Aggregated (2017-03-2019-01) BIOL 190, 251, 223 and 224 Grade Data:

Meta-Analysis for Evidence-Based Grading Scale Effective Fall 2019

Prepared by

Franklin S. Carman III, Ph.D., Professor of Biophysical Sciences

WNC-Carson City Campus

In Partial Fulfillment of

Accreditation Mandated Assessment

Institutionally Mandated Assessment

Self-Evaluation for Academic Year 2019-2020

Annual Plan for Academic Year 2019-2020

On

15 August 2019

Abstract/Executive Summary

A review of the immediately previous four (4) semesters' Final Course grades for the four accelerated pre-NURS BIOL courses (190, 251, 223 and 224) was undertaken (N=127).

From this study, a grading scale was experimentally derived that includes the student's final course percent (as distributed in Canvas) to determine the final course grade per the NSHE 4.0 GPA scale: **y = 0.0735x - 2.5** (x = student's Canvas final calculated course percent score; y = student's final letter grade for recording purposes as defined by the NSHE 0 $\rightarrow$ 4.0 GPA scale).

Of interest is two items: 1) the calculated grading scale for the BIOL courses isn't that far from the previously reported upon CHEM 121 grading scale and 2) the BIOL students in the accelerated courses scored a final course grade one letter grade higher and 10 percentage points higher then did the CHEM 121 students (B vs C; 74% vs 64%, respectively).

The grading scale will be implemented in Fall 2019.

159 Words; Flesch-Kincaid Level 15.3

Terms and/or Definitions

Mastery: Demonstrating continuous improvement towards learning about a fixed body of knowledge; determined, overall, statistically using Difficulty and Discriminatory Indices embedded in Canvas.

Performance: Demonstrating on examination at some degree ranging between the "best" and the "worst" scores.

Introduction

Two years ago (Fall 2017), the author began accelerating the four (4) pre-NURS BIOL courses (190, 251, 223, 224) to accommodate expediting students' movements in preparation for reaching WNC's Nursing Program sooner. Each of the courses in which students were enrolled were examined, quizzed, scored and stored in Canvas.

Prior to the mandated faculty implementation of Canvas, generating, storing and retrieving files of a spreadsheet nature was a bit cumbersome as they were easily "lost", names were forgotten, ad nauseum. Canvas, while not exactly perfect, however, has a big feature (besides being great evidenciary recordation) that makes it quite useful: the files remain for a substantial period of time and can easily be retrieved (even with intermittent internet service) for assessment studies (as well as by administrative personnel reviewing student discussions … dissentions???).

Canvas has been used by the author, now, for five (5) semesters. A variety of approaches to promote student learning regarding CHEM 121 have been utilized (cf 1, pp 9 and 22 of 29; 2) and changes constructed and implemented, Ibid.

This particular meta-analysis/assessment study is a product of examining four (4) semesters' worth of Canvas-based **BIOL 190, 251, 223 and 224 student data** (equivalent to eight (8) courses (4 courses times 2 years)) in the continuing struggle to effect meaningful methodologies to positively impact students in such a manner that they will demonstrate academically appropriate levels of knowledge: at the very least to demonstrate adequate mastery of the topic; at the most to demonstrate high performance levels on exams.

Methods

Final Course Grades and Final Course Percents were prepared via Excel for all eight (8) courses for optimal viewing and analysis. In the case of this data, standard deviation and half-standard deviations were employed.

Results

The reader is referred to individual **Appendices** (**1-3**, in order, below) regarding visual references to the following text.

Appendix 1 illustrates the approach taken to develop an evidence-based grading scale for the four BIOL courses under study.

Appendix 2 illustrated the actual distribution of grades in the two years' worth of courses.

Appendix 3 tabulates the grading scale to be implemented for Fall 2019 and used until further notice.

