

Comprehensive
Program Review
Of
Engineering,
Mathematics, &
Physical Science
For

AY2019-2020

&

AY2020-2021

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Independence
COMMUNITY COLLEGE

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1.0 Program Data and Resource Repository

1.1 Program Summary

The program should provide a descriptive summary of the program.

Narrative:

The Associate of Science Degree in Engineering, Mathematics, and Physical Sciences is intended to enable students to complete the necessary courses at the first-year and sophomore level in pursuit of Bachelor of Science Degree in the areas of chemistry, engineering, mathematics, or physics. The student needs to choose an area of emphasis at the time of choosing this program.

At a two-year college, it is hard to differentiate the individual programs for Engineering, Mathematics, Physics and Chemistry. These disciplines share the same core classes: Analytical Geometry and Calculus I & II, Physics I & II, and Statistics. In 2017, the various individual programs were consolidated to a single program.

1.2 Quantitative and Qualitative Data

All programs are provided with the most recent two years of data by the Office of Institutional Research (IR) as well as two-year budget data provided by the Business Office.

The data sets provided by the Office of Institutional Research include the following elements for the most recent two (completed) academic years:

- Number of Faculty (Full Time; Part Time; Total)
- Student Credit Hours by Faculty Type
- Enrollment by Faculty Type
- Faculty Name by Type
- Average Class Size, Completion, and Attrition
- Course Completion, Success and Attrition by Distance Learning v Face-to-Face
- Number of Degrees/Certificates Awarded
- Number of Graduates Transferring (if available from IR)
- Number of Graduates Working in Related Field (technical programs only)
- Expenditures and Revenues

Additional data may also be available for reporting from the Office of Institutional Research, as applicable. Requests for additional data must be made through a data request.

(See Section 1.2 in the Program Review Handbook for more information.)

Narrative:

The data in this table is based on the courses of emphasis within the program. Those courses are

- Analytical Geometry and Calculus I, II, & III
- Chemistry I & II for Majors
- College Physics I & II
- Elementary Statistics
- Engineering Physics I & II
- Organic Chemistry I & II.

		2019-2020	2020-2021
Number of Faculty:			
	Full time	3 (Southworth, Crompton, Saleh)	3 (Southworth, Chaplin, Saleh)
	Adjunct	4 (Deweese, Babb, Stover, Hayes)	4 (Deweese, Babb, Stover, Hayes)
Enrollment & Student credit hours by Faculty type:			
	Full Time	15 total credit hours taught, with 12 total students enrolled	41 total credit hours taught, with 41 total students enrolled
	Adjunct	30 credit hours taught; 68 total students enrolled	26 credit hours taught; 39 total students enrolled
Average Class size:			
	Face-to-Face classes	5.9	4.8
	Online classes	13.5	9
	All courses	7.3	5.3
Completion Rates:			
	Face-to-Face classes	94.3%	88.7%
	Online classes	77.8%	77.8%
	All courses	88.8%	86.3%
Pass ('D' or better) rates:			
	Face-to-Face classes	98%	92.7%
	Online classes	85.7%	85.7%
	All courses	93%	91.3%
Pass ('C' or better) rates:			
	Face-to-Face classes	96%	90.9%
	Online classes	85.7%	78.6%
	All courses	93%	88.4%
Number of Majors:		3 (1 returned in Fall 2020)	6 (1 returned in Fall 2021)
Degrees Awarded:		0	0

2.0 Student Success

2.1 Define Student Success

The program faculty should provide a definition of how student success is defined by the program. *(See Section 2.1 in the Program Review Handbook for more information.)*

Narrative:

1. The student meets the outcomes designated to the subject matter.
2. The student achieves the highest academic level possible, alongside with the clear understanding of the material.
3. The student is well prepared either to transfer to a 4-year college or to succeed in an occupational endeavor.
4. The student develops socially, and intellectually.
5. The student feels a sense of purpose, determination, and validity.

2.2 Achieve/Promote Student Success

The program faculty should describe how the program achieves and promotes student success. *(See Section 2.2 in the Program Review Handbook for more information.)*

Narrative:

1. Properly facilitate the student's success by meeting the students' educational needs.
2. Have supportive programs to meet the program outcomes.
3. Effective programs which prepare the students for their future institution or the workforce.
4. Use the assessment data to quality improve the program.

3.0 Assessment of Student Learning Outcomes

3.1 Reflection on assessment

The program faculty should provide a narrative reflection on the assessment of program curriculum. Please provide data gathered for outcomes at both program, course, and general education levels. Please review the Assessment Handbook for resources on gathering this information provided by the Assessment Committee.

Narrative:

See Tables below.

PENDING APPROVAL

Program Outcomes and Assessment

As a result of earning an AS degree in Mathematics & Physical Science, students will be able to:

1. Demonstrate appropriate proficiency in the foundational aspects of differential and integral calculus necessary to transfer to a 4-year institution and achieve a degree in a STEM-related field.

This program outcome is tied to Analytical Geometry and Calculus II (MAT2025), Calculus III, and Engineering Physics II (PHS2065).

The Program Outcomes will be considered met if 70% of the students in class(es) tied to outcome receive a grade of C or better.

AY2019-2020: There is no data since the courses tied to this outcome were not taught.

AY2020-2021: This outcome was met. All students in these courses received a C or higher.

2. Explain the scientific method and discuss the basic concepts of physical science and/or chemistry in the broader context of science and a diverse society.

This program outcome is tied to Chemistry I for Majors (PHS1025), College Physics I (PHS1065), and Engineering Physics I (PHS2055).

AY2019-2020: This outcome was met.

AY2020-2021: This outcome was partially met. Sixty-four percent of students finished the courses with a C or better. Chemistry I for Majors and Engineering Physics I met the outcome. Students in College Physics I struggled with the subject and did not.

3. Analyze a real-world problem, choose the appropriate mathematical construct for the problem at hand, and process the numeric, symbolic, and/or graphical information necessary to arrive at appropriate solutions/conclusions in real world applications.

This program outcome is tied to Analytical Geometry II (MAT2025).

AY2019-2020: There is no data since the courses tied to this outcome were not taught.

AY2020-2021: This outcome was met.

4. Demonstrate appropriate proficiency with the language of science, both through the student's ability to understand and use written and oral communications.

This program outcome is tied to Chemistry II for Majors (PHS1035), College Physics II (PHS1065), and Engineering Physics II (PHS2065).

AY2019-2020: There is no data since the courses tied to this outcome were not taught.

AY2020-2021: This outcome was met

5. Use appropriate lab techniques and resources to collect, analyze, and present data in a scientific manner.

This program outcome is tied to Chemistry II for Majors (PHS1035), College Physics II (PHS1065), and Engineering Physics II (PHS2065).

AY2019-2020: There is no data since the courses tied to this outcome were not taught.

AY2020-2021: This outcome was met

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Course Outcomes and Assessment
Analytical Geometry and Calculus I (MAT1055)

1. Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.
2. Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.
3. Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.
4. Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.
5. Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.
6. Integrate using numerical techniques (Simpson's and the Trapezoid Rules).

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: The course was taught on campus in the Spring 2020, until COVID-19 forced it online. There were two students in the class who met all outcomes. It was taught in the Fall at Cherryvale High school. The instructor only measured Outcome 1 and 2, which were met. The course was taught on campus in the Spring 2020, until COVID-19 forced it online. Calculus I was also taught at Neodesha and Fredonia high schools, where all students achieved the outcomes.

AY2020-2021: The course was taught at ICC, and Cherryvale, Fredonia, Independence, and Neodesha high schools. At ICC and Fredonia HS, all outcomes were met. Neodesha HS and IHS met all outcomes except one. Neodesha partial met outcome 4, while IHS partially met outcome 3. Cherryvale HS only measured outcomes 1 and 2, which they met.

Course Outcomes and Assessment
Analytical Geometry and Calculus II (MAT2055)

1. Find the area between curves, volume using slicing and shells, arc length, and surface area using integration; apply to problems in Physics, Engineering, Economics, and Biology.
2. Find derivatives and integrals involving hyperbolic, and inverse trigonometric functions. Find limits using L'Hopital's Rule.
3. Integrate improper integrals. Integrate using integration by parts, trigonometric substitutions, and rational functions using Partial Fractions.
4. Solve a differential equation by separation of variables. Solve initial value problems.
5. Determine if sequences converge and diverge. Determine convergence (absolute and conditional) and divergence of series using Integral test, Comparison test, Alternating series test, Ratio and Root tests.
6. Represent functions as Power Series, Taylor, and Maclaurin Series. Apply Taylor and Maclaurin series.
7. Define curves by parametric equations and polar coordinates. Differentiate and integrate curves in parametric form. Apply polar coordinates to area, length, and conic sections.
8. Use vectors in a plane and three dimensions and perform vector addition, subtraction, the dot product, and the cross product apply properties of vectors.
- 9.

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: This course was not taught.

AY2020-2021: This course was taught in Spring 2021. All outcomes were met.

There is no assessment data for Calculus III since it was not offered during AY2019-2020 or AY2020-2021.

Course Outcomes and Assessment
Elementary Statistics (MAT1103)

1. Create graphical and numerical descriptions of quantitative and qualitative data. (Chapter 2)
2. Calculate probabilities and percentiles related to a general normal distribution. (Chapter 6)
3. Distinguish differences in data analysis and interpretation between observational data and data from designed experiments. (Chapter 1)
4. Calculate and interpret a confidence interval for a single parameter, using both large and small samples. (Chapter 8)
5. Perform and interpret a test of hypotheses for a single parameter, using both large and small samples. (Chapter 10)
6. Perform and interpret statistical inference on the difference of two parameters. (Chapter 9)
7. Fit and interpret a simple linear regression model, including correlation and scatterplots. (Chapter 12)

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: Assessment is missing from Fall 2019. For the Spring 2020, all outcomes were met except Outcome 6. Instructor will provide more practice for Outcome 6.

AY2020-2021: This course was taught both in the Spring and Fall. The fall course met outcomes 1, 2, 3, 4, and 6; while not meeting outcome 5 and 7. The Spring course met outcomes 1 and 3, partially met 4 and 6, but did not meet outcomes 2, 5, and 7. Some of the formulas in this course are intensive. The instructor plans to make videos using MS Excel to simplify calculations.

Course Outcomes and Assessment
Chemistry I for Majors (PHS1025)

AY2019-2020

1. Explain the processes involved in the scientific method and be able to apply it to investigate natural phenomena and solve problems
2. Explain the design and significance of experiments that led to the adoption of modern atomic theory
3. Recognize and interpret isotopic notation, understanding the relationship between average atomic masses and isotopic masses
4. Relate atomic mass to composition in terms of subatomic particles
5. Descriptive chemistry of ionic and covalent compounds
6. Solutions
7. Chemical reaction and stoichiometry
8. Properties of solids, liquids, and gases
9. Describe, define, and perform calculations involving the following basic concepts thermodynamics
10. Conceptually and quantitatively relate spectroscopic observation of atoms to quantum mechanical theories
11. Molecular Bonding and Structure
12. Work in the laboratory in accordance with good laboratory practices
13. Gather and record qualitative and quantitative data accurately
14. Handle and evaluate data in logical, productive, and meaningful ways
15. Correlate laboratory work with principle topics in Chemistry I lecture

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: This course was taught in Fall 2019. Outcomes 7, 12, 13, and 14 were met. Outcomes 1, 3, 4, 6, 8, 11, and 15 were Partially met. Outcomes 2, 5, 9, and 10 were not met. The instructor planned to make printouts of key concepts, shorten the final, change calendar to allow for more time on difficult topics, and provide review questions for the final exam.

AY2020-2021: This course was taught in Fall 2020. Outcomes 1 and 12, 13, 14, and 15 were met. Outcomes 3, 4, 5, 6, 7, 8, 9, 10, and 11 were partially met. Outcome 2 was not met. The planned actions were to develop more active learning supplements, modify/create labs to address deficiencies, and modify lecture materials.

