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

## 2008-2009 Progress Report
## for the Six-Stage Assessment Strategy

**Submitted Patricia Clark, Ph.D., Trustee's Lecturer**
**(Edited by Joseph L. Thompson)**
**June 2009**

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

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

The Biology Department had previously accomplished the first two stages of the School of Science's strategies and initiated the third stage. However, the revision of stages 1 and 2 was deemed necessary in order to include additional courses, new instructors, and to update methods of assessment utilized in courses. This revision of stages 1 and 2 will allow us to reassess and complete the work previously begun on the third stage.

### 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 environment

**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 equipment commonly 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

As part of a BIOL K493 Research Project, Dr. Marrs and undergraduate student Winta Haile developed a senior Biology major exit survey. This survey simply reproduced the Biology Department's SLOs in the form of a user-friendly "Survey Monkey" designed for student use. Students were able to select whether they had experienced each of the SLOs in their classes and at what 'level' they felt they understood this topic, based on a Lickert scale. The link for this survey was sent to all prospective May 2007 and August 2007 graduating Biology majors, and over 125 student responses were generated. One interesting finding is that while Biology faculty place a high emphasis on research and applied skills, students did not feel like they received emphasis on this in their undergraduate curriculum.

In the future, the Department would like students completing a similar but more refined survey 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.

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

| Course | Title | Credit | 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 |
|---|---|---|---|---|---|---|---|---|---|
| K101 | Concepts of Biology I | 5 | B | B | | | B | B | B |
| K103 | Concepts of Biology 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

## 2008-2009 Progress Report
## for the Six-Stage Assessment Strategy

**Submitted by John V. Goodpaster, Ph.D.**
**(Edited by Joseph L. Thompson)**
**June 2009**

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

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

Based on prior efforts in the Department to codify the key knowledge, skills and abilities to be possessed by our graduates, the following SLOs were devised and approved by the department:

### Proficiencies for Introductory Chemistry

- Properties of matter and their molecular basis
- Theories of composition, structure, and bonding of matter
- Composition and reaction stoichiometry
- Energetic and kinetic basis of chemical reactivity
- Chemical equilibrium and its applications
- Nuclear decays and their kinetics
- Basic laboratory practice and techniques

### Proficiencies for Analytical Chemistry/Instrumentation

- Have the requisite laboratory skills for making quantitative measurements
- Understand the concept of reliability of quantitative measurements, and relevant statistical methods
- Know how to objectively and correctly evaluate the reliability of one's own data
- Be able to apply principles of chemical equilibria taught in General Chemistry to the solution of higher-level problems of solubility, potentiometry, and ionic activity
- Be familiar with the basic electronic and optics underpinnings of instrumentation
- Understand fundamental principles of chromatography, spectroscopy and electrochemistry as applied to the solution of analytical problems
- Be proficient with instrumentation commonly utilized for identification and quantization tasks in academic, industrial and clinical laboratories
- Have knowledge of modern concepts in analytical chemistry including proteomics, biosensors, metabolomics, etc.
- Demonstrate effective written communication skills needed for professional documentation and reporting of analytical studies

### Proficiencies for Biological Chemistry/Biochemistry

- Be able to apply principles from other disciplines of chemistry to biomolecules
- Understand the structure of proteins, nucleic acids, lipids, and other complex biomolecules including their three dimensional conformations, organization, and stabilizing interactions
- Understand the function of proteins, nucleic acid and lipids
- Be able to use appropriate mathematical equations to characterize ligand binding and catalysis
- Understand how structure and function are related on 4 levels: proteins and nucleic acids, organelles, cells, and multicellular organisms

- Understand the inter-relatedness of biological processes and systems including details of cellular energy production and storage, precursor synthesis, catabolism, and signaling
- Understand the dependence of biological/biochemical processes on the fundamental laws of physics and chemistry that govern them
- Understand the methodologies appropriate for purification, separation, and structural and functional characterization of biomolecules
- Understand the evolution of living systems, their interconnection with the evolution of their environment, and how such studies further the understanding of the biological systems/processes themselves

**Proficiencies for Inorganic Chemistry**

- Understand principles of electronic and molecular structure of inorganic and coordination compounds
- Understand principles of chemical bonding in inorganic and coordination compounds
- Understand the principles of symmetry and group theory as they apply to inorganic compounds
- Understand structural and compositional basis for properties and reactivities of inorganic compounds in the solid state, in the gas state and in solution
- Understand the principles of acid/base, oxidation/reduction, and coordination reactions as they apply to inorganic compounds
- Understand the molecular basis of electronic and vibrational spectroscopic properties of inorganic compounds
- Understand the systematic chemistry of transition element compounds
- Know how to synthesize and characterize a representative selection of main group and transition element compounds
- Know how to carry out and interpret a representative selection of physical measurements inorganic compounds

**Proficiencies for Organic Chemistry**

- Understand the principles of valence bond, molecular orbital, and hybridization theories
- Recognize and perform transformations between key functional groups
- Identify stereochemistry and three-dimensionality in organic molecules
- Understand the kinetic and thermodynamic principles of organic reactions
- Understand, recognize and apply the following reaction types: substitution, addition, elimination, rearrangement
- Predict the direction of acid-base chemistry, identify nucleophilic and electrophilic centers
- Understand and apply “arrow pushing” to one and two electron movement
- Identify organic molecules by spectroscopic analysis
- Understand the bonding and reactions of aromatic and conjugated systems
- Understand the properties and use of simple organometallic molecules in organic synthesis
- Develop a multistep synthesis of organic molecules
- Understand the structure and reactions of selected biomolecules
- Demonstrate proficiency in informatics, including retrieval and use of information for molecules and reactions
- Demonstrate proficiency in basic laboratory techniques, including preparation, separation, purification, and characterization of organic molecules