Discussion

There are a number of overlaying lines on the graphic in **Appendix 1**. The two (2) purple lines represent the intersection of the average course grade (GPA) with the average final course percent score. The horizontal light blue lines represent the starting point to separate grades into the NSHE GPA system. The light green vertical lines were the starting point for separating out percent scores into "grading blocks" by half standard deviation increments. The red diagonal line represents the best fit line using Excel's "trend line" (basically a fancy name for a linear regression line). The linear approach was taken to somewhat "mirror" the approach used in CHEM 121 [3].

Appendix 2 illustrates the grade distributions across the two years' worth of the four courses. Of interest is the left shift of the overall grades' distributions. One could likely argue the left shift as being a result of 1) grade inflation, 2) high student achievement and/or 3) BIOL students being stronger readers than CHEM 121 students [4] (which ties in with higher student achievement). Given that the majority of the students in these courses are highly motivated to achieve, it's doubtful that grade inflation is a viable explanation (anecdotally, the pre-NURS students at WNC are not unlike pre-MED students at 4-year institutions and are driven to get to a Nursing Program). Regardless, those students who obtain the necessary grade for admissions into WNC's Nursing program are very successful upon competing that program.

Note that the red vertical line in the graphic in Appendix 2 is slightly off-center. This is merely to indicate that the overall, aggregate, average is barely below 3.0 (2.963).

Appendix 3 summarizes, in an illustrative manner, the grading scale that was established and is to be implemented to four (4) significant figures during Fall 2019 through Spring 2020 in BIOL 190, 251, 223 and 224. Of interest is that this scale, just as observed in CHEM 121 [Ibid] isn't that far off the grading scale this author began using at WNC[C] in 1990. Given these observations, is it possible that adult students haven't changed their performance as much as faculty perceive in the last 30 years?

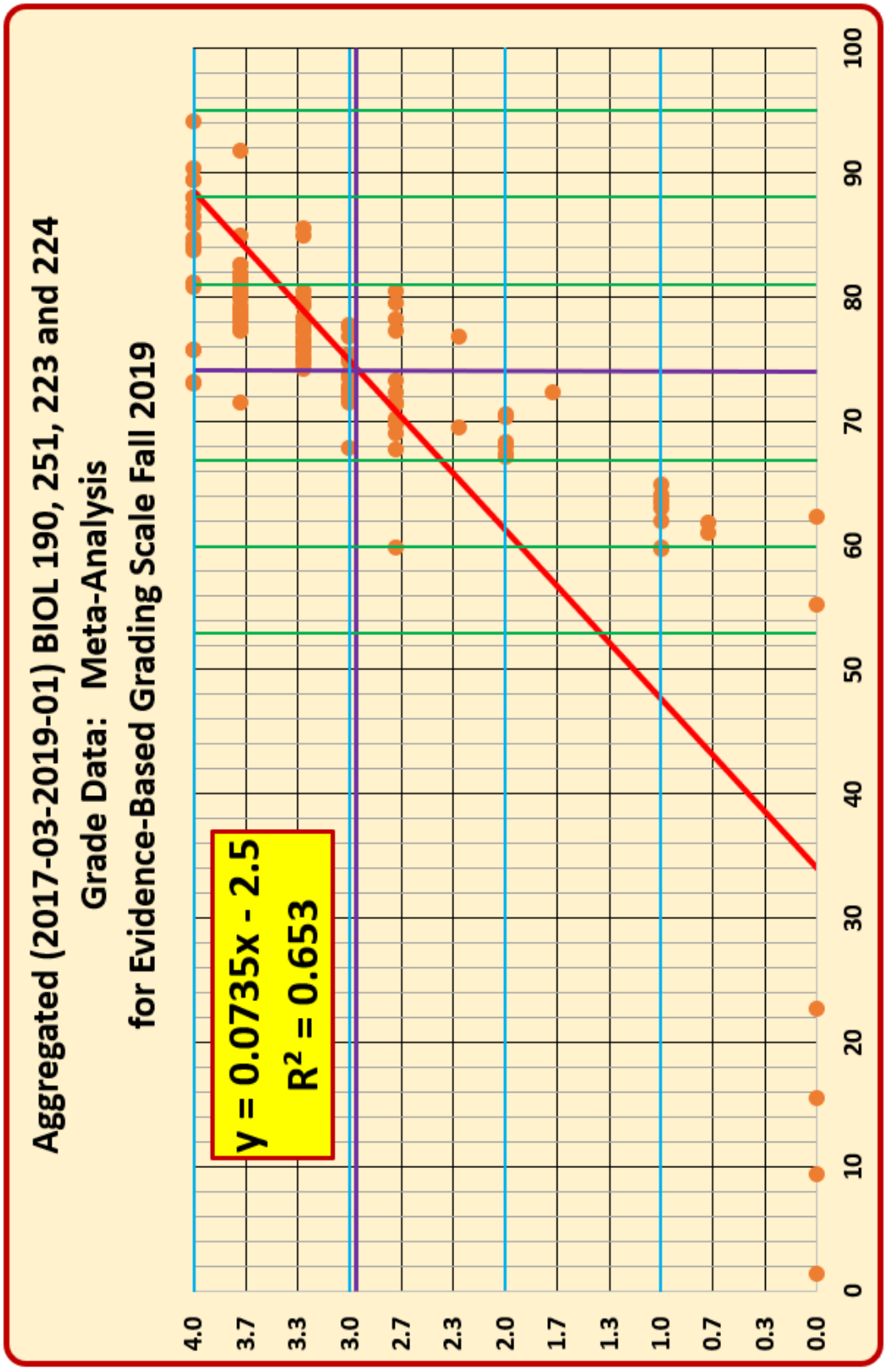
Conclusions, Recommendations and Future Actions