Course Outcomes and Assessment Chemistry II for Majors (PHS1035)

- | |
|--|
| <ol style="list-style-type: none"> 1. Demonstrate knowledge of colligative properties of solutions. 2. Demonstrate knowledge of chemical kinetics. 3. Demonstrate knowledge of chemical equilibrium. Apply chemical equilibrium to various systems such as acid & base chemistry. 4. Demonstrate knowledge of basic concepts of thermodynamics II. 5. Demonstrate knowledge of electrochemistry. 6. Demonstrate knowledge of one of the following optional topics listed by KBOR: <ol style="list-style-type: none"> i. Biochemistry ii. Coordination Chemistry iii. Descriptive chemistry iv. Nuclear and radiochemistry v. Organic chemistry vi. Solid State Chemistry 7. Apply good laboratory practices while working in the laboratory, including demonstrating the ability to record quantitative and qualitative data accurately, and evaluate data in a logical, productive, and meaningful way. |
|--|

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: This course was not taught.

AY2020-2021: All outcomes were met or partially met for this academic year. Outcomes 1 and 2 were only partially met. The instructor will review concepts from Chemistry I that apply to these outcomes prior to these subjects.

There is no assessment data for Organic Chemistry I or Organic Chemistry II since they were not offered during AY2019-2020 or AY2020-2021.

Course Outcomes and Assessment
College Physics I (PHS1055)

- 1 The student will be able to evaluate situations involving Physics I topics by choosing the appropriate conceptual frameworks.
- 2 The student will be able to recall relevant physical models and to successfully apply these models' using techniques of symbolic and numerical analysis to generate solutions to problems in Physics I topics.
- 3 The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics I topics, selecting relevant information, selecting an approach to solving the problem and carrying out the analysis needed to generate and communicate solution(s).
- 4 The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics I topics.

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: This course was not taught.

AY2020-2021: This course was taught in the Fall 2020. Outcome 3 was met. Mastery level for Outcomes 1, 2, and 4 were set at 80%. The student attained 68%, 76%, and 72%, respectively. The instructor plans to implement an online homework system and stress the need to engage the material and follow the proper approach to physics problems.

Course Outcomes and Assessment
College Physics II (PHS1065)

1. The student will be able to evaluate situations involving Physics II topics by choosing the appropriate conceptual frameworks.
2. The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis to generate solutions to problems in Physics II topics.
3. The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics II topics, selecting relevant information, selecting an approach to solving the problem and carry out the analysis needed to generate and communicate solution(s).
4. The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics II topics.

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: This course was not taught.

AY2020-2021: This course was taught Spring 2021. All outcomes were met, except Outcome 3 was only partially met. The instructor reports that student absences played a role in only partially meeting Outcome 3.

Course Outcomes and Assessment
Engineering Physics I (PHS2055)

1. The student will be able to evaluate situations involving Physics I topics by choosing the appropriate conceptual frameworks.
2. The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis to generate solutions to problems in Physics I topics.
3. The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics I topics, selecting relevant information, selecting an approach to solving the problem and carry out the analysis needed to generate and communicate solution(s).
4. The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics II topics.

These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.

Assessment:

AY2019-2020: This course was not taught.

AY2020-2021: This course was taught Fall 2020. All outcomes were met.

Course Outcomes and Assessment Engineering Physics II (PHS2065)
1. The student will be able to evaluate situations involving Engineering Physics II topics by choosing the appropriate conceptual frameworks. 2. The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis to generate solutions to problems in Engineering Physics II topics. 3. The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Engineering Physics II topics, selecting relevant information, selecting an approach to solving the problem and carry out the analysis needed to generate and communicate solution(s). 4. The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Engineering Physics II topics. 5.
These outcomes are aligned with those of the Kansas Core Outcomes Group as approved by the Kansas Board of Regents.
Assessment:
AY2019-2020: This course was not taught.
AY2020-2021: This course was taught Spring 2021. All outcomes were met.

3.2 Significant Assessment Findings

The program faculty should provide a narrative overview of the program's significant student learning outcomes assessment findings, any associated impact on curriculum, as well as any ongoing assessment plans. The program may attach data charts, assessment reports or other relevant materials. *(See Section 3.2 in the Program Review Handbook for more information.)*

Narrative:

Engineering: No engineering classes were offered, as there was no professor. No assessment data.

Mathematics: Three Mathematics majors' courses were run during the 2019-2020 and 2020-2021 academic years. These courses were Analytical Geometry and Calculus I, Analytical Geometry and Calculus II, and Elementary Statistics.

Analytical Geometry and Calculus I had eight sections run for 2019-2020 and 2020-2021. Forty-seven students were enrolled among all sections. Most of these students were enrolled concurrently at a local high school. Of these, forty-five students completed the course. All students who completed the course passed with a "C" average or better. Of the four sections run in 2019-2020, student learning outcomes were assessed in two sections of this course. In these sections, most students met all measures of each learning outcome. In 2020-2021, all courses assessed student learning outcomes with most students meeting the outcomes.

Analytical Geometry and Calculus II was only taught once in 2020-2021 and not at all in 2019-2020. It started with two students but only one completed. The completer met all outcomes and passed with an A.

Elementary Statistics had two total sections run in 2019-2020 and 2020-2021. Forty-seven students were enrolled in these sections. Of these, thirty-two students completed the course. Five students who completed the course failed; one received a D. The remaining twenty-nine students who completed the course passed with a C or better.

Chemistry:

During Fall 2020 semester, 9 students were enrolled in Chemistry –I. Two students got ‘F’ one student got “D” and 6 students got “C” or better. Six students met most of the learning outcomes.

In Spring 2021 semester, 2 students were enrolled, and both got “C” or better. Both students met all the learning outcomes.

During Fall semester of 2021-2022, three Chemistry classes were taught. There were two sections for Chemistry Nonmajors and one section for Chemistry-I. In one section of Chemistry NM, 6 students were enrolled. One student withdrew, and 5 students completed the class with “C” or better. In another section of Chemistry Nonmajors: 8 students were enrolled, and 3 students withdrew. Remaining 5 students got “C” or better.

In Chemistry I, nine students were enrolled. One student withdrew, and eight students completed the class with “C” or better grade.

Physics:

During the fall semester of 2019-2020 two physics classes were taught. College Physics I had three students enrolled, of whom a student withdrew, one failed, and the third student completed the class with a “C.” The Engineering Physics I had one student who completed the class with an “A.”

During the spring semester 2020-2021 two physics classes were taught. College Physics II had one student who completed the class with a “C,” and the Engineering Physics II which had one student who completed the class with a “B.”

3.3 Ongoing Assessment Plans

The program faculty should describe ongoing assessment plans and attach any new assessment progress reports for the current or past academic year.

Narrative:

No curriculum changes based on assessment.

PENDING APPROVAL

4.0 External Constituency and Significant Trends

An important component of maintaining a superior program lies in awareness and understanding of other possible factors that may impact the program and/or student outcomes. After consideration of these other factors, program faculty should document the relevant information within this section. As applicable, this should include the following.

4.1: Program Advisory Committee:

- Include Advisory Member Name/ Title/ Organization/ Length of Service on committee; note the Committee Chair with an asterisk (*).
- Upload meeting minutes from the previous spring and fall semesters and attach in the appendices section (10.0).

Narrative:

N/A

4.2: Specialized Accreditation:

- Include Accrediting Agency title, abbreviation, ICC contact, Agency contact, Date of Last Visit, Reaffirmation, Next Visit, FY Projected Accreditation Budget.
- Upload the most recent self-study and site visit documents.
- Upload agency correspondence which confirm accreditation status.

Narrative:

N/A

4.3: Other:

Discuss any external constituencies that may apply to the program. *(See Section 4.3 in the Program Review Handbook for more information.)*

Narrative:

HLC Accreditation: The College's regional accrediting body, the Higher Learning Commission (HLC), ensures that the institution is providing high quality education. Core Components 3 and 4 are particularly relevant to ensuring classroom and programs standards in this area.

5.0 Curriculum Reflection

5.1 Reflection on Current Curriculum

The program faculty should provide a narrative reflection that describes the program's curriculum holistically. The following are prompts formulated to guide thinking/reflection on curriculum. While presented in question form, the intent of the prompts is to stimulate thought and it is not expected that programs specifically answer each and every question.

- Is the curriculum of the program appropriate to the breadth, depth, and level of the discipline?
- How does this program transfer to four-year universities? (give specific examples)
- What types of jobs can students get after being in your program? (Please use state and national data)
- How dynamic is the curriculum? When was the last reform or overhaul?
- In the wake of globalization, how “internationalized” is the curriculum?
- How does the program assess diversity?
- Does the program have any community-based learning components in the curriculum?

Narrative:

This program was first offered in the 2018-2019 Course Catalog to better accommodate our potential student population and design a single track to guide all pre-engineering, math, and physical science majors through their common classes and set them up to continue to their four-year institution. All courses in this program transfer to four-year institutions in Kansas via the KBOR transfer matrix and are run with standards so that they should be transferrable anywhere in the US. There is a plethora of jobs possible after completing the four-year degree, depending on what specific field of science/math the student specializes in at their four-year.

Currently, ICC does not have an Engineering professor and there is no demand for engineering classes. It is prudent to remove references to remove references all engineering courses from the program and change the “Mathematics Emphasis” to “Engineering & Mathematics Emphasis.” This will help Navigators and faculty advise students with an expressed interest in engineering to cover prerequisites for a four-year program.

5.2 Degree and Certificate Offerings or Support

Program faculty should list what degrees and certificates are offered and/or describe how the program curriculum supports other degrees and/or certificates awarded by the college.

Narrative:

This program awards an associate of science degree. Professors in this program support the Biology program, and the general education program by additionally teaching non-major classes in their respective areas.

6.0 Faculty Success

6.1 Program Accomplishments

The program faculty should highlight noteworthy program accomplishments.

Narrative:

Dr. Chaplin acquired seven MicroLAB-528 data acquisition systems for the Chemistry Department during AY2020-21. This is a multi-channel data acquisition system incorporating a stirring/heating plate, temperature probe, broad-range spectrophotometer, multimeter, and drop counter which interfaces with proprietary computer software to allow students to monitor experimental progress and graph their results in real time. This system is an improvement over current technology used in the lab in that it increases the range of experiments that can be performed, gives students a more industry-relevant mode of data acquisition, decreases the amount of waste produced, and can be integrated into remote learning as needed. Additionally, seven HP laptops have been acquired to interface with these systems and other department activities.

6.2 Faculty Accomplishments

The program faculty should highlight noteworthy accomplishments of individual faculty.

Narrative:

The COVID-19 pandemic created special challenges for all faculty at ICC, not just the faculty of this program. Each faculty member went fully online in April 2020, when the nation shutdown for the pandemic. Faculty shepherded students into unfamiliar online homework systems, recorded video lessons, held zoom classes and office hours. Starting in the Fall 2020, ICC returned to on-ground learning but most of our classes were eight-week hybrid courses. Within six months of the first major change of modality, faculty again responded by redesigning courses to meet the new class structure. Faculty met these challenges with calm and professionalism.

When Dr. Nyssa Crompton resigned her position as Professor of Chemistry at the end of AY19-20, Dr. Nathan Chaplin, Professor of Biology, stepped in during AY20-21 to teach both biology and Chemistry. Dr. Narinder Sharma was hired as an Associate Professor of Chemistry for AY21-22 going forward.

6.3 Innovative Research, Teaching and Community Service

The program faculty should describe how faculty members are encouraged and engaged in promoting innovative research, teaching, and community service.

Narrative:

See 6.2 regarding COVID-19.

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7.0 Program Planning & Development for Student Success

7.1 Narrative Reflection on Qualitative and Quantitative Data and Trends

Provide a thoughtful reflection on the available assessment data. *(See Section 7.1 in the Program Review Handbook examples.)*

Narrative:

The class size over AY2019-2020 and AY2020-2021 has shrunk from 7.3 students to 5.3 students on average. It is unclear what effect COVID-19 had on class size. This program's courses do not translate easily to the online format, which may account for some attrition in class size. For much of AY2020-2021, classes were taught in hybrid format that pushed more learning out of the class, which could also account for the drop in class size.

