John Jay College of Criminal Justice
Department of Sciences

Forensic Science Major (FOS)

Assessment Plan
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I. Mission Statement:

This mission of the Department of Sciences is to provide all John Jay College students with a meaningful understanding of basic scientific principles, scientific methodologies, and to develop their quantitative and analytical reasoning skills. Furthermore, the Department seeks to:

- Present all forensic science students with a sound multidisciplinary foundation in science, to equip these students with the skills needed to pursue advanced educational opportunities, and to prepare them to become scientific professionals;

- Offer forensic science graduate students the opportunity to develop their scientific research skills and to provide them with in depth knowledge of current and cutting edge analytical techniques used by the forensic science community;

- Endow those students enrolled in the forensic science track of the Criminal Justice Doctoral program with the comprehensive theoretical background and analytical skills necessary to conduct independent research toward advancing the discipline of forensic science.
II. Assessment Philosophy

The primary mission of Department of Forensic Sciences (FOS) is to facilitate student success. One way to measure student success is to conduct student learning assessment. The assessment of student learning outcomes is able to provide the fundamental data for promoting Major effectiveness and the improvement of Major programs and courses. Effective and valuable assessment is best attained when there is a clear definition of what the learning objectives/outcomes and the assessment cycle are. Going beyond assessment of simple acquisition of knowledge, FOS assesses students’ mastery of subject matter and their ability to apply knowledge in the areas of Reasoning (critical thinking and creativity), Practical skills, and Communication.

FOS assessment is a faculty-led assessment to ensure a direct focus on learning. The assessment of student learning outcomes is ultimately the assessment of Major’s capability to provide learning opportunities consistent with its mission. The data obtained from assessment is used exclusively to assess and improve teaching and learning, not for the evaluation of individual faculty members or students.
III. STUDENT LEARNING GOALS

B.S. Program in Forensic Science

Students will be able to

(Reasoning) Draw appropriate scientific conclusions from evidence and experimental data.

- Understand the role of creativity in problem solving
- Apply scientific principles in gathering and interpreting scientific data

(Knowledge) Acquire broad fundamental concepts, theories, and principles in physical and biological sciences.

- Use the primary scientific literature effectively in their own research
- Describe the scientific progress that has led to their research project

(Practical skills) Accrue hands-on laboratory and practical research skills, including emphasizing the role of quality assurance and objectivity in scientific data collection and how these relate to the system of professional ethics in science.

(Communication) Develop competence in oral and written forms of scientific communication.
IV. FIVE-YEAR OUTCOMES ASSESSMENT ACTIVITIES

The Forensic Science Major will be assessed according to the plan described below.

*Curriculum assessment activities*

**Fall 2009**
- Define the mission statement of Forensic Science Major

**Spring 2010**
- Define the programmatic learning goals and outcomes
- Define the course learning goals and characterize those goals to map to the programmatic learning goals

**Fall 2010**
- Refine the course learning goals and characterize those goals to map to the programmatic learning goals based on Outcomes Assessment Director’s comments
- Compile the examples of assessment tools/methods
- Build the programmatic rubrics

**Spring 2011**
- Identify the course assessment tools/methods
- Develop course assessment rubric for each assessment tool/method for each course
- Implement FOS 402 Capstone Course Assessment (final assessment for students finishing 400 hours lab work) and collect data

**Fall 2011**
- Analyze FOS 402 Spring 2011 assessment data and summarize a report
- Implement FOS 401 Capstone Course Assessment (final assessment for students finishing 400 hours internship) and collect data
- Implement FOS 402 Capstone Course Assessment (mid-point assessment for students finishing 100 and 200 hours lab work) and collect data
- Refine/modify course curriculum maps and syllabi
- Develop course assessment rubric for 400-level courses

Revised November 28, 2011
Spring 2012

- Analyze FOS 402 (mid-point assessment) and FOS 401 Fall 2011 Assessment data and summarize a report
- Implement FOS 402 Capstone Course Assessment (final assessment for students finishing 400 hours lab work) with revised rubrics and collect data
- Implement FOS 401 Capstone Course Assessment (final assessment for students finishing 400 hours internship) with revised rubrics and collect data
- Implement assessment for 400-level courses

