Neuroscience (NSC) Baccalaureate Degree
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ACADEMIC YEAR COVERED BY THIS REPORT: [AcademicYear]

I. PROGRAM LEARNING OUTCOMES

Graduates will be able to • 1) Predict physiological outcomes of alterations to neuronal membrane properties and ion concentrations. • 2) Predict how neurons will respond to various stimuli at the synaptic level. • 3) Demonstrate quantitative literacy by correctly using equations, accurately making calculations, and interpreting information provided in graphical form. • 4) Demonstrate the ability to solve novel problems. • 5) Demonstrate the ability to implement the scientific process – make observations, formulate a testable hypothesis, analyze the scientific literature to provide background information, develop a rationale, design an experiment, report results, and make conclusions. • 6) Demonstrate the ability to communicate effectively (oral & written).

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

Direct Assessment *For questions on the NEU 3100 midterm and final exams, most of the questions used to assess the program learning objectives are application style questions that are admittedly challenging and require a solid understanding of the concepts taught in class in order to then apply them to new situations. LO 1) Data were collected during both the midterm and final exams in NEU 3100 (How the Nervous System Works I) and compared between the two exams. Data were collected from all students in the course, and thus, are representative of all students who took the course. LO 2) Data were collected during the final exam in NEU 3100 (How the Nervous System Works I). Data were collected from all students in the course. LO 3) Data were collected from specific questions on the midterm and final exams in NEU 3100 (How the Nervous System Works I). Data were collected from all students in the course, and thus, are representative of all students who took the course. LO 4) Data were collected from specific questions on the final exam in NEU 3100 (How the Nervous System Works I). Data were collected from all students in the course, and thus,

are representative of all students who took the course. LO 5) Data were collected from oral presentations and a written document during a group project in NEU 1000 (Introduction to Neuroscience Research). Data were collected from all students in the course, and thus, are representative of all students who took the course. LO 6) Data were collected from oral presentations during a group project in NEU 1000 (Introduction to Neuroscience Research) and written and oral projects in NEU 3200 (How the Nervous System Works II). Data were collected from all students in these courses, and thus, are representative of all students who took the courses.

B. Scoring of Student Work

Scoring of Work LO 1) There are scoring rubrics used for all questions on the midterm and final exams in which students can earn varying amounts of points depending upon elements of the questions which are correct or not. Dr. Patrick Sonner (course instructor) did the scoring. LO 2) There is a scoring rubric used for this question on the final exam in which students can earn varying amounts of points depending upon elements of the questions which are correct or not. Dr. Patrick Sonner (course instructor) did the scoring. LO 3) There are scoring rubrics used for all questions on the midterm and final exams in which students can earn varying amounts of points depending upon elements of the questions which are correct or not. As well, there are some points given out for students showing their work and incorporating appropriate units. Dr. Patrick Sonner (course instructor) did the scoring. LO 4) There are scoring rubrics used for all questions on the midterm and final exams in which students can earn varying amounts of points depending upon elements of the questions which are correct or not. Dr. Patrick Sonner (course instructor) did the scoring. LO 5) There was a scoring rubric used to assess students' oral presentations and written documents and their ability to implement the scientific process. Dr. Kathy Engisch (course instructor) did the scoring. LO 6) There were scoring rubrics used to assess student's ability to communicate effectively, in both NEU 1000 and 3200. In NEU 1000, Dr. Kathy Engisch (course instructor) provided the scoring, while in NEU 3200, Dr. Patrick Sonner (course instructor) and Andrea Molina (GTA) both scored each oral presentation individually and then averaged the combined scores. For the written project in NEU 3200, Dr. Patrick Sonner scored half the class and Andrea Molina scored the other half of the class.

C. Indirect Assessment

Indirect Assessment There are two primary indirect assessments currently in use by our program. The first is the set of end of course assessments provided by Wright State University, across all courses in the program. The second is the Student Assessment of Learning Gains (SALG) survey given to all students at the end of NEU 3100. The SALG assessment is much more specific to the learning outcomes for NEU 3100. In the future, I would like to incorporate a SALG survey for NEU 3200, also. Finally, going forward, we would like to incorporate an end

of program assessment for the program learning outcomes. This could be given to students in both final senior capstone courses, NEU 4020 and NEU 4040. Thus, since all students must complete one of the capstones to finish their degree requirements, we would be able to have all students take the end of program assessment survey.

III. ASSESSMENT RESULTS/INFORMATION:

LO 1 – based upon 2 midterm exam questions and 2 final exam questions LO 2 – based upon 1 question on the final exam LO 3 – based upon 2 questions on the midterm and 3 questions on the final exam LO 4 – based upon 3 questions on the final exam LO 5 – based upon a written document analyzing a research article; also based upon group presentations of this analysis LO 6 – For NEU 1000 it is based upon a final project written document and an oral presentation. For NEU 3200 it is based upon an individually written document and an oral group presentation SALG – Indirect Assessment survey at the end of NEU 3100