Most students who started one of the program's courses completed them. Ninety-four percent completed courses in AY2019-2020 and 88% in AY2020-2021. Those who completed the courses were likely to get a C or better. For AY2019-2020, 96% of students finished with a C or better; while 90.9% did the same in AY2020-2021.

As seen in 3.1, the most students met the learning outcomes for AY2019-2020 and AY2020-2021. (See Appendix)

7.2 Academic Program Vitality Reflection, Goals and Action Plans

The program vitality assessment, goals and action planning are documented by completing the Program Summative Assessment form.

Programs should use previous reflection and discussion as a basis for considering program indicators of demand, quality, and resource utilization and a program self-assessment of overall program vitality. (See Section 7.2 in the Program Review Handbook for more information.)

Narrative:

Please highlight the cell in the table below indicating the Vitality Indicator for your Program.

Potential Enhancement Opportunities	Maintain Current Levels of Support	Revitalization Opportunities/Needs	Phase Out
-------------------------------------	------------------------------------	------------------------------------	-----------

The current student population shows minimal demand for the main courses of this program. Those courses are Analytical Geometry and Calculus I, II, & III, Chemistry I & II for Majors, College Physics I & II, Elementary Statistics, Engineering Physics I & II, and Organic Chemistry I & II. However, these courses show good completion rates, most students complete the courses with a C or higher, and overall student learning outcomes are met. According to the U.S. Bureau of Labor Statistics in 2020 the median annual wage for STEM occupations was \$89,780 versus non-STEM occupations of \$40,020 (<https://www.bls.gov/emp/tables/stem-employment.htm>) This program should maintain current levels of support.

7.3 Academic Program Goals and Action Plans

Programs will also establish or update 3 to 5 long-term and short-term goals and associated action plans which support student success. These goals should include consideration of co-curricular and faculty development activities. Long-term goals are considered to be those that extend 3 to 5 years out, while short-term goals are those that would be accomplished in the next 1 to 2 years. Additionally, programs should update status on current goals. Programs should use S.M.A.R.T. goal setting for this purpose. (See Section 7.3 in the Program Review Handbook for more information.)

Narrative:

Short Term Goals:

- Create Introduction to Organic Chemistry and Biochemistry. This course will be used to satisfy 2+2 agreement that the VPAA is working to create with Kansas State Food Science Program. The course will also be used as stepping to make the lab ready for Organic Chemistry I and II, which have not been taught at ICC for over a decade.

- Continue the transition of Chemistry for Non-Majors into the hybrid/online environment by creating more videos and exploring out of class lab opportunities.
- The mathematics professor will join the American Mathematical Association of Two-year Colleges (AMATYC).
- Create 2 new 2+2 opportunities to establish strong partnerships for transfer to state universities.
- All program faculty create and caption a minimum of 1 video utilizing Canvas Studio
- Mathematics, Chemistry, and Physical Science professors will attend a conference in 2022-2023.
 - The Mathematics Professor will attend the AMATYC 2022 Toronto Conference.

Long Term Goals:

- Develop and teach Organic Chemistry I and II.
- Increase enrollment in Analytical Geometry and Calculus I and II.
- The college has two observatories: the dome and the flat top.
 - The dome: The building's wall is buckling out, and the dome is leaking water, which is flooding the floor. Right now, the damage might have extended to the telescope itself, if not for the level of moisture in the building, it would be the water getting inside the telescope.
 - The flat top: The building is deteriorating and the door as well.

Both buildings need climate control, electricity outlets, and Wi-Fi access.

- Update and repair ICC Observatory, including ADA requirements. The observatory needs a sidewalk for ease of use. It would also benefit from a deck (or concrete pad) between the buildings to hold star and observation parties for the ICC students, Schools, and community members, since the ground can be very swampy when wet. Both buildings would benefit from wi-fi access, electricity, and climate control. The domed building needs serious repairs. The dome leaks water that is flooding the floor and causing the walls to buckle. It is unclear if the high levels of moisture with the domed building have damaged the telescope. The flat top building is in better shape, but still deteriorating. The door has been repaired at least once. The moisture levels are also high causing the wood to expand.

7.4 Mission and Strategic Plan Alignment

Program faculty should indicate the ways in which the program's offerings align with the ICC mission. Also, in this section program faculty should provide narrative on the ways that initiatives may be tied to the ICC Strategic Plan and to HLC accreditation criterion. It is not necessary to consider an example for each HLC category, but program faculty are encouraged to provide one or two examples of initiatives in their program that are noteworthy. These examples may be helpful and included in future campus reporting to HLC. (Refer to section 4.3 for HLC categories)

Narrative:

The mission of ICC states “Independence Community College serves the best interests of students and the community by providing academic excellence while promoting cultural enrichment and economic development.” The Engineering, Mathematics, and Physical Science program aligns with our mission by providing academic excellence and opportunities for cultural enrichment to our students. The curriculum of the program emphasizes the scientific method and problem solving, which helps student approach issues within their communities and businesses in a data driven manner.

This program meets HLC Core Component 3.A.1: Courses and programs are current and require levels of performance by students appropriate to the degree or certificate awarded. The program meets the core component by offering the first two years of a four-year degree.

8.0 Fiscal Resource Requests/Adjustments

8.1 Budget Requests/Adjustments

Based on program data review, planning and development for student success, program faculty will complete and attach the budget worksheets to identify proposed resource needs and adjustments. These worksheets will be available through request from the college's Chief Financial Officer. Program faculty should explicitly state their needs/desires along with the financial amount required.

Programs should include some or all of the following, as applicable, in their annual budget proposals:

- Budget Projections (personnel and operation)
- Position Change Requests
- Educational Technology Support
- Instructional Technology Requests
- Facilities/Remodeling Requests
- Capital Equipment
- Non-Capital Furniture & Equipment
- New Capital Furniture & Equipment
- Replacement Capital Furniture & Equipment
- Other, as applicable
- Accreditation Fee Request
- Membership Fee Request
- Coordinating Reports

Resource requests should follow budgeting guidelines as approved by the Board of Trustees for each fiscal year. The resource requests should be used to provide summary and detailed information to the division Dean and other decision-makers and to inform financial decisions made throughout the year.

Narrative:

Engineering: Engineering does not have a budget currently. It was removed from this program during AY2021-2022.

Chemistry:

INDEPENDENCE COMMUNITY COLLEGE Chemistry

Fund 11 <u>Expenses</u>	AY2019-2020 For the Twelve Months Ending Tuesday, June 30, 2020				AY2020-2021 For the Twelve Months Ending Wednesday, June 30, 2021				AY2021-2022 For the Eight Months Ending Monday, February 28, 2022			
	Operating Budget	Expense	Encumbered	Remaining	Operating Budget	Expense	Encumbered	Remaining	Operating Budget	Expense	Encumbered	Remaining
Salary:												
11-1175-520-OC Faculty Salaries: Full-Time Faculty		52,316.59		(52,316.59)					59,049.96	29,524.99		29,524.97
11-1175-521-OC Faculty Salaries: Overload		550.00		(550.00)								
11-1175-522-OC Faculty Salaries: Adjunct		1,900.00		(1,900.00)	1,452.00			(1,452.00)				
11-1175-523-OC Faculty Salary: Supplemental Pay		366.67		(366.67)								
Total Salary		55,133.26		(55,133.26)	1,452.00			(1,452.00)	59,049.96	29,524.99		29,524.97
Fringe Benefits:												
11-1175-591-OC FICA (Social Security, Medicare)		3,700.14		(3,700.14)	122.40			(122.40)	4,517.28	2,239.98		2,277.30
11-1175-593-OC Unemployment					10.08			(10.08)		170.00		(170.00)
11-1175-594-OC Insurance Premiums		8,799.42		(8,799.42)					15,672.00	4,307.76		11,364.24
11-1175-596-OC Other Fringe Benefits					1,600.00			(1,600.00)				
Total Fringe Benefits		12,499.56		(12,499.56)	1,732.48			(1,732.48)	20,189.28	6,717.74		13,471.54
Travel:												
11-1175-601-0 Travel: Lodging, Airfare, Mileage									1,000.00			1,000.00
Total Travel									1,000.00			1,000.00
Repairs:												
11-1175-649-OC Repairs		1,343.44		(1,343.44)					999.96			999.96
Total Repairs		1,343.44		(1,343.44)					999.96			999.96
Instructional Supplies:												
11-1175-700-OC Instructional Supplies		5,947.84		(5,947.84)	4,905.62			(4,905.62)	3,000.00	236.00		2,764.00
Total Instructional Supplies		5,947.84		(5,947.84)	4,905.62			(4,905.62)	3,000.00	236.00		2,764.00
Office Supplies:												
11-1175-701-OC Office Supplies					134.91			(134.91)				
Total Office Supplies					134.91			(134.91)				
Professional Development:												
11-1175-717-OC Professional Development					55.00			(55.00)	500.00			500.00
Total Professional Development					55.00			(55.00)	500.00			500.00
Total		74,924.10		(74,924.10)	8,280.01			(8,280.01)	84,739.20	36,478.73		48,260.47

To initiate the course Introduction to Organic Chemistry and Biochemistry some chemicals and equipment will be purchased. This will require about \$3000.

There is sufficient money available to purchase commonly used chemicals. Money allotted for 2021-2022 will be used for immediate purchase of chemicals.

To support labs for Organic Chemistry I and II, certain equipment will be required. About \$5000 should be sufficient for this purchase.

Mathematics:

INDEPENDENCE COMMUNITY COLLEGE Math

		AY2019-2020				AY2020-2021				AY2021-2022			
		For the Twelve Months Ending Tuesday, June 30, 2020				For the Twelve Months Ending Wed., June 30, 2021				For the Eight Months Ending Monday, February 28, 2022			
		Operating Budget	Expense	Encumbered	Remaining	Operating Budget	Expense	Encumbered	Remaining	Operating Budget	Expense	Encumbered	Remaining
Fund 11													
Expenses													
Salary:													
11-1177-510-000	Administrative					999.99	(999.99)			62.49	(62.49)		
11-1177-520-000	Faculty Salaries: Full-Time Faculty		101,640.86		(101,640.86)	96,708.39	(96,708.39)			109,550.04	64,279.21		45,270.83
11-1177-521-000	Faculty Salaries: Overload		25,383.02		(25,383.02)	13,633.34	(13,633.34)			7,350.00	(7,350.00)		
11-1177-522-000	Faculty Salaries: Adjunct		31,232.50		(31,232.50)	21,466.66	(21,466.66)			4,782.50	(4,782.50)		
11-1177-523-000	Faculty Salary: Supplemental Pay		983.34		(983.34)					2,333.38	(2,333.38)		
11-1177-529-000	High Sch Sals: Representatives-									3,400.00	(3,400.00)		
	Total Salary		159,239.72		(159,239.72)	132,808.38	(132,808.38)			109,550.04	82,207.58		27,342.46
Fringe Benefits:													
11-1177-591-000	FICA (Social Security, Medicare)		10,033.74		(10,033.74)	10,314.56	(10,314.56)			8,380.56	6,080.86		2,299.70
11-1177-593-000	Unemployment					173.79	(173.79)				327.50		(327.50)
11-1177-594-000	Insurance Premiums		8,646.33		(8,646.33)	9,573.19	(9,573.19)			40,296.00	7,753.64		32,542.36
11-1177-595-000	Retirement Contributions					2,750.00	(2,750.00)						
11-1177-596-000	Other Fringe Benefits		2,333.31		(2,333.31)	10,762.60	(10,762.60)						
	Total Fringe Benefits		21,013.38		(21,013.38)	33,574.14	(33,574.14)			48,676.56	14,162.00		34,514.56
Travel:													
11-1177-601-000	Travel: Lodging, Airfare, Mileage									1,000.00	30.00		970.00
	Total Travel									1,000.00	30.00		970.00
Subscriptions:													
11-1177-682-000	Subscriptions									300.00			300.00
	Total Subscriptions									300.00			300.00
Instructional Supplies:													
11-1177-700-000	Instructional Supplies									300.00			300.00
	Total Instructional Supplies									300.00			300.00
Office Supplies:													
11-1177-701-000	Office Supplies									300.00			300.00
	Total Office Supplies									300.00			300.00
Total			180,253.10		(180,253.10)	166,382.52	(166,382.52)			160,126.60	96,399.58		63,727.02

The Mathematics budget is unique in that it is tied to this program as well as the Developmental Math Program. Both Brian Southworth and Allen Shockley use this budget.