Fall 2012

- Analyze 400-level course assessment data collected at Spring 2012 and summarize reports on the data collected Spring 2012
- Analyze FOS 402 assessment data collected at Spring 2012 and summarize reports on the data collected Spring 2012
- Analyze FOS 401 assessment data collected at Spring 2012 and summarize reports on the data collected Spring 2012
- Implement FOS 402 Capstone Course Assessment (mid-point assessment for students finishing 100 and 200 hours lab work) and collect data
- Propose the recommendations based on data
- Provide the plan of course revision

Spring 2013

- Analyze FOS 402 (mid-point assessment) and FOS 401 Fall 2011 Assessment data and summarize a report
- Summarize the final assessment report
- Provide the curriculum revision plan

Programmatic Assessment Activities

- Student final grade will be used to assess the course.
- Institutional surveys for student experience, alumni, and employers will be used to assess the major.
- Retention data will be evaluated to assess the major.
VI. Curriculum Maps for Capstone Courses

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<tr>
<th>Courses</th>
<th>Programmatic Learning Goals &amp; Objectives</th>
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<tbody>
<tr>
<td></td>
<td>Reasoning</td>
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<tr>
<td>FOS 401</td>
<td>Acquire the knowledge of practical applications by shadowing experienced laboratory scientists and develop an understanding of evidence analysis protocols.</td>
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<td>Assess each item of evidence by employing the scientific method.</td>
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<td></td>
<td>Assess data collected from experiments and analytical tests to formulate conclusions within the established standards of the laboratory.</td>
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Undergraduate Internship Course Learning Goals

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<th>Courses</th>
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<td>Reasoning</td>
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<tr>
<td>FOS 402</td>
<td>• Engages in problem-solving exercises relevant to a specific research study.</td>
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<td>• Describes the process of scientific exploration in their field of study.</td>
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<td>• Can accurately convey the scientific problem they are investigating.</td>
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<td></td>
<td>• Can understand a research plan developed for a specific scientific question.</td>
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<tr>
<td>Courses</td>
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| **BIO412**  
Molecular Biology I  
Course Learning Goals | **Reasoning**  
- Determine appropriate conclusions based on scientific evidence  
- Critically evaluate the molecular basis of various biological processes  
- Recognize the significance of the scientific process in understanding mol bio based problems.  
- Apply critical thinking skills in solving problems of a scientific nature  
- Critique scientific findings as related to molecular biological analysis  

**Knowledge**  
- Interpret molecular research findings as published in the popular media and primary scientific literature  
- Describe basic concepts of Mol Bio, including:  
  - Macro-molecular structure and function  
  - DNA replication  
  - gene regulation  
  - biotechnology  
- Explain the essential role of molecular biology in forensic science  

**Practical Skills**  
- Apply their basic laboratory skills and learn advanced experimental techniques including:  
  - recombinant DNA analysis  
  - microbial cell culture  
  - transformation  
  - DNA sequencing  
- Consider the importance of Quality Assurance/Quality Control in laboratory-based research  
- Apply experimental design and analytic skills to molecular biological problems  
- Describe how science is used in the criminal justice system  

**Communication**  
- Use sound scientific reporting techniques
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<td>Reasoning</td>
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<tr>
<td>BIO413</td>
<td>• Critically evaluate the molecular basis of various biological processes with an emphasis on forensic science, particularly DNA typing. • Recognize the complexities and intricacies of laboratory investigations • Recognize the significance of the scientific process in understanding mol bio based problems • Describe the scientific basis of DNA typing and interpretation • Apply problem solving techniques particularly related to forensic DNA typing, interpretation of profiles, and reporting statistical significance of results</td>
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<td>Learn to develop controlled laboratory procedures in the analysis of physical evidence such as fingerprints, glass, fibers, and minerals.</td>
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<td></td>
<td>Understand how the nature of the evidence and its context as well as the analytical results must be considered in formulating appropriate scientific conclusions.</td>
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<td>Acquire problem-solving skills by applying their foundation knowledge to situations of forensic complexity.</td>
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<td></td>
<td>Learn to critically assess their laboratory results in order to reach appropriate scientific conclusions when working with prepared “evidence”.</td>
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<th>Courses</th>
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| FOS 416         | • Learn to develop controlled laboratory procedures in the analysis of physical evidence such as blood, other physiological fluids, hair, and wood.  
• Understand how the nature of the evidence and its context and analytical results must be considered in formulating appropriate scientific conclusions.  
• Acquire problem-solving skills by applying their foundation knowledge to situations of forensic complexity. |
|                 | • Learn about the material nature of physical evidence such as blood, other physiological fluids, human hair, and wood.  
• Acquire knowledge about the chemistry and physical properties of several types of biological evidence and the scope and limitations of the methods used to analyze them.  
• Learn to appreciate the importance of accreditation and certification in forensic science, and ethical issues in scientific testimony. |
|                 | • Develop mastery in techniques such as: identification of physiological fluid stains such as blood and semen; human hair comparisons; polarized light microscopical analysis of mineral samples; scientific photography.  
• Develop skill in the handling of trace evidence by working with minute quantities of materials.  
• Learn to treat laboratory samples as actual evidence  
• Learn to analyze samples alongside controls and to properly document the experimental process from data acquisition and interpretation to the reporting of results and conclusions.  
• Document laboratory work in a manner which ensures both legal and scientific integrity in the handling of evidence.  
• Learn to prepare professional quality laboratory reports. |