LO 1 - The average of the 2 midterm questions decreased slightly from Fall 2018 to Fall 2019 (12% decline and 4% decline, respectively). The average of the 2 final questions were split, with one decreasing slightly and the other increasing slightly from Fall 2018 to Fall 2019 (3% decline and 3% increase, respectively). LO 2 - The averages of the question were rather low in Fall 2018 and Fall 2019, with a slight decrease in Fall 2019 (2% decline). LO 3 - As these are based upon the questions mentioned above for LO 1 and LO 2, the summary results are basically the same overall. There are some decreases year over year and some increases in the outcome. LO 4 - There were minor decreases and a minor increase in learning outcomes, year over year. LO 5 - Overall, there were some good gains on various elements of the written document (2-10% increase) from Fall 2018 to Fall 2019. There was a slight decrease in the associated oral discussions involving this assignment (4% decline). LO 6 - The NEU 1000 results indicate that overall, the data were quite consistent from Fall 2018 to Fall 2019 with some moderate gains and some slight declines. The NEU 3200 results indicate that overall, the data are consistent from Spring 2019 to Spring 2020. However, there is a slight decrease in the scores for the written document (5% decline) and for the oral presentation (5% decline). Regardless, the grades on this assignment were fairly strong. SALG - The overall results are encouraging as the average responses were all at or above 4.0 out of 5 (with a 4 indicating students self-identifying with good gains to a 5 indicating students self-identifying with great gains) across all topics in the course except for the final two topics in the course related to $Ca2+$ dependence of neurotransmitter release and excitatory postsynaptic receptors and potentials. These both had averages of 3.7 (between moderate gains to good gains).

LO 1 - Fall 2018 Midterm Q6=88.35%; Q19=90.91% Fall 2019 Midterm Q6=76.44%; Q19=86.15% Fall 2018 Final Q1=78.79%; Q4=76.82% Fall 2019 Final Q1=75.64%;

Q4=79.04% *All scores are the average percentage students received on the respective questions. LO 2 - Fall 2018 Final Q13=64.77% Fall 2019 Final Q13=62.26% *All scores are the average percentage students' received on the respective questions. LO 3 - Fall 2018 Midterm Q6=88.35%; Q19=90.91% Fall 2019 Midterm Q6=76.44%; Q19=86.15% Fall 2018 Final Q1=78.79%; Q4=76.82%; Q13=64.77% Fall 2019 Final Q1=75.64%; Q4=79.04%; Q13=62.26% *All scores are the average percentage students' received on the respective questions. LO 4 - Fall 2018 Final Q1=78.79%; Q4=76.82%; Q13=64.77% Fall 2019 Final Q1=75.64%; Q4=79.04%; Q13=62.26% *All scores are the average percentage students received on the respective questions. LO 5 - NEU 1000 Fall 2018 Hypothesis=98.5%; Rationale=88.7%; Flow Diagram=93%; Design Elements=86%; Results=90.7%; Discussion=94.5% NEU 1000 Fall 2019 Hypothesis=96.9%; Rationale=98.2%; Flow Diagram=95%; Design Elements=96.6%; Results=93.8%; Discussion=90.9% *All scores are the average percentage students received on the respective questions. LO 6 - NEU 1000 Fall 2018 Final Project Hypothesis=87.5%; Background=95.8%; Rationale=85.4%; Flow Diagram=96.5%; Design Elements=95.1%; Results=90.3%; Conclusions=84.7% NEU 1000 Fall 2019 Final Project Hypothesis=97.9%; Background=91.7%; Rationale=94.5%; Flow Diagram=94.0%; Design Elements=85.4%; Results=89.8%; Conclusions=87.3% NEU 1000 Fall 2018 Oral Presentations Slides=93.0%; Speaking=95.0% NEU 1000 Fall 2019 Oral Presentations Slides=91.9%; Speaking=93.7% NEU 3200 Spring 2019 Written 92.25%; Oral 97.27% NEU 3200 Spring 2020 Written 87.97%; Oral 92.90% *All scores are the average percentage students received on the respective assignments. SALG - The detailed statistics for each surveyed element can be seen in the attached SALG survey (Statistics tab), along with open-ended responses in the Data tab. However, an encouraging result was that the students self-identified that they made between good and great gains in their understanding of the main concepts explored in the class (mean=4.6; n=23). Also, students self-identified that they made good to great gains in their understanding of the relationships between the main concepts in the course (mean=4.2; n=23).

IV. ACTIONS TO IMPROVE STUDENT LEARNING

Information Sharing and Actions Information regarding the assessment has been shared between faculty in the department associated with the program. Discussions were had regarding approaches and strategies to try and improve learning outcomes. As a result, we began by changing our freshman and sophomore course sequence from NEU 1000 (freshman year) and NEU 2000 (sophomore year) to NEU 1010 and 1020 (freshman year) and NEU 2010 (sophomore year), in order to allow for more focused time in the coursework to aid in students developing and improving their scientific communication skills, as well as implementing the scientific process more effectively. Also, students felt that there was too much work involved in an introductory freshman course. Thus, the research related aspects will be moved to the sophomore level course. This new sequence just began this Fall 2020 semester. As such, we don't have any insight yet as to whether benefits to the associated learning outcomes will be gained. We have also made modifications in NEU 3100 to spend more time on some of the associated topics in class to address the content specific learning outcomes. If these don't provide sufficient improvements in the future, we may try alternative strategies including more out of class homework assignments to improve their

abilities to apply concepts learned in class to new scenarios. Also, going forward, we should plan to spend time during a departmental faculty meeting, annually, providing results of the assessments and discuss strategies for improvement. Additionally, we have a Neuroscience Advisory Board which is comprised of an interdisciplinary group of faculty at WSU. We would like to share the results of our assessment with them and get their feedback on ideas for improvement.

V. SUPPORTING DOCUMENTS

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