In short, using student-derived data, this assessment project has provided insights for the development of a data-driven grading scale for students' final course grades in the four accelerated pre-NURS BIOL courses.

Appendix 1

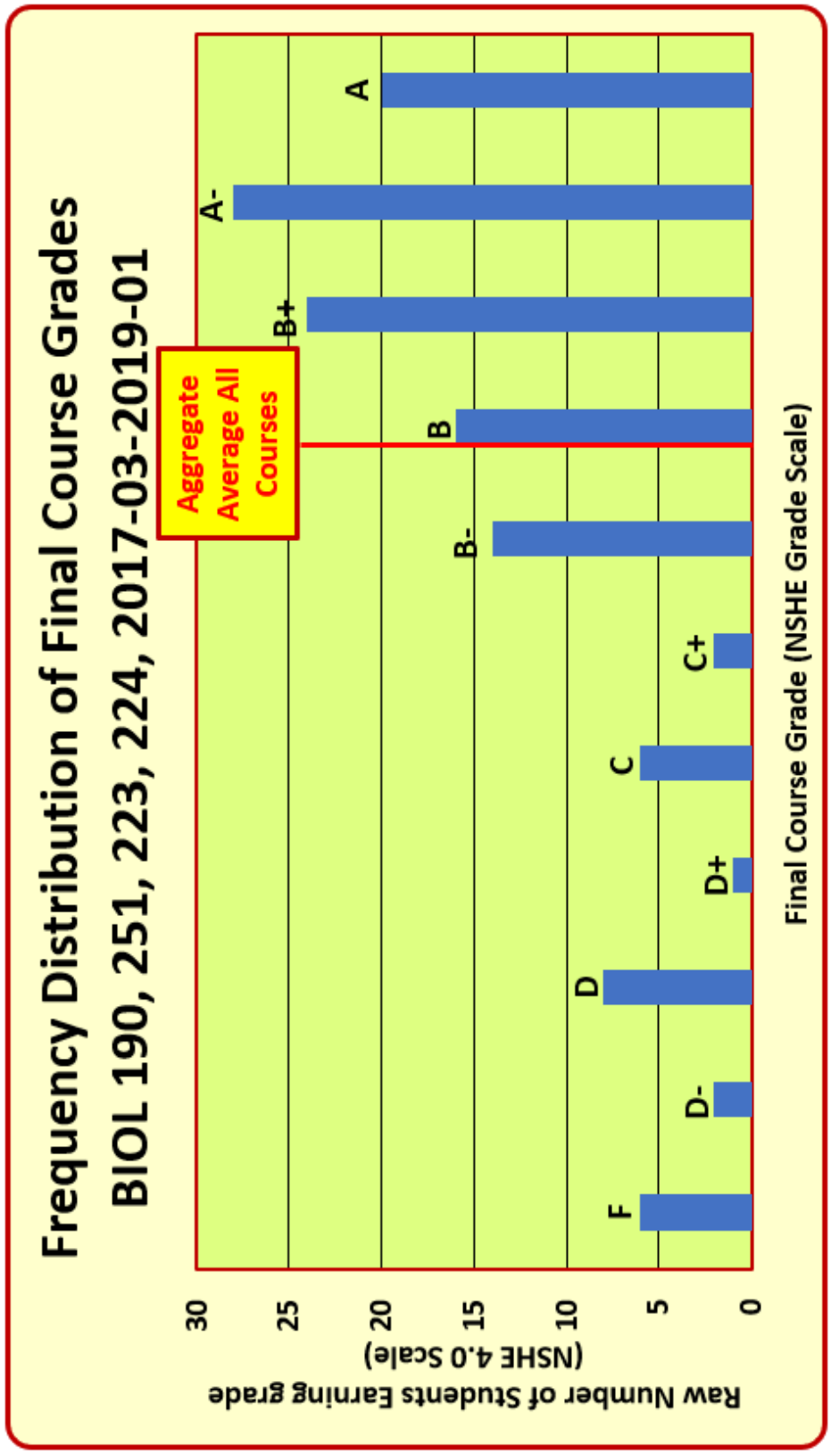
Aggregated (2017-03-2019-01) BIOL 190, 251, 223 and 224 Grade Data: Meta-Analysis