Southworth and Shockley will use \$95 each for annual AMATYC memberships. A total of \$160

Both faculty members will attend the AMATYC 2022 Toronto Conference. The registration is \$405 each, which will be covered by the AY2021-2022 budget. AY2022-2023 budget will cover air fare of \$500-600 per person and estimated \$700 per person for the hotel. A total of \$2600.

Physical Science:

INDEPENDENCE COMMUNITY COLLEGE Physical Science

Fund 11 Expenses	AY2019-2020 For the Twelve Months Ending Tuesday, June 30, 2020				AY2020-2021 For the Twelve Months Ending Wed., June 30, 2021				AY2021-2022 For the Eight Months Ending Monday, February 28, 2022			
	Operating Budget	Expense	Encumbered	Remaining	Operating Budget	Expense	Encumbered	Remaining	Operating Budget	Expense	Encumbered	Remaining
Salary:												
11-1174-510-000 Administrative (Salary)					125.00	(125.00)						
11-1174-520-000 Faculty Salaries: Full-Time Faculty	61,883.34			(61,883.34)	62,625.03	(62,625.03)			75,519.96	41,883.38		33,636.58
11-1174-521-000 Faculty Salaries: Overload	5,775.00			(5,775.00)	5,500.01	(5,500.01)				6,250.01		(6,250.01)
11-1174-522-000 Faculty Salaries: Adjunct	2,775.00			(2,775.00)	10,550.49	(10,550.49)						
11-1174-523-000 Faculty Salary: Supplemental Pay	366.67			(366.67)								
Total Salary	70,800.01			(70,800.01)	78,800.53	(78,800.53)			75,519.96	48,133.39		27,386.57
Fringe Benefits:												
11-1174-591-000 FICA (Social Security, Medicare)	4,781.26			(4,781.26)	6,173.78	(6,173.78)			5,777.28	3,867.32		1,909.96
11-1174-593-000 Unemployment					70.93	(70.93)				220.31		(220.31)
11-1174-594-000 Insurance Premiums	3,720.00			(3,720.00)	2,571.82	(2,571.82)			8,952.00	1,011.07		7,940.93
11-1174-595-000 Retirement Contributions					620.00	(620.00)						
11-1174-596-000 Other Fringe Benefits					1,240.00	(1,240.00)				2,170.00		(2,170.00)
Total Fringe Benefits	8,501.26			(8,501.26)	10,676.53	(10,676.53)			14,729.28	7,268.70		7,460.58
Travel:												
11-1174-601-000 Travel: Lodging, Airfare, Mileage									1,500.00			1,500.00
Total Travel									1,500.00			1,500.00
Repairs:												
11-1174-649-000 Repairs									1,400.04			1,400.04
Total Repairs									1,400.04			1,400.04
Instructional Supplies:												
11-1174-700-000 Instructional Supplies	566.00			(566.00)	248.55	(248.55)			154.82			(154.82)
Total Instructional Supplies	566.00			(566.00)	248.55	(248.55)			154.82			(154.82)
Professional Development:												
11-1174-717-000 Professional Development									500.00			500.00
Total Professional Development									500.00			500.00
Equipment:												
11-1174-850-000 Equipment - Non-Capital									500.00			500.00
Total Equipment									500.00			500.00
Total	79,867.27			(79,867.27)	89,725.61	(89,725.61)			94,149.28	55,556.91		38,592.37

The budget of physical science is divided between the field of physics as well as astronomy. The most beneficial conferences are:

- AAPT conference, national chapter.
- American Astronomical Society conference.

In addition to these conferences, there are visits to neighboring observatories. Therefore, the budget is to be set at \$1000.00 for travel, lodging, and conference fees.

9.0 Program Planning and Development Participation

9.1 Faculty and Staff

Program faculty will provide a brief narrative of how faculty and staff participated in the program review, planning and development process. List the preparer(s) by name(s).

Narrative:

Brian Southworth authored the report in consultation with Nathan Chaplin, Narinder Sharma, and Mona Saleh. Each author provided assessment data. Anita Chappuie, Director of Institutional Research, provided the data.

9.2 VPAA and/or Administrative Designee Response

After review and reflection of the *Comprehensive Program Review* or the *Annual Program Review*, the Division Chair and VPAA will write a summary of their response to the evidence provided. The Division Chair and VPAA's response will be available to programs for review and discussion prior to beginning the next annual planning and development cycle.

Narrative:

As Division Chair of the Math and Science Division, I agree with recommendations of this program review. -Brian Southworth. 3/11/2022

Program Review Committee: The Program Review Committee agrees with the recommendations of this program review. 3/25/2022

Vice President for Academic Affairs: I agree with the recommendations of, and the data contained within this program review. TCC 4/14/2022

10.0 Appendices

Any additional information that the programs would like to provide may be included in this section.

Associate of Science in Engineering, Mathematics, and Physical Sciences

Last Modified April 6, 2018

Program Description: The Associate of Science Degree in Engineering, Mathematics, and Physical Sciences is intended to enable students complete the necessary courses at the first-year and sophomore level in pursuit of Bachelor of Science Degree in the areas of chemistry, engineering, mathematics, or physics. The student needs to choose an area of emphasis at the time of choosing this program.

Analysis & Oral Communication (9 hours)

English Composition I (ENG1005)
English Composition II (ENG1013)
Public Speaking (COM1203) or Interpersonal Communications (COM1223)

Mathematics (5 hours)

Analytic Geometry & Calculus I (MAT1055)

Biological Sciences (5 hours)

Biology for Non-Majors (BIO1005)
Biology I (BIO1115)

Fine Arts and Aesthetic Studies (3 hours)

Art Appreciation (AED1043)
Drawing and Composition (AED???)
Ceramics I (AED2023)
Painting I (AED1033)
Music Appreciation (MUE1303)
Music Theory I (MUE1093)
Creative Writing (ENG2021)
Theatre Appreciation (THR1013)
Acting I (THR1021)
Stagecraft I (THR1033)

Cultural Studies (3 hours)

Anthropology
French I, II, III (FRL1005, 1015, 2005)
Spanish I, II, III (FRL1025, 1035, 2035)
World Regional Geography (SOC2013)
Intro to Race and Ethnic Relations (SOC2113)
African American History (HIS1163)
World History I (HIS1003)
World History II (HIS1013)

Human Heritage (3 hours)

History
 U.S. History I (HIS1023)
 U.S. History II (HIS1063)
Literature
 Introduction to Literature (ENG1073)
 American Literature I (ENG1083)
 American Literature II (ENG2113)
 Brit Literature I (ENG2123)

Brit Literature II (ENG2133)
Topics in Literature (ENG2153)
Philosophy and Religion
 Introduction to Philosophy (PHI2003)
 Ethics (SOC1073)
 Logical and Classical Reasoning (PHI2073)
 New Testament History (REL1013)

Social and Behavioral Science

Psychological (3 hours)

General Psychology (BEH1003)

Select 2 courses from two different subject areas below (6 hours)

Social Awareness
 Introduction to Sociology (SOC1003)
 Social Problems (SOC2023)
Political Awareness
 American Government (POL1023)
 Introduction to Political Science (POL1013)

Business and Technology

Personal Finance (BUS1003)
Financial Accounting (ACC1044)
Introduction to Business (BUS1093)
Computer Concepts and Apps (CIT1003)
Microeconomics (BUS2023)
Macroeconomics (BUS2033)

Total Core and General Education Hours: 37

Chemistry Emphasis (23)

Chemistry I (PHS1055)
Chemistry II (PHS1065)
Choice of 13 credit hours of the following:
 Organic Chemistry I (PHS2025)
 Organic Chemistry II (PHS2035)
 Analytic Geometry & Calculus II (MAT2025)
 Analytic Geometry & Calculus III (MAT2033)
 Elementary Statistics (MAT1103)
 Engineering Physics I (PHS2055) or College Physics I (PHS1055)
 Engineering Physics II (PHS2065) or College Physics II (PHS1065)

Mathematics Emphasis (24)

Analytic Geometry & Calculus II (MAT2025)
Analytic Geometry & Calculus III (MAT2033)
Elementary Statistics (MAT1103)
Engineering Physics I (PHS2055) or College Physics I (PHS1055)
Engineering Physics II (PHS2065) or College Physics II (PHS1065)
Programming Language (CSE2023 or CSE 2113)

Physics Emphasis (23)

Engineering Physics I (PHS2055) or College Physics I (PHS1055)
Engineering Physics II (PHS2065) or College Physics II (PHS1065)
Choice of 13 credit hours of the following:

Chemistry I (PHS1055)
Chemistry II (PHS1065)
Analytic Geometry & Calculus II (MAT2025)
Analytic Geometry & Calculus III (MAT2033)
Elementary Statistics (MAT1103)

Astronomy (PHS???5)

Pre-Engineering Emphasis (24)

Engineering Physics I (PHS2055)
Engineering Physics II (PHS2065)
Analytic Geometry & Calculus II (MAT2025)
Choice of 9 credit hours in an engineering discipline...(Civil,
Mechanical, Chemical, Environmental, Electrical)

**See Advisor for suggestions

Total Credit Hours by Emphasis

Chemistry: 60
Mathematics: 61
Physics 60
Pre-Engineering: 61

Assessment Report for *Analytical Geometry & Calculus I/MAT1055*

This course is KBOR aligned: Yes/No

For all measures; goal of 70% of the students will meet expectations.

1. **Met:** Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.

1. Chapter Test
2. 100%

Summary: No Changes necessary.

2. **Met:** Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.

1. Chapter Test
2. 100 %

Summary: No Changes necessary.

3. **Met:** Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.

1. Chapter Test
2. 100 %

Summary: No Changes necessary.

4. **Met:** Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.

1. Chapter Test
2. 100%

Summary: No Changes necessary.

5. **Met:** Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.

1. Chapter Test
2. 67 %

Summary: No Changes necessary. This class has three students in it. Two of the students met this outcome and one did not. Since the majority of the class met this outcome, I consider it met.

6. **Met:** Integrate using numerical techniques (Simpson's and the Trapezoid Rules).

1. Chapter Test
2. 100 %

Summary: No Changes necessary.

Final Comments: This class was on-ground at the start of the semester and used an online homework system from the start of class. The switch from on-ground to online was less traumatic for the students in this course than my other courses. This class also regularly attended MS Teams to work examples.

Assessment Report for *Analytical Geometry & Calculus I/MAT1055*

This course is KBOR aligned: Yes/~~No~~

List of Learning Outcomes:

1. Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.
2. Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.
3. Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.
4. Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.
5. Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.
6. Integrate using numerical techniques (Simpson's and the Trapezoid Rules).

Summary:

I may have misinterpreted the rubric. The percent that I gave was the level of mastery that the students achieved, not the percent of students that achieved that level. Some of the data may be skewed due to the format used for online assessment.

Measures, Data, and Results:

1. Learning Outcome #1: Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.

1. Measure #1: Evaluate.

1. Target Goal: 70% of Students show 70% mastery
2. Data: 6 of 6 (100) showed mastery

2. Measure #2: Evaluate.

1. Target Goal: 70% of Students show 70% mastery
2. Data: 6 of 6 (100) showed mastery

3. Measure #3: Determine the continuity of f at $a = 1$. Use the continuity checklist to justify your answer.

1. Target Goal: 70% of Students show 70% mastery
2. Data: 6 of 6 (100%) showed mastery

4. Results: This learning outcome was ____ Met ____ (Met/Not met/Partially Met)

5. Future Changes:

6. Strengths:

7. Weaknesses:

8. Additional Comments:

Learning Outcome #2: Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.