**Proficiencies for Physical Chemistry**

- Understand the principals of thermodynamics including the first and second laws and the meaning and calculation of various thermodynamic parameters
- Understand principles of kinetic molecular theory which are used to explain the properties of gases, liquids and solids
- Understand principles of quantum mechanics and its application to atomic structure, chemical bonding and molecular structure
- Understand principles of statistical mechanics and its application to chemical systems
- Comprehend principles of reaction rate theory and its application to chemical mechanisms and reaction rates
- Understand principles of electrochemistry in regard to electrode and electrochemical processes
- Know principles of transport processes
- Comprehend principles of spectroscopy and apply them to determine molecular structure
- Perceive the properties of macroscopic and microscopic structures including: surfaces, macromolecules and electric and magnetic properties of molecules
- Be able to derive physical chemical mathematical equations from fundamental chemical principles
- Be able to apply knowledge to solve physical chemical problems
- Demonstrate competence in using methods of analysis
- Understand the physical and spectroscopic techniques needed to characterize the macroscopic and microscopic behavior of atoms and molecules

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

The assessment process was continued and a matrix was created to map the various SLOs of the Department to each of our course offerings. This matrix was discussed at a meeting of the Undergraduate Teaching Committee in the Department of Chemistry and Chemical Biology.

In addition, the need to map the Department courses to the Principles of Undergraduate Learning (PULs) was discussed. This task received the most immediate attention and resulted in the matrix shown below. These results were passed on to the 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 | |
| LAB | **CHEM-C** | **325** | 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 | | |

| | | | | | |
|---|---|---|---|---|---|
| LEC | **CHEM-C** | **361** | 2 | | |
| LEC | **CHEM-C** | **362** | 2 | | |
| 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 | | |
| LEC | **CHEM-C** | **495** | 1A | | |
| LAB | **CHEM-C** | **496** | 2 | 3 | |
| LAB | **CHEM-S** | **125** | 2 | 3 | |
| LAB | **CHEM-S** | **126** | 2 | 3 | |

## Plans to Accomplish the Next Stage During School Year 2009 - 2010

Mapping the SLOs to the Chemistry curriculum will be the major goal for school year 2009 – 2010.

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

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**Submitted by Xukai Zou, Ph.D.**
**(Edited by Josh Morrison)**
**June 2009**

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**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 (MFT) is a standardized exam that covers topics in programming concepts, discrete structures and algorithms, and computer systems, norm-referenced to a large set of college seniors. After implementing the test in the capstone course for two consecutive years, the Department started data analysis and discussion of future improvement of the undergraduate curriculum. The Department determined that we should add an additional course to the core requirements, CSCI 48400, Computational Theory. This course was active many years ago, and will be taught once yearly by a returning former faculty member (part-time), Dr. Judith Gersting. The course includes topics in computational theory, complexity, and algorithms. These areas have been shown to be lacking in our senior-level students for the past two MFT cycles. This deficit persists when viewing the results of the MFT as compared with the overall group, as well as a selected peer group of universities. Happily, our results have been stronger than both the

peer and the national group for both years. Even so, our curriculum could be strengthened, and student outcomes improved, by adding this theory course.

**2. Major Field Test**

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

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

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

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

**3. Performance in Major Field Test**

Near the end of the Spring 2009 term, thirteen seniors completed the Major Field Test in Computer Science as part of CSCI 49500, the senior capstone course. These students did very well, scoring an average of 154 on a scale of 120-200. This placed the Department's average in the 65th percentile of all institutions. When examining the parts of the exam, the Department's institutional percentiles were:

- Programming Concepts: 65th percentile
- Data Structures & Algorithms: 65th percentile
- Systems: 40th percentile

Though these results were lower than last year's, our students still performed better than the overall group of students as well as a selected peer group of 10 institutions.

**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, once implemented.

# Assessment of Student Learning
# Forensic and Investigative Sciences Program
# Indiana University-Purdue University Indianapolis

## 2008-2009 Progress Report
## for the Six-Stage Assessment Strategy

**Submitted by Kristin A. Shea, M.S.**
**June 2009**

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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 understand 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 analyze (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 apply 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 evaluate 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 create (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;<br>**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;<br>**Integration and Application of Knowledge** - enhance their personal lives;<br>**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;<br>**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;<br>**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;<br>**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;<br>**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;<br>**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;<br>**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;<br>**Integration and Application of Knowledge -** meet professional standards and competencies;<br>**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;<br>**Integration and Application of Knowledge -** meet professional standards and competencies;<br>**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;<br>**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;<br>**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:

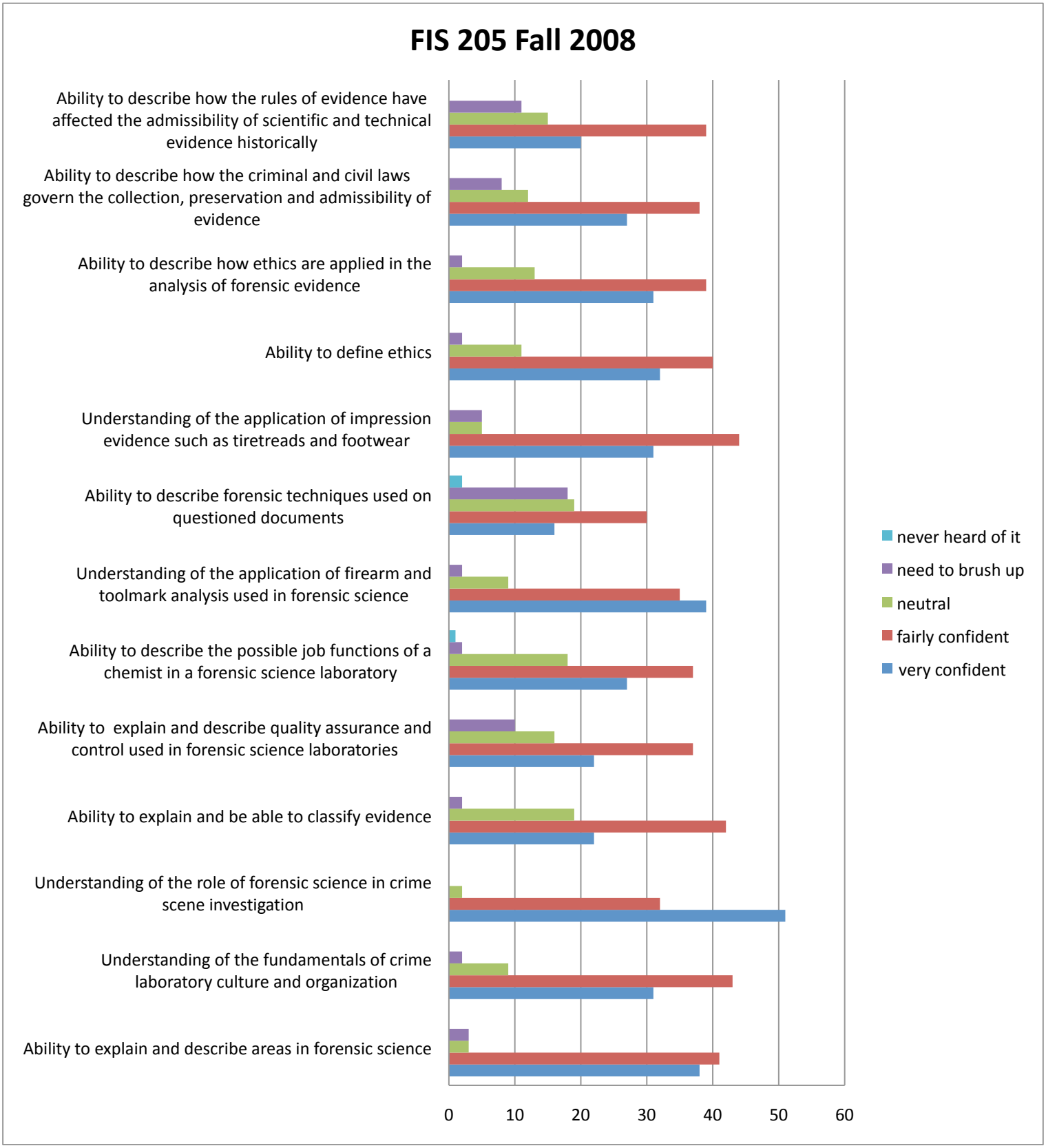
- Never heard of it
- Need to brush up
- Neutral
- Fairly confident
- Very confident

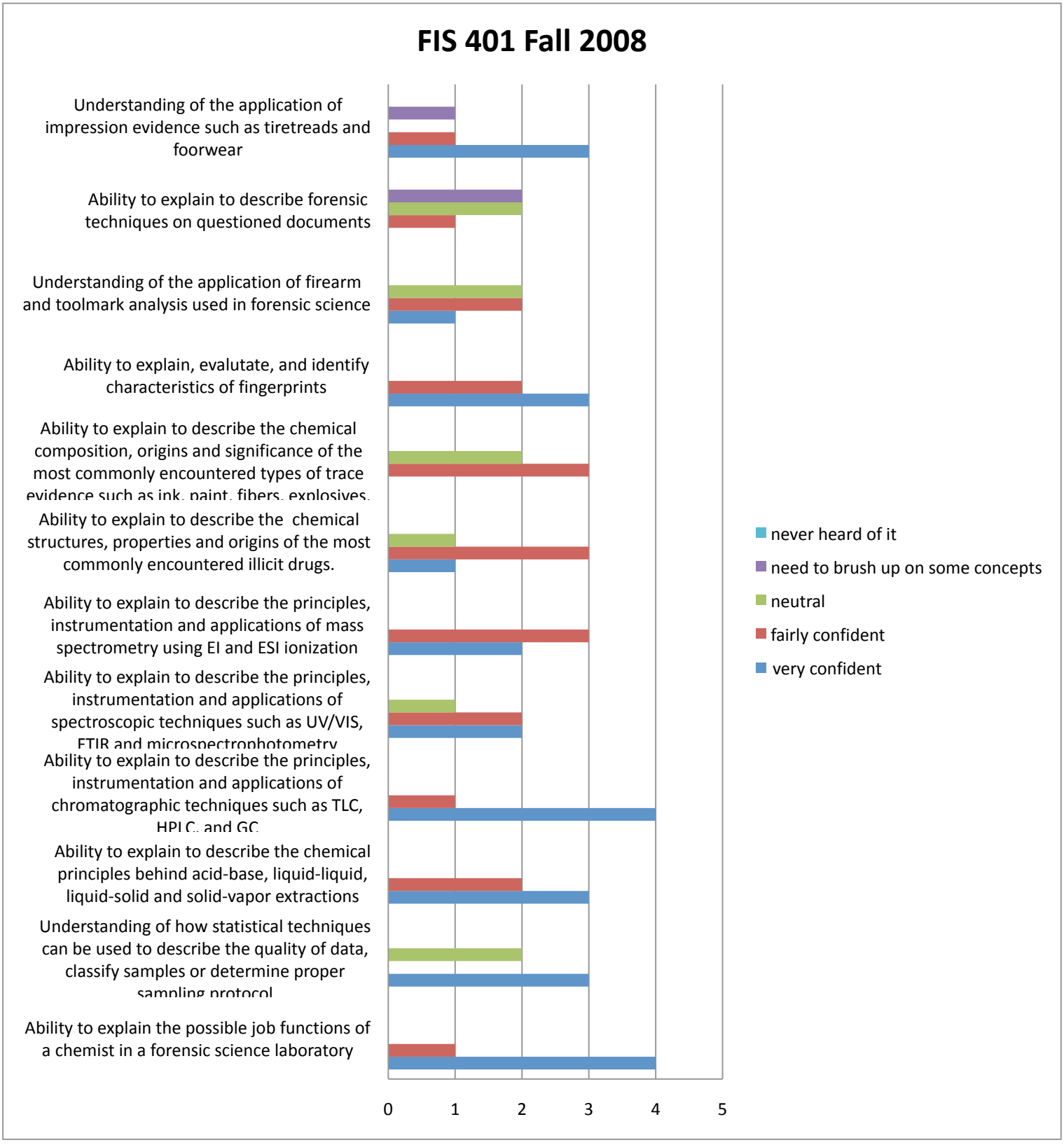
The FIS program will also continue to explore new methods of measurement to ensure breadth and depth in the data collection process. One new method will be implemented in the Summer of 2009. All students who are completing FIS 49000 *Capstone Experience* with an internship will receive a survey in August 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.

