1B	3	Ashburn-Nardo			X							
B307	6	4	1B											
B310	4	3	2	Kroupa			X							
B320	4	1A	5	Boehm				X						
B334	4	1C	1A											
B340	4	2	3	Johnson		X								
B344	4	1A	1B											
B356	4	3	1A											
B358	2	3	5											
B370	5	3	2	Ashburn-Nardo		X								
B380	4	2	6											
B398	2	3	1A											
B421	4	3	1A											
B424	3	2	4											
B322	2	3	5											
B360	5	4	6											
B365	5	4	6											
B366	2	3	5											
B368	1A	5	6	Hazer			X							
B375	2	1A	5	Devine			X							
B376	3	4	1C	Kroupa			X							
B386	1A	5	6											
B394	3	2	5											
B396	4	2	3											
B420	3	4	6											
B421	4	3	1A											
B422	3	2	6											
B492	3	1C	1B											
B433	2	1A	1B	J. Stewart		X								
B454	3	1A	4	Appleby	P	X								
B462	3	6	2	Hazer				X						
B471	4	1A	1C	Bringle		X								
B482	3	5	4											
B499	3	1A	1B	Johnson		X								

1. **Columns 2, 3, and 4 contain the PULs targeted as having Major (3), Moderate (2), and Minor (1) emphasis in each course.**

2. **A P indicates the semester in which a pilot assessment is scheduled.**

3. **An X indicates the semester in which an official assessment is scheduled.**

4. **A row is shaded when the course in column 1 has been scheduled to be assessed.**

5. **Although this is a 5-year schedule, it would be preferable for us to have all of our classes evaluated before the NCA accreditation visit takes place in 2012.**

6. **16 of 39 classes (41%) are scheduled to be assessed as of November 2, 2009.**

Appendix N

A Three-Step Method for Evaluating Student Attainment of the PULs

Step 1

Identify the PULs that are targeted in class activities and assignments for each class in a department or program's curriculum.
IUPUI has begun a new initiative to evaluate undergraduate student attainment of the abilities, skills, and attributes embodied in the Principles of Undergraduate Learning (PULs). As a first step, in Spring 2009, faculty responsible for every undergraduate program at IUPUI identified for each course one, two, or three PULs addressed in class activities and assignments. The following scale was used to indicate the degree of emphasis given to each PUL identified:

*3 indicates a **major** emphasis:*	*This PUL is prominent in at least one course objective; it is a **focus** of the course. Student learning of this PUL is assessed via at least one major assignment.*
*2 indicates a **moderate** emphasis:*	*The PUL is **explicitly** emphasized in the course. It is prominent in at least one course assignment and is assessed via that assignment.*
*1 indicates a **minor** emphasis:*	*This PUL is identified in one or more assignments and is **implicitly** emphasized in the course.*

Staff in the Offices of the Registrar and Information Management and Institutional Research (IMIR) have drawn on this information to create a database that links courses with the PULs emphasized. With this information, faculty members and advisors can use the matrix at http://www.planning.iupui.edu/pul/matrix/ to enter abbreviated course titles for an academic program, or an individual student's plan of study, and see immediately which PULs are addressed. Now, programs and departments need to carry out two additional steps in order to develop campus-wide data on student learning related to the PULs:

Step 2

Develop a schedule for evaluating student attainment of the skills and knowledge embodied in the PULs.
Faculty in each program or department must develop a **schedule for evaluating and recording students' PUL learning in at least one section of each of the department's/program's courses over the next five years. Only** PULs given **major or moderate emphasis** (i.e., scored as **3** or **2** in the course matrix) need to be included in the schedule.
- First, program/department members should review the matrix to verify that all courses offered are listed and that PULs are assigned for each course.
  - o To review the matrix, go to http://www.planning.iupui.edu/pul/matrix.
  - o Click the "IU Login" button and log in using the CAS system.
  - o Click on the link for "PUL Matrix by Department/Program."
  - o Select the appropriate department from the drop-down menu.
    If PULs are not assigned for a course, confer with colleagues, assign the appropriate one, two, or three PUL(s) for that course and ask your school scheduling officer to send this information to the Office of the Registrar.
- Next, **select and record a semester** for evaluating student attainment of the PUL-related knowledge and skills in each course offered by the department/program. *The schedule for evaluating students' attainment of the PULs in each course **should be submitted using the matrix web form (described below) by October 30, 2009.***
  - o In the "semester" column on the left, indicate in which semester (e.g., Spring 2010, Summer 2010, Fall 2010, etc. through Fall 2014) student attainment of the PULs for that course will be evaluated.
  - o If PULs for a course 'vary by class,' the course may be eliminated from the schedule for evaluating student attainment.
  - o Save the schedule by clicking "Save" so that you may view it later and edit.
  - o Click "Submit" to send your schedule to the IMIR site for review by your dean, IMIR staff, and others.
  - o Upon submission, you will receive an email message with a link to a downloadable PDF copy of your matrix. (Note: if you wish to print your matrix from the Web site, set the page orientation to Landscape for best results. The PDF version you receive upon submission will pre-set to print in Landscape orientation.)

Step 3

Identify and record a level of PUL attainment for each student enrolled in each course that has been schedule to have its PULs assessed.
- Review the PULs given major or moderate emphasis in the course by going to http://www.planning.iupui.edu/pul/matrix.
- Evaluate each student's class performance on each of the relevant PULs by clicking on the SIS PUL Evaluation button that will appear immediately below the SIS Grade Roster button that appears on your Oncourse homepage for your course. Please use the following rating scale for each PUL for each student in your class.
  - o 3 (VE) = Very Effective
  - o 2 (E) = Effective
  - o 1 (SE) = Somewhat Effective
  - o 0 (NE) = Not Effective
- In assigning the ratings, use evidence from a single assignment or from multiple activities (test items, oral presentations, individual and group projects) designed to give students opportunities to practice and make progress in learning the knowledge and skills associated with the particular PUL emphasized.
- To determine ratings, you may wish to use or adapt one of the PUL rubrics found at http://nca.iupui.edu .
- Although student names/ID numbers will be used to simplify the work of recording their levels of learning, this identifying information will not be included in any reports prepared for the campus or the Higher Learning Commission.

The Three Most Important Principles of Undergraduate Learning (PULs) for Students to Achieve in B103

1. Faculty at IUPUI have worked hard since 2002 to create a statement of the knowledge and skills we want all undergraduate students to develop and strengthen while they are at IUPUI, and we have named this statement our Principles of Undergraduate Learning (go to http://www.iport.iupui.edu/selfstudy/tl/puls/ for a complete description of the PULs). We have had a period of time since 2002 for faculty and students to become comfortable with this statement. Some faculty have implemented the PULs, and we have some good examples of how they have done so. Now we want to become more systematic by insuring that students have sufficient opportunities to strengthen all the PULs. Therefore, a sampling plan has been developed to help faculty, students, parents, the public, and our accrediting association actually see that IUPUI is a place where students are learning these things. Our faculty have been asked to engage in the following three steps to accomplish this sampling plan.
   a. Identify the three the PULs you believe are most important for your students to accomplish in your course.
   b. Designate one of these PULs as the one that you emphasize most in your course (Major Emphasis), designate another as the one to which you give second most emphasis (Moderate Emphasis), and designate the third as the one to which you give third most emphasis (Minor Emphasis).
   c. Either use existing assignments or create new methods to collect data to determine how successfully your students have accomplished these three PULs by the end of your course.
2. The strategies I will use in B103 to accomplish the first three assessment tasks listed above appear in the table below. Once I have accomplished these tasks, I will use the data I collect to modify B103 in ways that will enable future B103 students to achieve its three most important PULs even more successfully.