1. Measure #1: Find the derivative of $f(x) = x^2 + 3x - 5$.

1. Target Goal: 70% of Students show 70% mastery
2. Data: 6 of 6 (96%) showed mastery

2. Measure #2: Find the derivative of $f(x) = \sin(x)$.

1. Target Goal: 70% of Students show 70% mastery
2. Data: 6 of 6 (92%) showed mastery

3. Measure #3: Suppose a stone is thrown vertically upwards from the edge of a cliff with an initial velocity of 64 ft/s from a height of 32 feet above the ground. The height s (in feet) of the stone above the ground t after it is thrown is . Determine the velocity and acceleration after t seconds.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (96%) showed mastery

4. Results: This learning outcome was ___Met_____ (Met/Not met/Partially Met)

5. Future Changes:

6. Strengths:

7. Weaknesses:

8. Additional Comments:

3. Learning Outcome #3: Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.

1. Measure #1: Using Newton's method find the third approximation, x_3 , to the root of given the first approximation, $x_1 = 1$.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (93%) showed mastery

2. Measure #2: Solve optimization problem: If 1200 of material is available to make a box with a square base and open top, find the largest possible volume of the box.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (93%) showed mastery

3. Measure #3: Graph a curve finding maximum and minimum points, inflection and concavity.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (93%) showed mastery

4. Results: This learning outcome was ___Met_____ (Met/Not met/Partially Met)

5. Future Changes:

6. Strengths:

7. Weaknesses:

8. Additional Comments:

4. Learning Outcome #4: Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.

1. Measure #1: Integrate an indefinite Integral.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (96%) showed mastery

2. Measure #2: Integrate a definite integral.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (96%) showed mastery

3. Measure #3: Express the limit, on the interval as a definite integral. Do not integrate.

1. Target Goal: 70% of Students show 70% mastery

2. Data: 6 of 6 (96%) showed mastery

5. Results: This learning outcome was ___Met_____ (Met/Not met/Partially Met)

6. Future Changes:

6. Strengths:

7. Weaknesses:

8. Additional Comments:

5. Learning Outcome #5: Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.

1. Measure #1: Find the derivative of an exponential function. Find the derivative of .

1. Target Goal: 70% of Students show 70% mastery
 2. Data: 6 of 6 (83%) showed mastery
2. Measure #2: Find the derivative of a logarithmic function. Find the derivative of
1. Target Goal: 70% of Students show 70% mastery
 2. Data: 6 of ?? (83%) showed mastery
3. Measure #3: Evaluate the limit.
1. Target Goal: 70% of Students show 70% mastery
 2. Data: 6 of 6 (83%) showed mastery
4. Results: This learning outcome was _____ (Met/Not met/Partially Met)
5. Future Changes:
6. Strengths:
7. Weaknesses:
8. Additional Comments:
6. Learning Outcome #6: Integrate using numerical techniques (Simpson's and the Trapezoid Rules).
1. Measure #1: Integrate using Simpsons or Trapezoid rule. using $n = 6$.
 1. Target Goal: 70% of Students show 70% mastery
 2. Data: 6 of 6 (75%) showed mastery
 2. Measure #2: Find error for Simpson's or the Trapezoid rule for using $n = 6$.
 1. Target Goal: 70% of Students show 70% mastery
 2. Data: 6 of ?6 (75%) showed mastery
3. Results: This learning outcome was __Met_____ (Met/Not met/Partially Met)
4. Future Changes:
5. Strengths:
7. Weaknesses:

8. Additional Comments:

PENDING APPROVAL

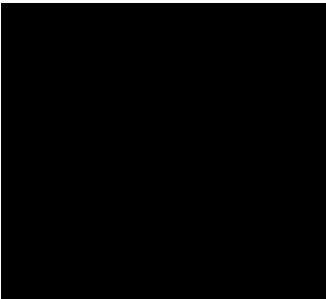
Fall 2019 Analytical Geometry and Calculus I

Results for Fall Semester 2019-- 2020

Key

1 = The student met the outcome.

0 = The student did not meet the outcome.

Name/ID	Outcome 1			Outcome 2		
	Measure 1	Measure 2	Measure 3	Measure 1	Measure 2	Measure 3
	1	1	1	1	1	1
	1	1	0	1	1	1
	1	1	1	1	1	1
	1	1	0	1	1	0
	1	1	0	1	1	0
	1	1	1	1	1	1
	1	1	0.5	1	1	0.666666
	0.833333			0.888888		667
	333			889		

1. The students were overall successful with limits and derivatives.
2. Students may need to improve on the application aspect.
3. Students need more real world application of the concepts.
4. I plan on finding more application problems, whether it be in another calculus book or online.

1. What strengths were displayed through the assessments of your measures?

The students overall were good at limits and derivatives.

2. What weaknesses were displayed through the assessments of your measures?

Some of the students had issues with applications, but they were mainly those students who were not taking physics at the same time.

3. Based on the results and analysis, what recommendations will be made to better achieve the desired outcome?

More real world application.

4. What changes do you plan to make?

I plan on looking for more application problems on Teacher Pay Teachers.

PENDING APPROVAL

Assessment Report for *Elementary Statistics (Mat1103)* Spring 2020

This course is KBOR aligned: Yes/~~No~~

List of Learning Outcomes:

1. Create graphical and numerical descriptions of quantitative and qualitative data.

1. Measures: 75% of students will master this outcome

Percentage of People Who Completed 4 or More Years of College Listed by state are the percentages of the population who have completed 4 or more years of a college education. Construct a frequency distribution with 7 classes.

21.4	26.0	25.3	19.3	29.5	35.0	34.7	26.1	25.8	23.4
27.1	29.2	24.5	29.5	22.1	24.3	28.8	20.0	20.4	26.7
35.2	37.9	24.7	31.0	18.9	24.5	27.0	27.5	21.8	32.5
33.9	24.8	31.7	25.6	25.7	24.1	22.8	28.3	25.8	29.8
23.5	25.0	21.8	25.2	28.7	33.6	33.6	30.3	17.3	25.4

2. Measures 75% of students will master this outcome

Each year advertisers spend billions of dollars purchasing commercial time on network sports television. In the first 6 months of 1988, advertisers spent \$1.1 billion. A recent article listed the top 10 leading spenders (in millions of dollars):

Company A	\$70.6	Company F	\$27.8
Company B	62.8	Company G	26.9
Company C	57.8	Company H	21.9
Company D	55.2	Company I	22.4
Company E	29.7	Company J	19.3

Calculate the mean amount spent.

3. Measures 75% of students will master this outcome

Find the sample standard deviation.

2, 3, 4, 5, 6

2. Calculate probabilities and percentiles related to a general normal distribution.

1. Measures 75% of students will master this outcome

A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 440 seconds and a standard deviation of 40 seconds. Find the probability that a randomly selected boy in secondary school can run the mile in less than 348 seconds.

(Round to 4 decimal places)

2. Measures 75% of students will master this outcome

The average score of all golfers for a particular course has a mean of 75 and a standard deviation of 3.5. Suppose 49 golfers played the course today. Find the probability that the average score of the 49 golfers exceeded 76.

(Round to 4 decimal places)

3. Measures 75% of students will master this outcome

Find the indicated z-score.

Find the z-scores for which 98% of the distribution's area lies between $-z$ and z .

3. Distinguish differences in data analysis and interpretation between observational data and data from designed experiments.

1. Measures 75% of students will master this outcome

Identify sampling method used:

In a medical research study, a researcher selects a hospital and interviews all the patients that day.

2. Measures 75% of students will master this outcome

Suggest some confounding variables that the researcher might want to consider when doing a study:

The New England Journal of Medicine reported that when poor women move to better neighborhoods, they lower the risk of developing obesity and diabetes.

3. Measures 75% of students will master this outcome

Determine whether the data are qualitative or quantitative:

Pizza sizes (small, medium, and large)

4. Calculate and interpret a confidence interval for a single parameter, using both large and small samples.

1. Measures 75% of students will master this outcome

When 415 junior college students were surveyed, 150 said they have a passport. Construct a 95% confidence interval for the proportion of junior college students that have a passport. Round to the nearest thousandth.

2. Measures 75% of students will master this outcome

Construct a 90% confidence interval for the population mean, μ . Assume the population has a normal distribution. A sample of 15 randomly selected math majors has a grade point average of 2.86 with a standard deviation of 0.78. Round to the nearest hundredth.

3. Measures 75% of students will master this outcome

Construct a 95% confidence interval for the population standard deviation σ of a random sample of 15 crates which have a mean weight of 165.2 pounds and a standard deviation of 10.4 pounds. Assume the population is normally distributed.

5. Perform and interpret a test of hypotheses for a single parameter, using both large and small samples.

1. Measures 75% of students will master this outcome

A recipe submitted to a magazine by one of its subscribers states that the mean baking time for a cheesecake is 55 minutes. A test kitchen preparing the recipe before it is published in the magazine makes the cheesecake 10 times at different times of the day in different ovens. The following baking times (in minutes) are observed.

54 55 58 59 59 60 61 61 62 65

Assume that the baking times belong to a normal population. Test the null hypothesis that the mean baking time is 55 minutes against the alternative hypothesis $\mu > 55$. Use $\alpha = .05$.

2. Measures 75% of students will master this outcome

A recent study claimed that less than 15% of junior high students are overweight. In a sample of 160 students, 18 were found to be overweight. At $\alpha = 0.05$, test the claim.

3. Measures 75% of students will master this outcome

In 2010, the mean expenditure for auto insurance in a certain state was \$806. An insurance salesperson in this state believes that the mean expenditure for auto insurance is less today. She obtains a simple random sample of 32 auto insurance policies and determines the mean expenditure to be \$781 with a standard deviation of \$39.13. Is there enough evidence to support the claim that the mean expenditure for auto insurance is less than the 2010 amount at the $\alpha = 0.05$ level of significance?

6. Perform and interpret statistical inference on the difference of two parameters.

1. Measures 75% of students will master this outcome

A recent survey showed that in a sample of 100 elementary school teachers, 21 were single. In a sample of 190 high school teachers, 41 were single. Is the proportion of high school teachers who were single less than the proportion of elementary teachers who were single? Use $\alpha = 0.01$.

2. Measures 75% of students will master this outcome

In the initial test of the Salk vaccine for polio, 400,000 children were selected and divided into two groups of 200,000. One group was vaccinated with the Salk vaccine while the second group was vaccinated with a placebo. Of those vaccinated with the Salk vaccine, 41 later developed polio. Of those receiving the placebo, 102 later developed polio. Test the hypothesis that the Salk vaccine is effective in lowering the polio rate. Use $\alpha = 0.05$.

- Measures 75% of students will master this outcome

Nine students took the SAT. Their scores are listed below. Later on, they read a book on test preparation and retok the SAT. Their new scores are listed below. Test the claim that the book had no effect on their scores. Use $\alpha = 0.05$. Assume that the distribution is normally distributed.

Student	1	2	3	4	5	6	7	8	9
Scores before reading book	720	860	850	880	860	710	850	1200	950
Scores after reading book	740	860	840	920	890	720	840	1240	970

- Fit and interpret a simple linear regression model, including correlation and scatterplots.

- Measures 75% of students will master this outcome

The data below are the final exam scores of 10 randomly selected calculus students and the number of hours they slept the night before the exam. Calculate the linear correlation coefficient.