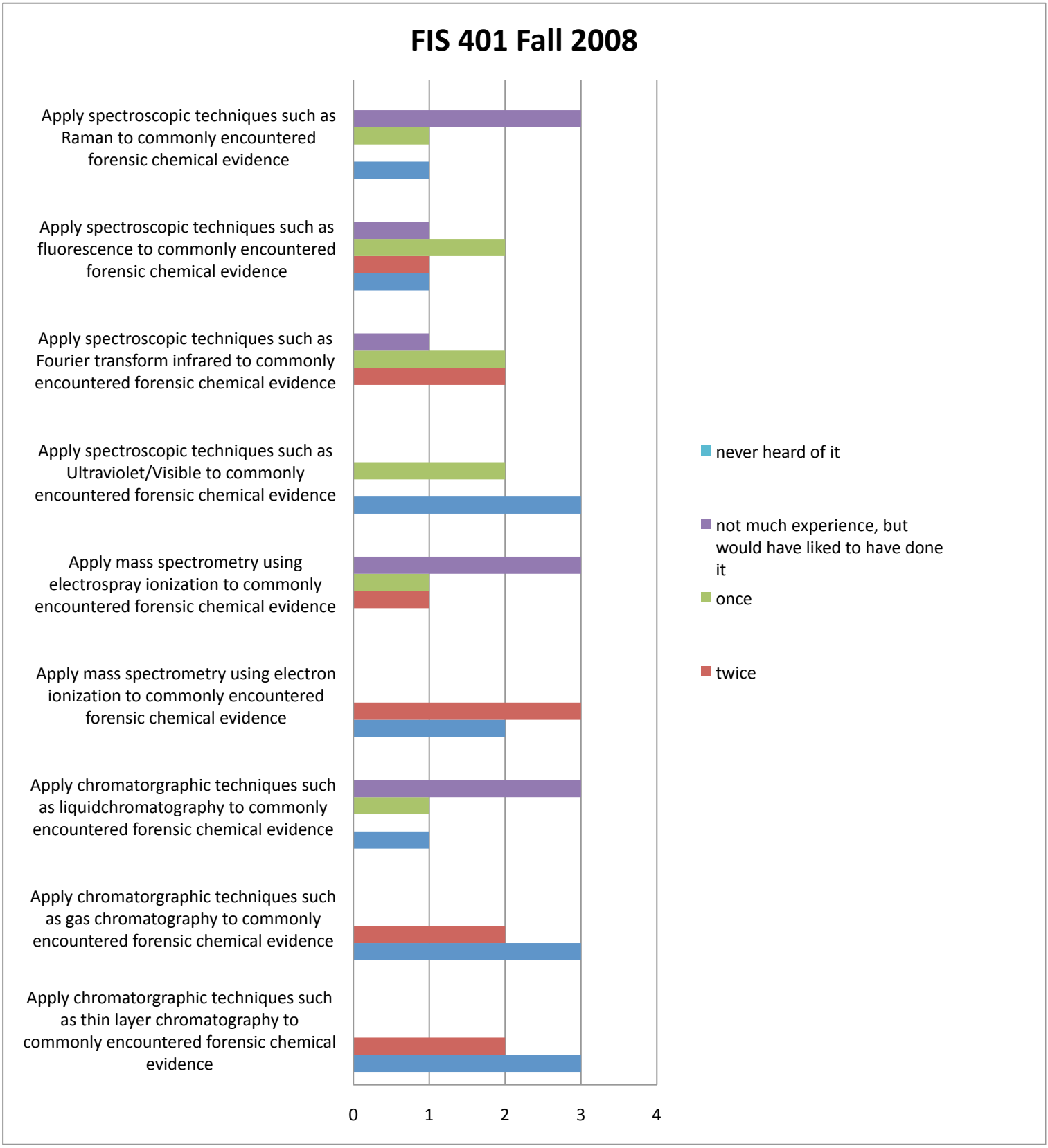
**Stage 4** → Collect data to determine if the SLOs are being accomplished successfully.

