Program Assessment Report (PAR)

Integrated Science Studies (ISS) Baccalaureate Degree

REPORT PREPARED by: Jacquemin, Stephen James

ACADEMIC YEAR COVERED BY THIS REPORT: 2020-2021

I. PROGRAM LEARNING OUTCOMES

Students will demonstrate foundational knowledge and competency in core science disciplines (BIO, EES, CHEM, PHY, STAT). Students will demonstrate proficiency in laboratory and/or field skills. Students will demonstrate effective scientific communication skills.

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

Objective 1: Composite calculations from cumulative assessments in foundational courses from EES, CHM, PHY, and BIO were used to create a single number that gages learning of foundational lecture material from the first-year science courses in these specific disciplines. OBJECTIVE 1: Foundational Skills Rubric Name Percent Mastery of BIO Percent Mastery of CHEM Percent Mastery of EES Percent Mastery of PHY/MTH/STAT Overall Class Average Moving forward, this style of assessment will be dropped in favor of a single standardized short answer/essay style exam covering material from these foundational courses which will be administered to the capstone students in the senior seminar. The construction of this new exam is an iterative process and is not yet complete but a few sample questions for this new assessment tool are as follows (questions to be graded on a scale of 0 to 10 arranged by discipline with new rubric to follow): Objective 2: Composite calculations from cumulative lab and/or field book assessments from foundational courses in EES, CHM, PHY, and BIO were used to create a single number that gages lab skills across the disciplines. This single number is a composite of all available lab activities. See individual courses for specific course objectives and lab outcomes. In this summary is a single numeric which measures the degree to which the following overarching objectives have been met: OBJECTIVE 2: Lab and Field Skills Overarching Education Goals and Rubric To what extent did labs help, foster, facilitate, or otherwise – (overall scale of 0 to 100) Introduce

students to scientific methods and experimental design Teach students how to use scientific equipment and perform experiments safely Help students understand scientific concepts and theories Develop students' critical thinking and problem-solving skills Encourage students to ask scientific questions and formulate hypotheses Help students learn how to collect, analyze, and interpret data Teach students how to communicate scientific ideas and results through oral and written reports Help students learn how to work effectively in a team Expose students to real-world applications of scientific concepts Help students develop technical skills and expertise in a particular scientific field Foster creativity and curiosity about the natural world Encourage students to think about the ethical and societal implications of scientific research Help students learn how to identify and evaluate sources of scientific information Teach students how to design and conduct their own independent research projects Prepare students for careers in science, technology, engineering, and mathematics (STEM). Objective 3: Research papers and/or presentations were collected and analyzed from the senior capstone class (SM 4000) using defined rubrics. Rubric follows: OBJECTIVE 3: Communication Skills Rubric Name Scientific Content (10 pts) Interpretation of Content (10 Points) Readable for a Wide Audience (10 Points) Organization (10 Points) Overall Writing Quality (10 Points) Class Average

B. Scoring of Student Work

Scoring of student work was done using in house rubrics and other methods indicated in procedures used for assessment (see above section for rubrics). The 2020-21 program assessment includes all students registered for the capstone class for the BS in ISS during this time period. This assessment includes a total of 8 students. Note however that a total of 27 students were registered for the ISS program during this time. The objective assessed for this year was Objective 3: Communication in the Sciences.

C. Indirect Assessment

The following Likert style survey is comprised of 10 questions, with each on a sliding scale from agree completely to do not agree at all (a numeral of 5 corresponds to agree completely). The survey is administered via email to students that have been enrolled in the program at one time or another. Note that not all students are/were/will able to be reached. As time moves forward, presentation of results will expand with a rolling composite average compared to the current assessment year. Survey Questions Survey Results Topic and Extent of Perceived Mastery Average Score (2017-2024; N=11) 2020-2021 Core Concepts in Biology 5.00 5 Core Concepts in Earth Environmental 4.82 4 Core Concepts in Chemistry 4.64 5 Core Concepts in Physics 3.91 4 Core Concepts in Math and Statistics 4.64 4.5 Scientific Method 4.91 5 Communication Skills 5.00 5 Problem Solving and Reasoning Skills 5.00 5 Ethical Implications of Science 4.91 5 Feeling of Preparation 5.00 5

III. ASSESSMENT RESULTS/INFORMATION:

Assessment Metric Summary and Analysis in Relation to Learning Outcome OBJECTIVE 1: Foundational Knowledge Not assessed during this year. OBJECTIVE 2: Lab/Field Skills Not assessed during this year. OBJECTIVE 3: Communication of Science Metric assessed using student data from 2020-21. Included 8 students with a single capstone term paper. Average across all rubric metrics was 78.9%. Lowest scores were in Overall Writing Quality suggesting that additional improvements to writing editing is warranted.

On a larger scale, this program has realized a total of 20 graduates from 2017 to 2021. See table below. It is worth noting that while this is not a huge number of graduates compared to a large university program that graduates hundreds ever year that we are a small enrollment branch campus and that this program is the only opportunity for a Bachelors of Science Degree in this or other surrounding counties in Ohio. Moving forward, enrollment could grow in this program provided expanded attention to recruitment. In addition, enrollment could grow in this program if it was opened/promoted to Dayton Campus students as it is a multidisciplinary science degree that meets the needs of communities. BS Integrated Science Graduates Huelsman Stephen 2017 Mason Chad 2017 Smith Austin 2017 Gnau Nicholas 2018 Mazzone Nichole 2018 McClure Nicole 2018 Teeters Brian 2018 Crites Aaron 2019 Kanorr Shelby 2019 Mason Shawn 2019 Poore Phillip 2019 Kinney Brittany 2020 Rohrer Emma 2020 Axe Bradley 2021 Bornhorst Adam 2021 Cobb Chasalin 2021 Homan Benjamin 2021 Shimp Bethany 2021 Strang Benjamin 2021 Wendel Cody 2021

[Analysis]

IV. ACTIONS TO IMPROVE STUDENT LEARNING

There are many steps that can be taken to improve or maintain the excellent student learning in the ISS Degree Program. Some potential strategies to continue on with or begin include: Continuing to provide students with a clear and well-defined curriculum that outlines the goals and objectives of the program, along with specific knowledge and skills. Ensuring that students continue to have access to high-quality instructional materials, such as textbooks, lectures, and online resources, that are relevant to the sciences. Providing students with additional opportunities beyond the few experiences that currently exist to engage in hands-on learning activities and experiments that allow them to apply the concepts and principles they are learning in the classroom outside of the classroom through internships, jobs, volunteer opportunities, etc. Continuing to encourage students to develop critical thinking and problem-solving skills, which are essential for success in the sciences. Providing students with more opportunities to interact with practicing earth and biological, agricultural, and healthcare professionals and/or other

experts in the field, so that they can learn from their experiences and insights. Expanding students access to state-of-the-art technology and equipment, such as advanced laboratory equipment and computer simulations, to enhance their learning experiences.

V. SUPPORTING DOCUMENTS

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.