Hours, x	5	7	4	10	4	6	6	7	8	5
Scores, y	71	86	66	94	72	84	91	96	96	77

- Measures 75% of students will master this outcome

The regression line for the given data is $\hat{y} = -1.885x + 0.758$. Determine the residual of a data point for which $x = -1$ and $y = 3$.

x	-5	-3	4	1	-1	-2	0	2	3	-4
y	11	6	-6	-1	3	4	1	-4	-5	8

- Measures 75% of students will master this outcome

The data below are the average one-way commute times (in minutes) for selected students and the number of absences for those students during the term. Find the equation of the regression line for the given data. What would be the predicted number of absences if the commute time was 95 minutes? Is this a reasonable question? Round the predicted number of absences to the nearest whole number. Round the regression line values to the nearest hundredth.

Commute time (min), x	72	85	91	90	88	98	75	100	80
Number of absences, y	3	7	10	10	8	15	4	15	5

Measures, Data, and Results:

1. **<Partially Met>**: Create graphical and numerical descriptions of quantitative and qualitative data.

1. 63 %
2. 83 %
3. 100%

Summary: It appears that more focus should be on creating the graphical displays.

2. **<Partially Met>**: Calculate probabilities and percentiles related to a general normal distribution.

1. 86 %
2. 57 %
3. 86%

Summary: I expected a higher percentage for the Central Limit Theorem problems. More focus should be placed on identifying those types of problems.

3. **<Met>**: Distinguish differences in data analysis and interpretation between observational data and data from designed experiments.

1. 100 %
2. 100 %
3. 100 %

Summary: This is not a surprise since it is simpler material.

4. **<Partially Met>**: Calculate and interpret a confidence interval for a single parameter, using both large and small samples.

1. 50 %
2. 67 %
3. 83 %

Summary: The main issue here seemed to be the failure to identify which technique to use in the problems. A flowchart and focus on “which method to use” should be implemented.

5. **<Partially Met>**: Perform and interpret a test of hypotheses for a single parameter, using both large and small samples.

1. 77.6 %
2. 60.6 %
3. 80.6 %

Summary: Again the main issue here seemed to be confusion on which method to use. One individual was mixing the p-value approach with the traditional or classical approach.

6. **<Not Met>**: Perform and interpret statistical inference on the difference of two parameters.

1. 60.75 %
2. 55.75 %
3. 73.75%

Summary: I think that more assignment problems might help on these topics.

7. **<Met>**: Fit and interpret a simple linear regression model, including correlation and scatterplots.

1. 100 %

2. 80 %
3. 80%

Summary: The calculator does most of this technique so it is not surprising that these were higher.

Final Comments: Part of the problem with the statistics is the size of the class (6 students that finished to the end). One student with either low or high scores can skew the results.

PENDING APPROVAL

Assessment Report for *Chemistry I for Majors/PHS1025*

Term: Fall 2019 Prepared By: Nyssa Crompton

List of Learning Outcomes: (KBOR Aligned)

1. Explain the processes involved in the scientific method and be able to apply it to investigate natural phenomena and solve problems
2. Explain the design and significance of experiments that led to the adoption of modern atomic theory
3. Recognize and interpret isotopic notation; understanding the relationship between average atomic masses and isotopic masses
4. Relate atomic mass to composition in terms of subatomic particles
5. Descriptive chemistry of ionic and covalent compounds
6. Solutions
7. Chemical reaction and stoichiometry
8. Properties of solids, liquids, and gases
9. Describe, define, and perform calculations involving the following basic concepts thermodynamics
10. Conceptually and quantitatively relate spectroscopic observation of atoms to quantum mechanical theories
11. Molecular Bonding and Structure
12. Work in the laboratory in accordance with good laboratory practices
13. Gather and record qualitative and quantitative data accurately
14. Handle and evaluate data in logical, productive, and meaningful ways
15. Correlate laboratory work with principle topics in Chemistry I lecture

Summary:

CHM-I started with 6 students this year, and ended with 1 A, 1 B, 1 C, 1 D, 1 W for medical reasons early in the semester, and 1 W where the student quit after not being allowed to attend a hazardous materials lab late after a warning (also in September). This year, the course was reworked to remove the bridge chapter to CHM-II, to make all labs lab notebook labs instead of a mix of notebook and worksheet labs, and to incorporate a new online textbook. Learning outcomes #7, 12, 13, and 14 were met, #1, 3, 4, 6, 8, 11, and 15 were considered partially met, and #2, 5, 9, and 10 were not met. The best success was the meeting of most of the lab outcomes, which was due to the redesign of the laboratory notebook experience based on last year's assessment data. All of the lab learning outcomes would have met, except the students turned in the final lab report with a plagiarized paragraph in the introduction section. This year, a comprehensive final was used to assess all 11 lecture learning outcomes. The final was slightly long, but built with simpler questions than in previous years. The students told me that they did not need extra review sessions nor come to office hours the week before the final; however, on the final, the students demonstrated a clear lack of long-term learning across the course, which resulted in only #7 being met. The biggest change for next year is to incorporate more review problems prior to Thanksgiving and the final week of classes in preparation for the final.

Measures, Data, and Results:

1. Learning Outcome #1: Explain the processes involved in the scientific method and be able to apply it to investigate natural phenomena and solve problems
 1. Measure #1: Exam #1 Question

1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 3 out of 4 students (75%) received at least 70% on this activity.
2. Measure #2: Final Lab Data & Analysis Sections
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 4 out of 4 students (100%) received at least 70% on this activity.
3. Measure #3: Final Exam Q Set #1/2
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
4. Results: This learning outcome was Partially Met
5. Future Changes: Change final exam question. The question asked the students to identify the steps of the scientific method in Rutherford's gold foil experiment. The students interpreted the wording as first describe the experiment, and then just listed the scientific method steps without identifying where they went in Rutherford's experiment.
6. Strengths: Students demonstrated the ability to carry out the scientific method
7. Weaknesses: Students do not know what the words of the scientific method really mean in the laboratory, even though they are doing them.
8. Additional Comments: None at this time.
2. Learning Outcome #2: Explain the design and significance of experiments that led to the adoption of modern atomic theory
 1. Measure #1: Lab 3: Understanding the atom
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 3 out of 4 students (75%) received at least 70% on this activity.
 2. Measure #2: Exam 1 question on one of the key early atomic experiments
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
 3. Measure #3: Final Exam question set #1/2
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
 4. Results: This learning outcome was NOT met

5. Future Changes: Emphasize the importance of this concept in more homework problems prior to exam, and change final exam question- see learning outcome #1 above.
 6. Strengths: The students appeared to understand the key experiments during the lab.
 7. Weaknesses: Students did not feel that this information was valuable to learn exams.
 8. Additional Comments: Not at this time
3. Learning Outcome #3: Recognize and interpret isotopic notation; understanding the relationship between average atomic masses and isotopic masses
1. Measure #1: Ch 2 Challenge Qs (5 Qs specifically practicing calculating isotopic masses and abundances)
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 4 out of 4 students (100%) received at least 70% on this activity.
 2. Measure #2: Exam #1 Q on calculating isotopic abundance
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 3 out of 4 students (75%) received at least 70% on this activity.
 3. Measure #3: Final Exam Q-Set #3 on calculating isotopic masses from abundances
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
 4. Results: This learning outcome was Partially Met
 5. Future Changes: Possibly create a set of review problems before the final
 6. Strengths: Students understood the material right after practicing it
 7. Weaknesses: Long-term learning was lacking in this area
 8. Additional Comments: None at this time
4. Learning Outcome #4: Relate atomic mass to composition in terms of subatomic particles
1. Measure #1: Ch 2 Content & Basic Skills Qs
 1. Target Goal: 70% of students who attended receive at least 70% on this activity
 2. Data: 4 out of 4 students (100%) received at least 70% on this activity.
 2. Measure #2: Exam #1 Qs on subatomic particles #1(11 – 20)
 1. Target Goal: 70% of students who attended receive at least 70% on this activity

2. Data: 3 out of 4 students (75%) received at least 70% on this activity.
 3. Measure #3: Final Exam Q-Set #4 on subatomic particles
 1. Target Goal: 70% of students who attended receive at least 70% on this activity
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
 4. Results: This learning outcome was Partially Met
 5. Future Changes: Possibly create a set of review problems before the final
 6. Strengths: Students understood the material right after practicing it
 7. Weaknesses: Long-term learning was lacking in this area
 8. Additional Comments: None at this time
5. Learning Outcome #5: Descriptive chemistry of ionic and covalent compounds
 1. Measure #1: Ch 2 Content & Basic Skills Qs
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 4 out of 4 students (100%) received at least 70% on this activity.
 2. Measure #2: Exam #1 Qs on subatomic particles #1 (21 – 50)
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
 3. Measure #3: Final Exam Q-Set #5 on ionic and covalent compounds
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 1 out of 4 students (25%) received at least 70% on this activity.
 4. Results: This learning outcome was NOT met
 5. Future Changes: Add the planned lesson on this topic, see additional comments
 6. Strengths: Students could answer questions about this outside of exam settings
 7. Weaknesses: Students did not value this concept, probably because there was not a class session covering it.
 8. Additional Comments: The class day that we were to lecture over this content was cancelled by the administration, while sports activities were allowed to continue. The subject was attempted to be covered over the internet with an additional packet of problems, but the students never did that packet because it wasn't worth points, and the material was never covered as deeply as it was supposed to be this year.

6. Learning Outcome #6: Solutions

1. Measure #1: Chapter 6- All homework

1. Target Goal: 70% of students who attended receive at least 70% on this activity
2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

2. Measure #2: Solutions Lab (#6)

1. Target Goal: 70% of students who attended receive at least 70% on this activity
2. Data: 3 out of 4 students (75%) received at least 70% on this activity.

3. Measure #3: Final Exam Q-Set #6 Solutions

1. Target Goal: 70% of students who attended receive at least 70% on this activity
2. Data: 1 out of 4 students (25%) received at least 70% on this activity.

4. Results: This learning outcome was Partially Met

5. Future Changes: Possibly create a set of review problems before the final

6. Strengths: Students understood the material right after practicing it

7. Weaknesses: Long-term learning was lacking in this area

8. Additional Comments: None at this time

7. Learning Outcome #7: Chemical reactions and stoichiometry

1. Measure #1: All Ch 7 Problems

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

2. Measure #2: Exam #2

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 3 out of 4 students (75%) received at least 70% on this activity.

3. Measure #3: Final Exam Q-Set #7

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 2 out of 4 students (50%) received at least 70% on this activity.

4. Results: This learning outcome was Met

5. Future Changes: Possibly create a set of review problems before the final

6. Strengths: Students understood the material right after practicing it on an exam level scale

7. Weaknesses: Long-term retention

8. Additional Comments: One student did not attempt the final exam question, and the other was close to getting 70%, so the outcome is being considered met. This is the area where the most time in the course is spent and more time was spent here than last year, due to last year's class struggling so greatly with it. In general, this is considered a big success from our assessment learnings from last year.

8. Learning Outcome #8: Properties of solids, liquids, or gases

1. Measure #1: All Ch 8 and 10 problems

1. Target Goal: 70% of students who attended receive at least 70% on this activity
2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

2. Measure #2: Phases half of Exam #2 (All of Group 1 Qs, and Group 2 #3)

1. Target Goal: 70% of students who attended receive at least 70% on this activity

2. Data: 3 out of 4 students (75%) received at least 70% on this activity.

3. Measure #3: Final Exam Q-Set #8: Phases

1. Target Goal: 70% of students who attended receive at least 70% on this activity

2. Data: 1 out of 4 students (25%) received at least 70% on this activity.

4. Results: This learning outcome was Partially Met

5. Future Changes: Possibly create a set of review problems before the final

6. Strengths: Students understood the material right after practicing it

7. Weaknesses: Long-term learning was lacking in this area

8. Additional Comments: None at this time

9. Learning Outcome #9: Describe, define, and perform calculations involving the following basic concepts thermodynamics

1. Measure #1: All Chapter 9 Problems

1. Target Goal: 70% of students who attended receive at least 70%

2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

2. Measure #2: Thermo half of Exam #2

1. Target Goal: 70% of students who attended receive at least 70%

2. Data: 2 out of 4 students (50%) received at least 70% on this activity.

3. Measure #3: Final Exam Q-Set #9: Thermo

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 2 out of 4 students (50%) received at least 70% on this activity.

