Department of Biology - Assessment Plan Working Draft, May 2009

Student Learning Outcome	Course(s)	Outcome Measure(s)	Comparative External Measures	When Measured	Who Collects and Analyzes	How data are used for annual reporting and improvement.
1. Students will be able to describe core concepts of biology in the areas of organismal biology, cell biology, genetics, ecology, and evolution.	Required core courses: BIO 105, BIO 106, BIO 205, BIO 225 Concepts will be reinforced in upper-division electives.	Course exams Concept-based pre- and post-exam	Exit exam (ETS national standardized exam)	Course exams: Throughout courses and at the end of core courses; pre-exam in freshman year; post-exam and exit exam taken 1-2 semesters before degree completion	Course instructors; exit exam scores and pre- and post-exam scores collected and analyzed by designated faculty member	Assessment data will be used to evaluate how well the curriculum teaches students core concepts. Trends in terms of deficiencies will be used to plan course or curriculum improvements.
2. Students will be able to perform basic laboratory and field experimental methods specific for the areas of organismal biology, cell biology, genetics, ecology, and evolution.	Required core courses: BIO 105, BIO 106, BIO 205, BIO 225 Experimental methods will be reinforced in upper-division electives and independent research projects	Course lab exams Lab practicals Digital portfolios	Identified standards from relevant professional biological societies	Throughout courses and applied learning opportunities	Course instructors and potentially a committee to evaluate portfolios	The data will be used to summarize the extent to which the current curriculum teaches students basic laboratory and field methods. Gaps in the proficiency of students will be addressed in individual courses.

3. Students will be able to understand how scientific knowledge is achieved. This will be guided by AAAS process skills: observing, classifying, formulating hypotheses, predicting, inferring, experimenting, interpreting data and drawing conclusions, and communicating.	Required core courses: BIO 105, BIO 106, BIO 205, BIO 225 Concepts will be reinforced in upper-division electives.	AAAS process skills will be measured by active learning, engagement, and feedback. This can be done both within core courses and among core and upper-level courses. Skills can also be quantitative, oral and written communication, & technologically based.	Exit exam (ETS national standardized exam). This test can measure both content and skill based learning.	Course lecture exams, course lab exams, instructor-guided experiments, independent student experiments. These will be both field and lab-based experiments & procedures. Also important are written, oral, and quantitative measures.	Collaborative effort between lab and lecture instructors within a course. Also information will be shared among courses. ETS skills assessment section will be analyzed for student competencies.	Process skills will be the guiding factor for conducting science with industry-based standards. Cross-talk and pre-and post-tests can be used within a class to examine within-course growth, and repeated-measures tests can be given among courses to assess retention of skills and content.
4. PTA students will be ready to work at entry level upon graduation.	PTA 100, 110, 120, 130, 140, 160, 185, 200, 240, 255, 260, 280, 285, 290 and 295, as well as BIO 101, 250, PSY 101.	Clinical Performance Instrument (CPI	Licensure exam results Employer and graduate surveys	CPI measured as final assessment of clinical performance in PTA 290. FSBPT reports are purchased when most or all of a graduating class has taken the licensure exam, generally in January. Employer and graduate	ACCE collects and analyzes data from CPI, and reports information to Program director. Program director analyzes and monitors Federation reports. Program director collects, analyzes and monitors data from surveys.	**CPI**- If any of the twenty CPI indicators falls below an 85% average/year, this indicator is monitored. If the indicator remains below 85% for three consecutive years, curriculum changes are instituted. **Licensure exam** – Reports from the Federation of State Boards of Physical Therapy (FSBPT) provide a comparison of Western's PTA program to all other PTA

				surveys at 6 and 18 months post graduation.		programs. Content areas that are lower than national norms are monitored. If this trend continues for three consecutive years, curriculum changes are instituted. **Surveys**- Surveys are studied for evidence of preparedness of graduates to work at entry level from the employer's and the graduate's perspective.

APPENDIX I

Student learning outcome 1: Students will be able to describe core concepts of biology in the areas of organismal biology, cell biology, genetics, ecology, and evolution.