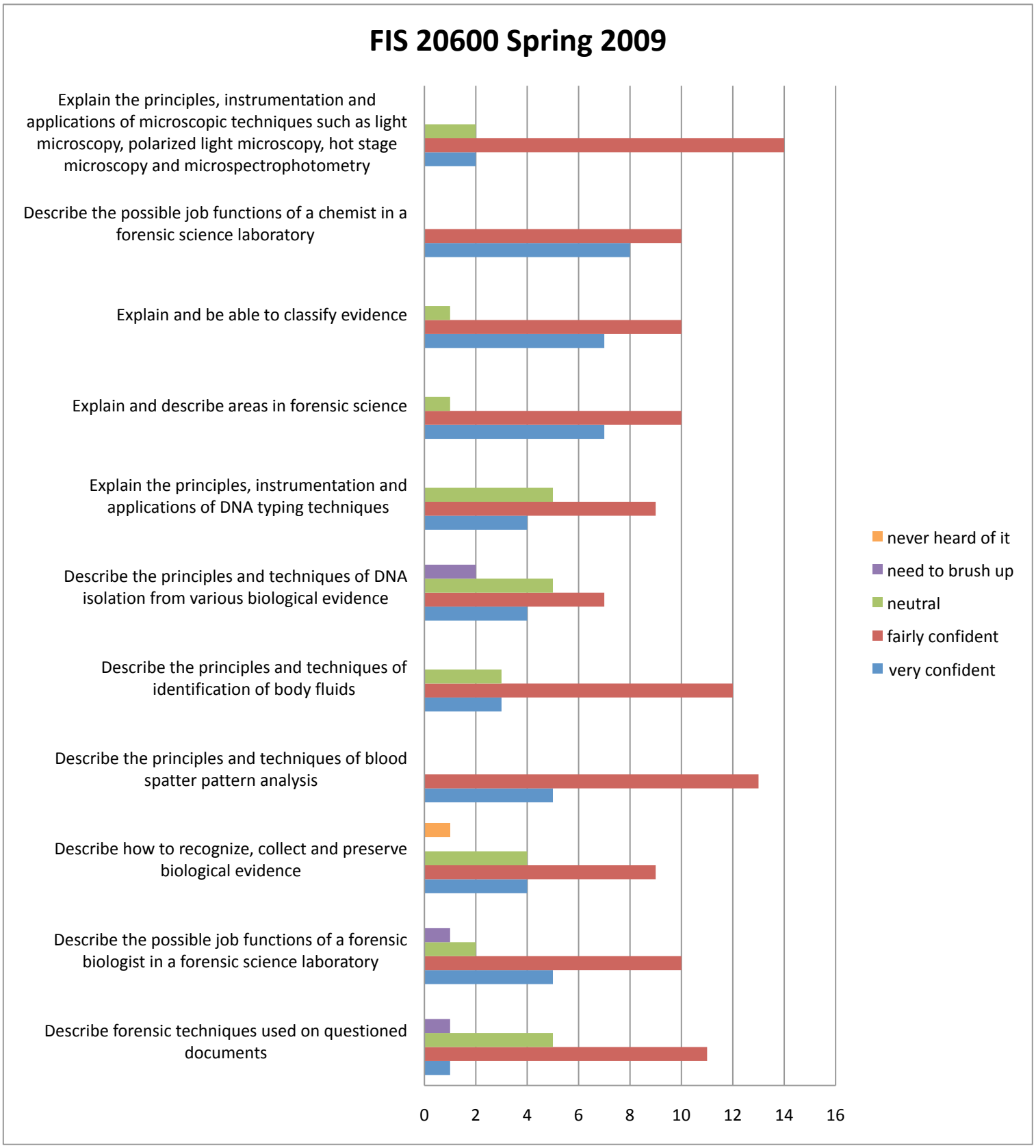
The method of measurement referred to in the previous section was used in the Fall 2008 for two courses: FIS 20500 *Concepts of Forensic Science I* and FIS 40100 *Forensic Chemistry I*; and the Spring 2009 for three courses: FIS 20600 *Concepts of Forensic Science II*, FIS 30500 *Professional Issues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

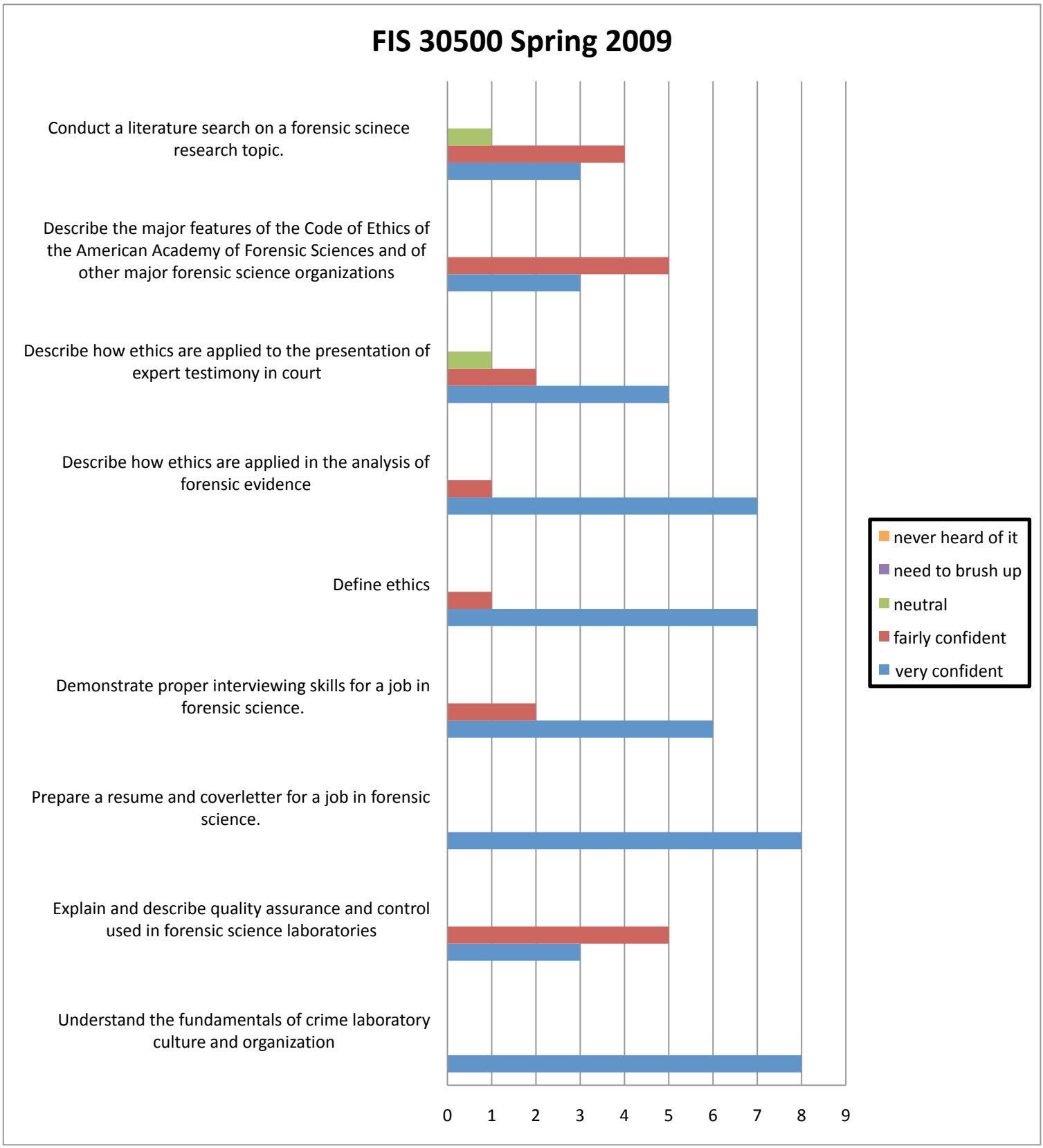
The FIS program will continue to collect data for all of its courses in the 2009-2010 academic year.