4. Results: This learning outcome was NOT Met

5. Future Changes: Consider altering the schedule to make Ch 9 have an extra day or be the chapter that is divided up instead of Ch 8

6. Strengths: Calorimetry problems went better this year

7. Weaknesses: Heating curves were the major problem

8. Additional Comments: None at this time

10. Learning Outcome #10: Conceptually and quantitatively relate spectroscopic observation of atoms to quantum mechanical theories

1. Measure #1: Ch 3 Challenge Qs

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 2 out of 4 students (50%) received at least 70% on this activity.

2. Measure #2: Exam #1 Quantum Qs

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 2 out of 4 students (50%) received at least 70% on this activity.

3. Measure #3: Final Exam Q-Set #10: Quantum

1. Target Goal: 70% of students who attended receive at least 70%

2. Data: 0 out of 4 students (0%) received at least 70% on this activity.
4. Results: This learning outcome was Not met
5. Future Changes: Make printouts next year of the key concepts to use in lecture
6. Strengths: None evident
7. Weaknesses: Students continue to struggle with these concepts, despite a new book and a new way of approaching this chapter
8. Additional Comments: This is the hardest section of the course, and is taught in varying levels at CHM-I. Sometimes these concepts are saved until year 3 of chemistry, but it is one of our learning outcomes. Out of all of these outcomes, this is one that I expect will have the most trouble meeting based on the advanced nature of the content material.

11. Learning Outcome #11: Molecular Bonding and Structure

1. Measure #1: All Chapter 4 & 5 Problems

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 3 out of 4 students (75%) received at least 70% on this activity.

2. Measure #2: Exam #1 Mol Bonding and Structure Qs

3. Target Goal: 70% of students who attended receive at least 70%
4. Data: 2 out of 4 students (50%) received at least 70% on this activity.

3. Measure #3: Final Exam Q-Set #11: Mol & Lewis Structure

5. Target Goal: 70% of students who attended receive at least 70%
6. Data: 0 out of 4 students (0%) received at least 70% on this activity.

4. Results: This learning outcome was Partially Met
5. Future Changes: Shorten the final exam
6. Strengths: Lewis structures were ok, but as good as prior years.
7. Weaknesses: Molecular orbital diagrams were not as well understood this year as last year. The final exam was slightly long, and two of the four students did not address this problem (the last on the exam) for apparently time-related reasons.
8. Additional Comments: This was the other content that suffered from losing the class day on this material right after Labor Day.

12. Learning Outcome #12: Work in the laboratory in accordance with good laboratory practices

1. Measure #1: Aggregate Lab Work Points from every lab in the semester
 1. Target Goal: 70% of students who attended receive at least 70%
 2. Data: 4 out of 4 students (100%) received at least 70% on this activity.
2. Results: This learning outcome was MET
3. Future Changes: Not at this time
4. Strengths: Lab safety lecture continues to prove its worth
5. Weaknesses: None evident
6. Additional Comments: None at this time

13. Learning Outcome #13: Gather and record qualitative and quantitative data accurately

1. Measure #1: Aggregate Lab Notebook Points
 1. Target Goal: 70% of students who attended receive at least 70%

2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

2. Results: This learning outcome was MET

3. Future Changes: Not at this time

4. Strengths: By switching to all lab notebook labs from the beginning, the formatting was picked up and became something natural for them all to do.

5. Weaknesses: Confusion in the first few labs as to how to turn questions in and needing conclusions in the notebook continued to plague people.

6. Additional Comments: This was one of the other large changes based on last year's assessment, and it has appeared to pay off.

14. Learning Outcome #14: Handle and evaluate data in a logical, productive, and meaningful ways

1. Measure #1: Aggregate Lab Data/Analysis Sections

1. Target Goal: 70% of students who attended receive at least 70%

2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

2. Measure #2: Aggregate Lab Conclusion Sections

1. Target Goal: 70% of students who attended receive at least 70%

2. Data: 4 out of 4 students (100%) received at least 70% on this activity.

3. Results: This learning outcome was MET

4. Future Changes: Not at this time

5. Strengths: By switching to all lab notebook labs from the beginning and introducing these sections one at a time, the students mastered the ability to handle data in tables and figures, as well as be able to draw conclusions.

6. Weaknesses: Online software not copying figures properly
7. Additional Comments: I will continue to inquire about classroom computers with proper excel and PowerPoint that could be used by chemistry students to create lab figures, but that is not currently in the budget.

15. Learning Outcome #15: Correlate Laboratory work with principle topics in Chemistry I lecture

1. Measure #1: Introduction Section to Lab #9

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 3 out of 4 students (75%) received at least 70% on this activity.

2. Measure #2: Introduction Section to Lab #10

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 2 out of 4 students (50%) received at least 70% on this activity.

3. Measure #3: Introduction Section to Lab #11

1. Target Goal: 70% of students who attended receive at least 70%
2. Data: 0 out of 4 students (0%) received at least 70% on this activity, due to the class only submitting one group lab report and the introduction section had a paragraph plagiarized off of the internet.

4. Results: This learning outcome was Partially Met

5. Future Changes: Better directions to Lab #10

6. Strengths: On their own, students were generally able to connect lab to lecture concepts in their introduction.

7. Weaknesses: Human Temptation? In Lab #10, they were working in pairs, and one of the pairs did not complete their introduction to include all the parts

for that lab. In lab #11, the group of 4 submitted one lab report, which was good except for that one paragraph.

8. Additional Comments: This outcome would have been considered met if the plagiarism had not occurred on the last lab.

PENDING APPROVAL

Assessment Report for *Elementary Statistics (Mat1103)*

Fall 2022

This course is KBOR aligned: Yes/~~No~~

Outcomes, Measures, Data, and Results:

For all measures; goal of 65% of the students will meet expectations.

1. **<Met/Not Met/Partially Met>**: Create graphical and numerical descriptions of quantitative and qualitative data.

1. Measures: Chapter Test

2. Results: 100%

Summary: No changes needed.

2. **<Met/Not Met/Partially Met>**: Calculate probabilities and percentiles related to a general normal distribution.

1. Measures: Chapter Test

2. Results: 67%

Summary: No changes needed.

3. **<Met/Not Met/Partially Met>**: Distinguish differences in data analysis and interpretation between observational data and data from designed experiments.

1. Measures: Chapter Test

2. Results: 100%

Summary: No changes needed.

4. **<Met/Not Met/Partially Met>**: Calculate and interpret a confidence interval for a single parameter, using both large and small samples.

1. Measures: Chapter Test
2. Results: 67%

Summary: No changes needed.

5. **<Met/Not Met/Partially Met>**: Perform and interpret a test of hypotheses for a single parameter, using both large and small samples.

1. Measures: Chapter Test
2. Results: 33%

Summary: I will provide supplementary video for calculation and interpretations.

6. **<Met/Not Met/Partially Met>**: Perform and interpret statistical inference on the difference of two parameters.

1. Measures: Chapter Test
2. Results: 67%

Summary: No changes needed.

7. **<Met/Not Met/Partially Met>**: Fit and interpret a simple linear regression model, including correlation and scatterplots.

1. Measures: Chapter Test
2. Results: 33%

Summary: I think I will move this early in the semester, so students will have more time to work on it. One student skipped this test. So the mastery of the students who did take is 50%.

Final Comments: This class had three students. The ideal mastery level is 70%, but that is hard to achieve with only three students, so I have reduced it to 65%. If 2 of 3 students show mastery, then a majority of the class shows mastery.

Analytical Geometry & Calculus I

Results for Fall/Spring Semester 2019-- 2020

Key

1 = The student met the outcome.

0 = The student did not meet the outcome.

Name/ID	Outcome 1			Outcome 2		
	Measure 1	Measure 2	Measure 3	Measure 1	Measure 2	Measure 3
	1	1	1	1	1	1
	1	1	0	1	1	1
	1	1	1	1	1	1
	1	1	0	1	1	1
	1	1	1	1	1	1
	1	1	1	1	1	1
	1	1	1	1	1	1
	1	0	1	1	1	0
	1	0	1	1	1	0
		0.777777	0.777777			0.777777
	1	778	778	1	1	778
	0.851851			0.925925		
	852			926		

1. The students were overall successful with limits and derivatives. Only a couple of student struggle with application and continuity.
2. Students may need to improve on the application aspect.
3. Students need more real world application of the concepts.
4. I plan on finding more application problems, whether it be in another calculus book or online.

1. What strengths were displayed through the assessments of your measures?

This class knows how to find the derivative whether it be product and quotient rule or substitution method.

2. What weaknesses were displayed through the assessments of your measures?

Some of the students had issues with applications, but they were mainly those students who were not taking physics at the same time.

3. Based on the results and analysis, what recommendations will be made to better achieve the desired outcome?

More real world application.

4. What changes do you plan to make?

I plan on looking for more application problems on Teacher Pay Teachers.

Assessment Report for *Elementary Statistics (Mat1103)*

Spring 2021

This course is KBOR aligned: Yes/~~No~~
Outcomes, Measures, Data, and Results:

For all measures; goal of 65% of the students will meet expectations.

1. **<Met/Not Met/Partially Met>**: Create graphical and numerical descriptions of quantitative and qualitative data.

1. Measures: Chapter Test
2. Results: 100%

Summary: No changes needed.

2. **<Met/Not Met/Partially Met>**: Calculate probabilities and percentiles related to a general normal distribution.

1. Measures: Chapter Test
2. Results: 36%

Summary: See Final Comments

3. **<Met/Not Met/Partially Met>**: Distinguish differences in data analysis and interpretation between observational data and data from designed experiments.

1. Measures: Chapter Test
2. Results: 100%

Summary: No changes needed.

4. **<Met/Not Met/Partially Met>**: Calculate and interpret a confidence interval for a single parameter, using both large and small samples.

1. Measures: Chapter Test
2. Results: 64%

Summary: See Final Comments

5. **<Met/Not Met/Partially Met>**: Perform and interpret a test of hypotheses for a single parameter, using both large and small samples.

1. Measures: Chapter Test
2. Results: 27%

Summary: See Final Comments

6. **<Met/Not Met/Partially Met>**: Perform and interpret statistical inference on the difference of two parameters.

1. Measures: Chapter Test
2. Results: 64%

Summary: See Final Comments

7. **<Met/Not Met/Partially Met>**: Fit and interpret a simple linear regression model, including correlation and scatterplots.

1. Measures: Chapter Test
2. Results: 27%

Summary: I think I will move this early in the semester, so students will have more time to work on it. See Final Comments.

Final Comments: This course was still during the COVID period. As we progress through the semester, the calculations become more time intensive if done by hand. I plan on adding videos showing how to use MS Excel to automate many of the intensive calculation, which hopefully will increase the mastery of Outcomes 2, 4,5, 6, and 7.

PENDING APPROVAL

Assessment Report for *Analytical Geometry & Calculus I/MAT1055*
Spring 2021
IHS Rouselle

This course is KBOR aligned: Yes/No

Outcomes, Measures, Data, and Results:

For all measures; goal of 70% of the students will meet expectations (70% or higher).

1. **<Met>**: Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.

Measures:

1. Evaluate. $\lim_{x \rightarrow -2} (x^2 + 5x + 7)$
2. Evaluate. $\lim_{x \rightarrow \infty} (3x^2 - 9x)$
3. Determine the continuity of $f(x) = x - 2$ at $a = 1$. Use the continuity checklist to justify your answer.

Results: 83%

Summary: Students were strong when it came to evaluating the various types of limits. Very few missed these problems. A few students forgot the conditions for continuity, but overall the class did well at stating the 3 steps.

2. **<Met>**: Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.

Measures

1. Find the derivative of $y = x^2 \cos(x)$.
2. Find the derivative of $f(x) = (2x - 5)^7$.
3. Suppose a stone is thrown vertically upwards from the edge of a cliff with an initial velocity of 64 ft/s from a height of 32 feet above the ground. The height s (in feet) of the stone above the ground t after it is thrown is $s = -16t^2 + 64t + 32$. Determine the velocity and acceleration after t seconds.