Specific concepts covered in core courses include:

- BIO 105
  - Describe organismal diversity.
  - Describe the mechanisms and processes that lead to evolution.
  - Describe the basis attributes of life, including: cellular organization, reproduction, energy use, and homeostasis.
  - Describe the scientific process (method).

- BIO 106: Upon successful completion of this course the student should be able to:
  - Describe basic biochemical molecules.
  - Identify cellular structures and know their functions.
  - Describe the basic principles of cellular metabolism.
  - Identify and explain the regulation, form and processes of the cell cycle and cell division.

    - Identify the basic principles of molecular genetics
    - Explain the basic principles of cellular physiology.
    - Apply the Scientific Method in a laboratory setting.
    - Correctly use scientific equipment.
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- BIO 205
    - Explain Mendelian and Non-Mendelian patterns of inheritance
    - Describe the molecular basis of gene expression and regulation (also covered in BIO 106).
    - Describe the process of evolution in terms of population genetics

- BIO 225
    - Describe the pattern and process of the dimensions of space and time across organismal hierarchy, from molecular to global systems.
    - Describe the mechanisms and processes that lead to evolution.

- The department will discuss the development of a curriculum proposal for a senior capstone or seminar course. This could provide a venue to administer the exit exam/post-exam in a way that holds students accountable for doing well on the exam (for example, the grade could count in their capstone course grade, and/or they may have to achieve a minimum score in order to pass the course).
- We plan to generate a table for the core courses plus upper-division electives that shows where the individual concepts listed above are introduced and/or reinforced.

Student learning outcome 2: Students will be able to perform basic laboratory and field experimental methods specific for the areas of organismal biology, cell biology, genetics, ecology, and evolution.

- BASIC MATHMATICAL SKILLS: Exponents and Scientific notation, Logarithms, Units of Measurement, Use of basic equations
- SOLVING PROPORTIONAL RELATIONSHIPS: Ratios and Proportions, Percents, Density, Unit Conversions, Concentration and Dilution
- SOLVING RELATIONSHIP GRAPHING PROBLEMS: Graphing Linear Relationship, Graphing Exponential Relationships
- COLLECTING AND REPORTING DATA: Describing Data, Collecting Meaningful Data; Avoiding Errors, Experimental terminology
- IDENTIFICATION AND USE OF EQUIPMENT IN OBTAINING MEASUREMENTS:1. Properly identify and use laboratory equipment in the measurement of weight , volume, temperature, pH and conductivity
- IDENTIFICATION AND USE OF SPECIFIC LABORATORY EQUIPMENT (NOT ALREADY ADRRESSED ABOVE): i.e. Microscope, etc.
- USE OF GENERAL AND SPECIALIZED COMPUTER SOFTWARE: 1. Microsoft Office: Word, PowerPoint, Excel, 2. Statistical analysis: SPSS, 3. Reference management and documentation: EndNote, Bioinformatics

- THE PRESENTATION OF LABORATORY RESULTS: 1. Design and present a poster, 2. Give a oral presentation using PowerPoint, 3. Write a formal laboratory report or journal-style article

Student learning outcome 3: Students will be able to understand and integrate content and utilize biology-based skills. These will be tested according to both the ETS exam and the AAAS standards. Specifically they are outlined as follows:

- Understand the major **content** and concepts in biology. This would be according to how the following standard organizational is important to an overall understanding of the patterns and processes of biology. This organizational hierarchy of emergent properties is the following:
  - Atoms, molecules, organelles, cells, tissues, organs, organ systems, individual organisms, populations, ecosystems, biomes, biosphere.
- Understanding how scientific knowledge is achieved through **process** skills. This would be following the AAAS process skills, which are used in all scientific experiments. These processes skills are the following:
  - Observing, classifying, formulating hypotheses, predicting, inferring, experimenting, interpreting data and drawing conclusions, and communicating.
- Integrative actions that will be important in assessment will be critical thinking, quantitative interpretation and analysis, experimental design, and oral and written communication.