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| Courses | TOX 415  
Forensic Pharmacology  
Course Learning Goals |
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<td><strong>Programmatic Learning Goals &amp; Objectives</strong></td>
<td><strong>Reasoning</strong></td>
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|  | • Categorize how various drug classes may predictably alter human physiological functions and predict the outcomes of exposures to such agents  
• Interpret scientific data obtained from multiple sources and compile this information to assess how various biological factors may alter drug actions  
• Identify the proper methods for collection of toxicological data from different biological sources  
• Accurately appraise pharmacological data and toxicological data for clinical and legal purposes  
• Explain and justify their scientific opinions  
• Apply this knowledge to present scientific opinions in court of law | • Identify how key factors involved in how specific classes of drug impact in human health and behavior, performance  
• Collect scientific information and utilize various media and scientific literature to identify how drugs produce these effects  
• Present information related to basic aspects of human physiology and biochemistry, and the relation to pharmacology  
• Describe the roles of the biological factors in individual and selective toxicities | • Employ analytical skills involved in basic techniques used for qualitative and quantitative analysis of drugs and poisons in different matrixes  
• Interpret scientific data in unbiased and objective manners and recognize the what is incomplete, inaccurate or biased presentations of results and data  
• Critique opinions obtained from other sources for accuracy and objectivities  
• Demonstrate the conduct and behavior both in and out of laboratory consisted with relevant published professionals codes of behaviors and ethics | • Participate in discussions as well as written expression of thoughts and opinions, such as case studies, written exams and assignments  
• properly articulate and support scientific positions for both public presentation as well as for legal settings  
• Demonstrate written competence by means of assignments and examinations |
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<td>Reasoning</td>
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|         | • critique technical data and opinions from published articles and legal proceeding  
         | • Describe the process of specimen selections as related to both clinical and forensic toxicology  
         | • Assess the potential usefulness of information obtainable  
         | • Differentiate various specimen types with regard to the information that can be obtained and limitations of different biological specimens analyzed.  
         | • Formulate and document accurate opinions and data developed from analytical measurement of biological samples that are generated by the student or other sources  
         | • Interpret toxicological data in relation to the type and condition of specimens  
         | • Utilize information gained both in classroom and from toxicological/pharmacological literatures to evaluate and interpret different types of toxicological and pharmacological data  
         | • Apply various advance analytical techniques utilized for qualitative and quantitative detection for drug and poisons in biological (post modem and clinical) specimens.  
         | • Interpret scientific data in unbiased and objective manners and recognize the what is incomplete, inaccurate or biased presentations of results and data  
         | • Critique opinions obtained from other sources for accuracy and objectivities  
         | • Demonstrate the conduct and behavior both in and out of laboratory consisted with relevant published professionals codes of behaviors and ethics  
         | • Understand the key elements involved in chain of custody and specimens and maintaining documentations of all laboratory procedures  
         | • Participate in discussions as well as written expression of thoughts and opinions, such as case studies, written exams and assignments  
         | • Properly articulate and support scientific positions for both public presentation as well as for legal settings  
         | • Demonstrate written competence by means of assignments and examinations  

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Appendix A

Programmatic Rubric

Rubric for creating and scoring materials in the undergraduate program in forensic science.