IUPUI's Principles of Undergraduate Learning (PUL)	Corresponding IUPUI Psychology Department Student Learning Objective(s) (SLO)	What will you do to accomplish these SLOs in this class, and how will your instructor assess how well you have accomplished them?
Major Emphasis Integration and Application of Knowledge	• Develop self-awareness by identifying personal strengths, weaknesses, values, and goals • Develop a realistic plan to pursue a career in psychology or a psychology-related field	The ten papers you will write in B103 will require you to address these two SLOs directly. Your instructor will use the **Correctness Scores** you earn on your papers to assess how well you accomplish this PUL.
Moderate Emphasis Language and Visual Communication Skills	• Develop effective writing skills	You will follow the rules provided in the 6th edition of the *Publication Manual of the American Psychological Association* to write your papers. Your instructor will use the **APA Style Scores** you earn on your papers to assess how well you accomplish this PUL.
Minor Emphasis Understanding Society and Culture	• Collaborate civilly and effectively as a member of a diverse group to accomplish a complex task	You will collaborate with your classmates on several tasks (i.e., your COR report and its collaboration report, your outside-class meetings with your TA, your ability to use your TA's feedback to increase the quality of your papers, and your class attendance). Your instructor will combine your scores on these tasks into a **Collaboration Score** to assess how well you accomplish this PUL.

Appendix P

Two-Year IUPUI Undergraduate Psychology Program 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			

* The ?s in the final three columns indicate that these faculty will be <u>asked</u> to assess the PULs in their courses during the semesters indicated.

Appendix Q

Analysis of the Frequency and Emphasis With Which Each of the Principles of Undergraduate Learning Are Targeted for Accomplishment 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.

Appendix R

Psychology End-of-Semester Principles of
Undergraduate Learning (PULs) Evaluation Report Form
(Please replace the XXs with appropriate information.)

Class Number and Title: XX
Instructor: XX
Semester and Year: XX
Numbers and Titles of the Three PULs Targeted for Different Levels of Emphasis in This Course
1. Number and Title of the PUL that has a **<u>Major Emphasis</u>** in this course: XX
   (This PUL is prominent in at least one course objective; it is a focus of the course. Student learning of this PUL is assessed via at least one major assignment.)
2. Number and Title of the PUL that has a **Moderate Emphasis** in this course: XX
   (This PUL is explicitly emphasized in the course. It is prominent in at least one course assignment and is assessed via that assignment.)
3. Number and Title of the PUL that has **Some Emphasis** in this course: XX
   (This PUL is identified in one or more assignments and is implicitly emphasized in the course.)

Using the grading scale you employ to assign final grades in this course (e.g., 90-100% = A, 80-89% = B, etc.), please use the following 0 to 3 scale to assign each of your students a score that reflects her/his ability to demonstrate each of the three above PULs. Report these scores for each of your students in this course by clicking on the SIS PUL Assessment tab that will appear below the SIS Grade Roster tab you will use to report your final grades for this course via Oncourse.

Assign a 3 (**Very Effective**) to those students whose performance on the assignment or assignments related to each PUL would have earned them a letter grade of A+,A, or A-.
Assign a 2 (**Effective**) to those students whose performance on the assignment or assignments related to each PUL would have earned them a letter grade of B+,B, or B-.
Assign a 1 (**Somewhat Effective**) to those students whose performance on the assignment or assignments related to each PUL would have earned them a letter grade of C+,C, or C-.
Assign a 0 (**Not Effective**) to those students whose performance on the assignment or assignments related to each PUL would have earned them a letter grade of D+,D, D-, or F.

Use the table below to report the number of ratings you assigned to each of the PULs you assessed.

PUL Number	Number of Very Effective Ratings (Score = 3)	Number of Effective Ratings (Score = 2)	Number of Somewhat Effective Ratings (Score = 1)	Number of Not Effective Ratings (Score = 0)	Mean Rating

Do the mean ratings of any of the PULs you assessed lead you to believe that a change in the way you teach this course could increase these ratings to a level that is more in line with your expectations.
Yes or No

If you answer to the previous question was Yes, explain the specific ways in which you plan to change the course for next semester so that a higher percentage of your students will receive higher rankings for the PULs you target in this course.

I plan to change the course…

Finally, please explain the method you will use to collect data that will enable you to determine if your methods were successful in enabling your students to receive higher rankings for the PULs you target in this course.

I will use ….