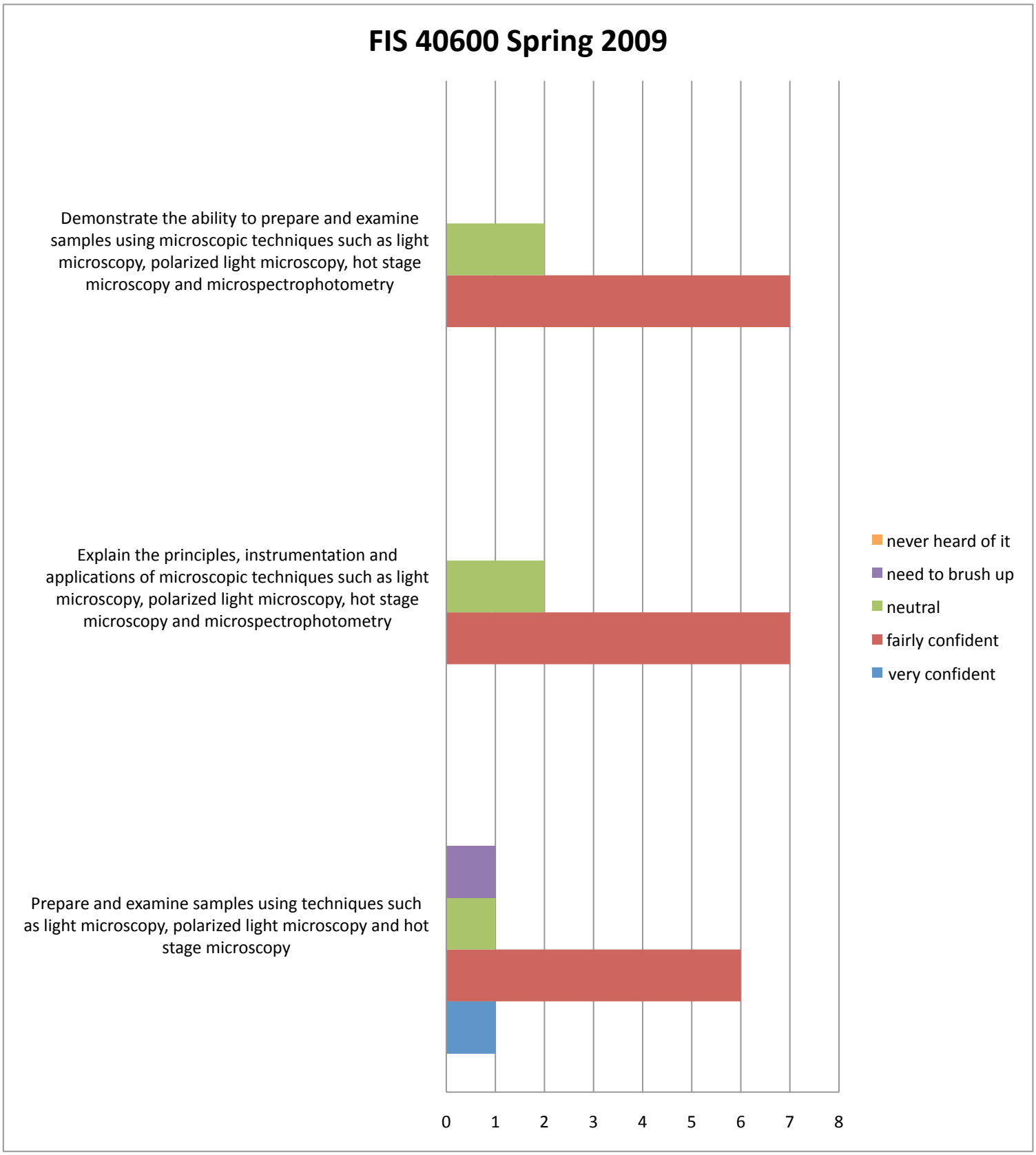

FIS 205 Fall 2008
Ability to describe how the rules of evidence have affected the admissibility of scientific and technical evidence historically
Ability to describe how the criminal and civil laws govern the collection, preservation and admissibility of evidence
Ability to describe how ethics are applied in the analysis of forensic evidence
Ability to define ethics
Understanding of the application of impression evidence such as tiretreads and footwear
Ability to describe forensic techniques used on questioned documents
Understanding of the application of firearm and toolmark analysis used in forensic science
Ability to describe the possible job functions of a chemist in a forensic science laboratory
Ability to explain and describe quality assurance and control used in forensic science laboratories
Ability to explain and be able to classify evidence
Understanding of the role of forensic science in crime scene investigation
Understanding of the fundamentals of crime laboratory culture and organization
Ability to explain and describe areas in forensic science
0
10
20
30
40
50
60
never heard of it
need to brush up
neutral
fairly confident
very confident


FIS 401 Fall 2008
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
0
1
2
3
4
5
never heard of it
need to brush up on some concepts
neutral
fairly confident
very confident


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
0
1
2
3
4
never heard of it
not much experience, but would have liked to have done it
once
twice


FIS 20600 Spring 2009
Explain the principles, instrumentation and applications of microscopic techniques such as light microscopy, polarized light microscopy, hot stage microscopy and microspectrophotometry
Describe the possible job functions of a chemist in a forensic science laboratory
Explain and be able to classify evidence
Explain and describe areas in forensic science
Explain the principles, instrumentation and applications of DNA typing techniques
Describe the principles and techniques of DNA isolation from various biological evidence
Describe the principles and techniques of identification of body fluids
Describe the principles and techniques of blood spatter pattern analysis
Describe how to recognize, collect and preserve biological evidence
Describe the possible job functions of a forensic biologist in a forensic science laboratory
Describe forensic techniques used on questioned documents
0
2
4
6
8
10
12
14
16
never heard of it
need to brush up
neutral
fairly confident
very confident


FIS 30500 Spring 2009
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
0 1 2 3 4 5 6 7 8 9
never heard of it
need to brush up
neutral
fairly confident
very confident


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
never heard of it
need to brush up
neutral
fairly confident
very confident
0
1
2
3
4
5
6
7
8

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

## 2008-2009 Progress Report
## for the Six-Stage Assessment Strategy

**Submitted by Brian A. Woodahl, Ph.D.**
**(Edited by Joseph L. Thompson)**
**June 2009**

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### 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?