The rubric on the pages that follow was developed for the Department of Sciences to evaluate student learning and was developed after consultation and review of published and publicly available science education materials. This rubric is meant to accompany the programmatic learning goals, and it is meant as a guide to developing individual course rubrics and assessment materials. Using this document as a platform upon which individual course assessments can be based, programmatic learning outcomes can be scaffolded across the degree. This document is not meant as an absolute standard for all courses, but rather as a summary of the overall objectives and targets for undergraduate education in the Department of Sciences.
<table>
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<tr>
<th>Level</th>
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<th>Knowledge</th>
<th>Practical skills</th>
<th>Communication</th>
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<tr>
<td>4th</td>
<td>- Identifies scientific data, calls out differences between data and evidence, and identifies assumptions/subjective influences on data interpretation. - Understands and demonstrates scientific research as a creative endeavor. - Compares and contrasts strengths/weaknesses in research design. - Can justify conclusions.</td>
<td>- Explains scientific ideas and concepts comprehensively. - Applies scientific knowledge to solve problems in new or atypical scenarios not previously discussed in class. - Provides scientifically supported rationales to analyze and evaluate information. - Draws knowledge from diverse areas, not necessarily presented in class.</td>
<td>- Proficient in mastering new or previously unencountered situations in the laboratory and the field. - Demonstrates superior technical skills in laboratory and field situations and able to troubleshoot problems. - Implements controls and standards effectively to assure quality of data collected an objectivity of analysis.</td>
<td>- Reads and coherently interprets scientific manuscripts in all fields of knowledge. - Can critique scientific literature. - Can defend conclusions. - Summarizes own scientific work in both written and oral forms comprehensively.</td>
</tr>
<tr>
<td>3rd</td>
<td>- Understands both the process of scientific investigation and the outcomes. - Identifies scientific variables, and techniques for data analysis. - Growing ability to contrast differences in research design and appropriate application to new situations. - Correct interpretation of results.</td>
<td>- Can apply scientific knowledge to solve problems in complex scenarios. - Evaluates scientific information and provides a rationale that demonstrates understanding of the information.</td>
<td>- Applies academic knowledge to practical situations in the laboratory and the field. - Demonstrates proficient technical skills in laboratory and field situations. - Draws knowledge from various areas to address open-ended problems of a scientific nature.</td>
<td>- Proficiency in documenting data, writing lab reports, developing appropriate conclusions. - Documents methods and results correctly. - Able to present scientific results</td>
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</table>
| 2nd | ● Attempts to explain the purpose of scientific scenarios and to predict possible outcomes.  
     ● Understands multiple steps of a scientific investigation.  
     ● Attempts to contrast differences in research design (may not be accurate).  
     ● Recognizes differences between data and evidence. |
|-----|--------------------------------------------------------------------------------------------------|
|     | ● Can apply scientific approach to solving simple problems.  
     ● Attempts to analyze scientific information by correlating basic knowledge learned in courses (though no explanation may be provided). |
|     | ● Attempts to apply academic knowledge to practical situations in the laboratory.  
     ● Demonstrates adequate technical skills in laboratory situations.  
     ● Capable of following laboratory procedures that incorporate appropriate controls.  
     ● Proficient understanding of, and practice in, laboratory safety protocol and procedures. |
|     | ● Documents data collected.  
     ● Uses advanced scientific terms and principles.  
     ● Understands basic organization of scientific reports. |

| 1st | ● Basic understanding of scientific information as being research and data driven.  
     ● Ability to use logic in problem solving activities and exercises; but may not fully understand scientific process. |
|-----|--------------------------------------------------------------------------------------------------|
|     | ● Defines scientific terms, facts, concepts, principles, and theories that are learned in the class.  
     ● Able to define the methods used in scientific research. |
|     | ● Understands the role that experimental controls play in laboratory science.  
     ● Basic ability to apply knowledge to practical situations in the laboratory.  
     ● Skill in basic laboratory operations and procedures.  
     ● Understands and able to recite laboratory safety procedures. |
|     | ● Able to research scientific terms and present them in their own words in written or oral form.  
     ● Basic understanding of differences between scientific and non-scientific communication. |

Version date: Feb 7, 2011. Authors: AC, SYC, NL, LR, LK

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