for Evidence-Based Grading Scale Fall 2019


Aggregated (2017-03-2019-01) BIOL 190, 251, 223 and 224
Grade Data: Meta-Analysis
for Evidence-Based Grading Scale Fall 2019
y = 0.0735x - 2.5
R² = 0.653
4.0
3.7
3.3
3.0
2.7
2.3
2.0
1.7
1.3
1.0
0.7
0.3
0.0
0
10
20
30
40
50
60
70
80
90
100

Appendix 2

Frequency Distribution of Final Course Grades BIOL 190, 251, 223, 224, 2017-03-2019-01


Frequency Distribution of Final Course Grades
BIOL 190, 251, 223, 224, 2017-03-2019-01
Aggregate Average All Courses
A
A-
B+
B
B-
C+
C
D+
D
D-
F
0
5
10
15
20
25
30
Raw Number of Students Earning grade (NSHE 4.0 Scale)
Final Course Grade (NSHE Grade Scale)

Appendix 3

Evidence-Based/Derived Grading Scale for BIOL 190, 251, 223 and 224 Students' Final Course Grades' Determination

Effective Fall 2019

Fall 2019 BIOL 190, 251, 223 and 224 Grading Scale		
Student's Canvas-Based Final Course Per Cent (x)	**Student's Calculated Final Course Grade (4.0 NSHE Scale) (y)**	**Recorded Letter Grade (NSHE Scale)**
BIOL 190, 251, 223 and 224 Final Course Grade Equation: $y = 0.0735x - 2.5$		
≥ 88.435 %	≥ 4.000	A
84.353 – 88.434 %	3.700 -- 3.999	A-
78.912 – 84.352 %	3.300 – 3.699	B+
74.830 – 78.911 %	3.000 – 3.299	B
70.748 – 74.829 %	2.700 – 2.999	B-
65.306 – 70.747 %	2.300 – 2.699	C+
61.224 – 65.305 %	2.000 – 2.299	C
57.143 – 61.223 %	1.700 – 1.999	C-
51.701 – 57.142 %	1.300 – 1.699	D+
47.619 – 51.700 %	1.000 – 1.299	D
43.537 – 47.618 %	0.700 – 0.999	D-
≤ 43.536 %	≤ 0.699	F