### 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.

In 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

| Course | Title | Hrs | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 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, in 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 |

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

## 2008-2009 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 2009**

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### 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.

Please note that the Psychology Department took several steps back this year in order to bring itself in line with the University's comprehensive assessment strategy that required we base our assessment efforts on the accomplishment of the university's specific Principles of Undergraduate Learning (PULs) rather than on the unique student learning outcomes (SLOs) of the undergraduate Psychology Program, which we have been using as the basis for our assessment efforts for the past four years. This required a precise articulation of our SLOs with the PULs, which was performed by carefully matching each of our SLOs with at least one of the specific learning outcomes of each of the PULs. See Appendix L for a table that summarizes this articulation process.

## 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 14 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 the critical thinking skills of retention, comprehension, application, analysis, synthesis, and evaluation.

## 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 Fall 2005 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 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 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 is presented in Appendix C, and a discussion of these results appears in Appendix D.

The upcoming 2012 North Central Accreditation visit prompted Drew Appleby to assign his Fall 2008 PSY-B454 *Capstone Seminar in Psychology* students a collaborative research project to survey the psychology faculty to determine (1) the feasibility of using the following comprehensive, seven-step process in their classes to assess psychology majors' ability to accomplish the Psychology Department's SLOs and (2) their willingness to do so.

1. Identify a 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.
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.
3. Put these SLOs in your course syllabi and emphasize them on the first day of class to ensure that your students are fully aware of the specific types of knowledge and skills you want them to acquire in your 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.
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.
6. Provide Dr. Appleby with the summative feedback about how well your students perceive they have acquired the SLOs targeted in your 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).

Half of the full-time psychology faculty responded to this survey, and their responses indicated a willingness to use this strategy, with feasibility and willingness mean rating ranging from 4.81 to 3.09 on a 5-point scale on which 5 represented the strongest feasibility and willingness responses. Please see Appendix K for the full results of this survey.

In the spring semester of 2009, a university-wide committee created a comprehensive assessment strategy whose first stage is to require faculty to choose the three Principles of Undergraduate Learning (PULs) they intend their students to accomplish in each of the classes they teach and then to rank order these PULs in the following order:

1. This PUL has major emphasis in my course.
2. This PUL has moderate emphasis in my course.
3. This PUL has some emphasis in my course.

This process was facilitated by the creation of the table that mapped the SLOs of the Psychology Department with the PULs of the University. See Appendix L for this table.

Psychology faculty complied with this request and a table of the results is contained in Appendix M, which also includes the component of the University's new RISE initiative that courses target. The data in this table will be used to determine how often psychology majors are provided with curricular opportunities to accomplish the PULs.

The second stage of the University's comprehensive assessment strategy (i.e., to assess the extent to which students are accomplishing the PULs the faculty have targeted in their classes) will be initiated in a workshop given during a Psychology Department retreat on August 19, 2009, by two representatives from the IUPUI Teaching and Learning Center.

## Stage 3 → Identify or Create Methods to Measure These SLOs

**Method 1**

The Psychology Department offers the following three types of capstone experiences.

- An empirical research project, 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 (b) 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 on-the-job practicum, which allows students to apply what they have learned about a particular sub-discipline 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 scholarly seminar, 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.

## 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 ensure 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 retain 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 understand 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 analyze (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 apply 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 evaluate 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 create (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. The Department has not yet addressed these results, 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 both the Department's ability to provide opportunities for you to develop these sets of knowledge and skills and 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

**Instructions to the Capstone Instructor:**

**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 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. | | | | |

Appendix G

# 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 Not Accomplish this SLO," a 1 to "Accomplished this SLO at an Acceptable Level," and a 3 to "Accomplished this SLO at an Exemplary Level." These mean ratings appear in descending order of magnitude below.

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

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

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 exemplary 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 acceptable 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 unable to demonstrate to their faculty that they have accomplished the following SLO in an adequate manner.

- Speaking skills

Appendix H

# 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<br>Level 1<br>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<br>Level 1<br>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<br>Level 1<br>B481 | Quizzes over reading material. | Average quiz grades: all but 2 of 12 students had an average score of C- or higher.<br><br>The vast majority of students accomplished the SLO of knowledge base of psychology. | | |
| Ethics<br>Level 1<br>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.<br><br>Students of this class have accomplished the ethics SLO at a very basic level. | | |

| | | | | |
|---|---|---|---|---|
| Content<br>Level 3<br>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-.<br><br>The vast majority of students in this class accomplished this SLO. | | |
| Collaboration<br>Level 3<br>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.<br><br>All students accomplished the collaboration SLO. | | |
| Career Planning<br>Level 3<br>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.<br><br>All students accomplished this SLO. | | |
| Oral Communication<br>Level 2.5 (applying and creating)<br>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.<br><br>The vast majority of students accomplished this SLO. | | |
| Career Planning<br>Level 3<br>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.<br><br>The vast majority of students accomplished this SLO. | | |

| | | | | |
|---|---|---|---|---|
| Research<br>Level 3<br>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.<br><br>The vast majority of students accomplished this SLO. | | |
| Ethics<br>Level 1<br>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.<br><br>The vast majority of this class understood the ethics in psychology at the basic level of learning. | | |
| Research<br>Level 1.5<br>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:<br>Testing Procedures: 14 passed with a C or higher<br>Constructing Tests: 11 passed with a C or higher<br>Reliability: 17 passed with a C or higher<br>Validity: 9 passed with a C or higher<br><br>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<br>Level 1<br>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.<br><br>The majority of students accomplished this SLO. | | |

| | | | | |
|---|---|---|---|---|
| Diversity<br>Ethics<br>Level 1<br>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:<br>Special Populations: 12 students passed with a C or higher<br>Technical: 16 passed with a C or higher.<br><br>The majority of students accomplished these SLOs. | | |
| Critical Thinking<br>Level 2<br>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<br>Level 1.5<br>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<br>Level 2<br>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-.<br><br>All students accomplished SLOs to satisfactory of professor. | | |
| Application ,<br>Writing Skills,<br>Speaking Skills<br>Level 3<br>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<br>Level 1<br>B380 | Students are to take 5 exams covering textbook material. | In Spring 2007, 45 out of 48 students received grades of C or better.<br><br>The vast majority of these students have successfully accomplished this SLO. | | |
| Content<br>Level 1<br>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.<br><br>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.

Appendix K

*How feasible in your classes are the seven-stages of the following comprehensive assessment strategy (5=feasible, 1=not feasible) and how willing (5=willing, 1=not willing) are you to implement these stages if they are feasible?*

| 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. 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. 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 ensure 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? | 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. | | | |
| 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 |

# Psychology Courses and the PULs and RISE Components They Target

| Course Type | Course Number and Title | PUL #1 | PUL #2 | PUL #3 | RISE |
|---|---|---|---|---|---|
| Introductory | B103 Orientation to a Major in Psych | 3 | 1A | 5 | |
| | B104 Psych as a Social Science | 3 | 2 | 5 | |
| | B105 Psych as a Biological Science | 4 | 1A | 2 | |
| Methods | B305 Statistics | 1B | 2 | 3 | |
| | B311 Intro Lab in Psych | 2 | 1B | 3 | |
| Core | B307 Tests & Measurement | 6 | 4 | 1B | |
| | B310 Lifespan Development | 4 | 3 | 2 | |
| | B320 Behavioral Neuroscience | 4 | 1A | 5 | |
| | B334 Perception | 4 | 1C | 1A | |
| | B340 Cognition | 4 | 2 | 3 | |
| | B344 Learning | 4 | 1A | 1B | |
| | B356 Motivation | 4 | 3 | 1A | |
| | B358 Intro to I/O Psych | 2 | 3 | 5 | |
| | B370 Social Psych | 5 | 3 | 2 | |
| | B380 Abnormal Psych | 4 | 2 | 6 | |
| | B398 Brain Mechanisms of Behavior | 2 | 3 | 1A | |
| | B424 Theories of Personality | 3 | 2 | 4 | |
| Specialization | B322 Intro to Clinical Psych | 2 | 3 | 5 | |
| | B360 Childhood & Adolescence | 5 | 4 | 6 | |
| | B365 Stress & Health | 5 | 4 | 6 | |
| | B366 Cons/Apps in Organizational Psych | 2 | 3 | 5 | |
| | B368 Cons/Apps in Personnel Psych | 2 | 1C | 3 | |
| | B375 Psych & Law | 2 | 1A | 5 | |
| | B376 Psych of Women | 3 | 4 | 1C | |
| | B386 Intro to Counseling | 1A | 5 | 6 | |
| | B394 Drugs & Behavior | 3 | 2 | 5 | |
| | B396 Alcohol, Alcoholism, & Drug Abuse | 4 | 2 | 3 | |
| | B420 Humanistic Psych | 3 | 4 | 6 | |
| | B421 Internship in Psych | 4 | 3 | 1A | E |
| | B422 Professional Practice | 3 | 2 | 6 | E |
| | B492 Readings and Research in Psych | 3 | 1C | 1B | R |
| Capstone | B433 Capstone Lab in Applied Psych | 3 | 5 | 1C | R |
| | B454 Capstone Seminar in Psych | 3 | 1A | 4 | |
| | B462 Capstone Practicum in I/O Psych | 3 | 6 | 2 | E |
| | B471 Capstone Lab in Social Psych | 4 | 1A | 1C | R |
| | B482 Capstone Practicum in Clinical Psych | 3 | 5 | 4 | E |
| | B499 Capstone Honors Research | 3 | 1A | 1B | R |

**PULs → 1A = Language Skills 1B = Quantitative Skills 1C = Information Resources Skills**
**2 = Critical Thinking**
**3 = Integration and Application of Knowledge**
**4 = Intellectual Depth, Breadth, and Adaptiveness**
**5 = Understanding Society and Cultures**
**6 = Values and Ethics**

**PULs → #1 = Major Emphasis #2 = Moderate Emphasis #3 = Some Emphasis**

**RISE → R = Research I = International S = Service Learning E = Experiential**

Appendix M

# Articulating the Student Learning Outcomes of the IUPUI Department of Psychology's Undergraduate Program with IUPUI's Principles of Undergraduate Education

| Principles of Undergraduate Learning (PULs) | Specific Student Learning Outcomes (SLOs) Derived from the Definitions of the PULs | Comparable SLOs of the Psychology Undergraduate Program |
|---|---|---|
| **Core Communication and Quantitative Skills**<br>• **1A → Language and Visual Communication Skills** | Express ideas and facts to others effectively in a variety of formats, particularly written, oral, and visual formats | • Demonstrate effective writing skills<br>• Demonstrate effective speaking skills<br>• Utilize computers and other technologies for many purposes |
| **Core Communication and Quantitative Skills**<br>• **1B → Quantitative Skills** | 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 |
| **Core Communication and Quantitative Skills**<br>• **1C → Information Resources and Technology Skills** | Make effective use of information resources and technology | • Demonstrate information competence by identifying, locating, evaluating, and retrieving written and electronic information<br>• 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<br>• 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<br>• 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<br>• 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 | • Work effectively as a member of a group to accomplish a task |
| **Values and Ethics** | Understand ethical principles within diverse cultural, social, environmental, and personal settings | • Understand and abide by the ethics of psychology |

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