Results: 71%

Summary: Derivatives were a strong area for my student this year. Most of them correctly applied the product, quotient, and chain rules. They did very well with particle motion, especially since we revisit this topic in the integral units.

3. **<Partially Met>**: Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.

Measures

1. Using Newton's method find the third approximation, x_3 , to the root of $x^5 - x - 1 = 0$ given the first approximation, $x_1 = 1$.
2. Solve optimization problem: If 1200 cm² of material is available to make a box with a square base and open top, find the largest possible volume of the box.

3. Graph a curve finding maximum and minimum points, inflection and concavity.
 $f(x) = x^3 - 12x^2 + 36x$

Results: 67%

Summary: Students met expectations with Newton's method and graphing a curve, but had an awfully hard time with optimization problems. If the problem was set up for them, they could correctly differentiate and solve, but many of them had trouble translating the words into equations.

4. **<Met>**: Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.

Measures:

1. Integrate an indefinite Integral. $\int (3x^2 - 7x + 5) dx$
2. Integrate a definite integral. $\int_0^{\pi/2} \cos(x) \sin(x) dx$
3. Express the limit, $\lim_{n \rightarrow \infty} \sum_{i=1}^n \cos(x_i) \Delta x$ on the interval $[\pi, 2\pi]$ as a definite integral. Do not integrate.

Results: 83%

Summary: Students did very well on basic integrals. Several of them struggled on substitution and the applications of integrals. 100% of my students correctly converted from summation notation to integral notation. Some of them struggled with the new notations used with integrals, but overall grasped the topics well.

5. **<Met>**: Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.

Measures:

1. Find the derivative of an exponential function. Find the derivative of $y = 3x \ln x$
2. Find the derivative of a logarithmic function. Find the derivative of $f(x) = \ln(x^2 - 1)$
3. Evaluate the limit. $\lim_{x \rightarrow \infty} e^x \ln x$

Results: 75%

Summary: Students did well with remembering the derivatives of exponential and logarithmic functions. A couple of them mixed them up and had the derivative of e^x as $1x$. They also understood L'Hospital's Rule well and correctly evaluated the limit.

6. **Met**: Integrate using numerical techniques (Simpson's and the Trapezoid Rules).

Measures:

1. Integrate using Simpsons or Trapezoid rule. $\int_1^4 \ln(x) dx$ using $n = 6$.
2. Find error for Simpson's or the Trapezoid rule for $\int_1^4 \ln(x) dx$ using $n = 6$.

Results: 87.5%

Summary: Students did very well remembering the formulas for the Trapezoid rule and Simpsons rule. We spent one day learning the rules and then another full class period practicing with a partner without using notes. This was very helpful for students. All but one student scored 70% or higher on these measures.

Final Comments: This was my first year teaching calculus for ICC. My class was at very different levels; some students had a very easy time, others struggled through every single lesson. Second semester seemed to go better than first, because the kids had the concept of derivatives figured out, so integrals was an easy transition. Overall, the class did well and everyone passed with a C or higher.

PENDING APPROVAL

Assessment Report for *Analytical Geometry & Calculus II/MAT2025* Spring 2021

This course is KBOR aligned: Yes/No

Outcomes, Measures, Data, and Results:

For all measures; goal of 70% of the students will meet expectations.

1. **<Met/Not Met/Partially Met>**: Find the area between curves, volume using slicing and shells, arc length, and surface area using integration; apply to problems in Physics, Engineering, Economics, and Biology. (Chapter 6)

1. Measures: Chapter 6 Test

2. Results: 100%

Summary: No change required.

2. **<Met/Not Met/Partially Met>**: Find derivatives and integrals involving hyperbolic, and inverse trigonometric functions. Find limits using L'Hopital's Rule. (Mixed Test)

1. Measures: Mixed Chapter Test

2. Results: 100%

Summary: No change required.

3. **<Met/Not Met/Partially Met>**: Integrate improper integrals. Integrate using integration by parts, trigonometric substitutions, and rational functions using Partial Fractions. (Chapter 7)

1. Measures: Chapter 7 Test

2. Results: 100%

Summary: No change required.

4. **<Met/Not Met/Partially Met>**: Solve a differential equation by separation of variables. Solve initial value problems. (8.1)

1. Measures: Chapter 9/8.1 Test

2. Results: 100%

Summary: No change required.

5. **<Met/Not Met/Partially Met>**: Determine if sequences converge and diverge. Determine convergence (absolute and conditional) and divergence of series using Integral test, Comparison test, Alternating series test, Ratio, and Root tests. (Chapter 10)

1. Measures: Chapter 10 Test

2. Results: 100%

Summary: No change required.

6. **<Met/Not Met/Partially Met>**: Represent functions as Power Series, Taylor and Maclaurin Series. Apply Taylor and Maclaurin series. (Chapter 10)

1. Measures: Chapter 10 Test

2. Results: 100%

Summary: No change required.

7. **<Met/Not Met/Partially Met>**: Define curves by parametric equations and polar coordinates. Differentiate and integrate curves in parametric form. Apply polar coordinates to area, length, and conic sections. (Chapter 9)

1. Measures: Chapter 9/8.1 Test

2. Results: 100%

Summary: No change required.

8. **<Met/Not Met/Partially Met>**: Use vectors in a plane and three-dimension and perform vector addition, subtraction, the dot product, and the cross product apply properties of vectors. (Chapter11)

1. Measures: Chapter 11 Test

2. Results: 100%

Summary: No change required.

Final Comments: The class started with two people. One dropped within a month from the start of class. This semester I did not review differentiation and integration the first couple days of class. I think that was a mistake and may have led to one of the students dropping the class. I will hold the review the next time the class is taught.

It is hard to comment about general trends in the class, since there was only one student and the class was tailored to him.

This class met Monday through Thursday for 80 minutes a day and had a hybrid component. The class had more seat time than required by KBOR. It allowed me to cover a complex subject that normally would take two days in one and provided greater flexibility. I am not opposed to teaching this way again.

Assessment Report for *Analytical Geometry & Calculus I/MAT1055* *Fredonia HS* *Spring 2021*

This course is KBOR aligned: Yes/No
Outcomes, Measures, Data, and Results:

For all measures; goal of 100% of the students will meet expectations of 70%.

1. **<Met >**: Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.

1. Measure: Chapter 2 Exam

2. Results: 88%

Summary: The students struggled with the algebraic manipulations to determine the limit of a function.

2. **<Met >**: Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.

1. Measure: Chapter 3 Exam

2. Results: 87.5%

Summary: Application problems gave the students the most trouble.

3. **<Met >**: Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.

1. Measure: Chapter 4 Exam

2. Results: 95%

Summary: The students were especially successful at finding the derivative of a polynomial function. They, also, managed to succeed finding the derivative of trigonometric functions.

4. **<Met >**: Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.

1. Measure: Chapter 5 Exam

2. Results: 95%

Summary: Integration

5. **<Met >**: Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.

1. Measure: Final Exam

2. Results: 92%

Summary:

6. <Met>: Integrate using numerical techniques (Simpson's and the Trapezoid Rules).

1. Measure: Final Exam
2. Results: 92%

Summary:

Final Comments: For all measures the Results percentage is the average of the class for that measure.

PENDING APPROVAL

Assessment Report for *Analytical Geometry & Calculus I/MAT1055*

This course is KBOR aligned: Yes/No

Outcomes, Measures, Data, and Results:

For all measures; goal of <chosen percent>% of the students will meet expectations.

1. **<Met/Not Met/Partially Met>:** Evaluate the limit of a function at a point and at infinity, both algebraically and graphically; use limits to determine the continuity of a function, differentiability of a function, and apply the Intermediate-Value Theorem.

1. Measures
2. Results: 87%

Summary:

2. **<Met/Not Met/Partially Met>:** Find the derivative of a function by the definition of derivative; find the derivative involving exponents, sums, products, quotients, the chain rule, trigonometric functions, and by implicit differentiation; apply the derivative to velocity, acceleration, and rates of change as well as finding the tangent line to a curve; and apply related rates to application problems.

1. Measures
2. Results: 75%

Summary:

3. **<Met/Not Met/Partially Met>:** Apply derivatives to curve sketching by finding critical points, applying First and Second Derivative tests, finding inflection points and concavity, and using the Mean-Value Theorem for Derivatives. Apply derivatives to optimization problems, related rate problems. Apply Newton's Method and use differentials to estimate change.

1. Measures
2. Results: 75%

Summary:

4. **<Met/Not Met/Partially Met>:** Using Riemann Sums find the area under a curve and express the definite integral as limit of Riemann Sums; integrate algebraic and trigonometric functions as both indefinite and definite integrals. Integrate definite integrals using the Fundamental Theorem of Calculus. Apply the Mean-Value Theorem for Integrals.

1. Measures
2. Results: 63%

Summary:

5. **<Met/Not Met/Partially Met>:** Find derivatives and integrals involving exponential and logarithmic functions. Find limits using L'Hopital's Rule. Solve applications of exponential increase and decrease.

1. Measures
2. Results: 75%

Summary:

6. **<Met/Not Met/Partially Met>:** Integrate using numerical techniques (Simpson's and the Trapezoid Rules).

1. Measures
2. Results: 100%

Summary:
Final Comments:

PENDING APPROVAL

Assessment Report for *Engineering Physics (PHS1055)*

Term: Fall 2020; Prepared by: Mona Saleh

This is a KBOR aligned course.

The following assessment data represents one student. The student did very well, kept in touch as the classes moved to remote learning and communicated very well then.

.....Column Break.....Measures, Data, and Results:

1. Learning Outcome #1: The student will be able to evaluate situations involving Physics I topics by choosing the appropriate conceptual frameworks.

1. Measure #1: chapter exercises.

1. Target Goal: 80%

2. Data: The student attained 97%.

2. Results: This learning outcome was MET.

3. Future Changes: N/A.

4. Additional Comments: N/A

2. Learning Outcome #2: The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis in order to generate solutions to problems in Physics I topics.

1. Measure #1: Simulations were used to measure this outcome.

1. Target Goal: 80%

2. Data: 97%

2. Results: This learning outcome was MET.

3. Future Changes: None at this time

4. Additional Comments: N/A.

1. Learning Outcome #3: The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics I topics, selecting relevant information, selecting an approach to solving the problem and carrying out the analysis needed to generate and communicate solution(s).

1. Measure #1: Exam

1. Target Goal: 85%

2. Data: 87%

2. Results: This learning outcome was Met

3. Future Changes: None at this time

4. Strengths: Preparing and solving many exercises before the exam.

5. Weaknesses: N/A

6. Additional Comments: N/A

2. Learning Outcome #4: The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics I topics.

1. Measure #1: Labs

1. Target Goal: 85%

2. Data: 94%.

2. Results: This learning outcome was MET

3. Future Changes: N/A

4. Strengths: Commitment, asking questions, and keeping in touch with the instructor.
5. Weaknesses: N/A.
6. Additional Comments: None at this time

PENDING APPROVAL

Assessment Report for *College Physics (PHS1055)*

Term: Fall 2020; Prepared by: Mona Saleh

This is a KBOR aligned course.

The following assessment data represents one student, the other three withdrew from the course when classes moved to online instruction due to the Covid-19 pandemic. The performance of the remaining student started to decline then.

One of the withdrawals was a result of many factors, among which lack of attendance, being ill prepared for such class, and feeling intimidated by other students' performance. The second withdrawal was because of moving the instruction to online, although the student was at a good standing with a B grade average. The third student did very well, with a B grade average as well, and quit performing as soon as the class switched to remote learning.

Measures, Data, and Results:

1. Learning Outcome #1: The student will be able to evaluate situations involving Physics I topics by choosing the appropriate conceptual frameworks.

1. Measure #1: chapter exercises.

1. Target Goal: 80%

2. Data: the student attained 68%.

2. Results: This learning outcome was NOT MET.

3. Future Changes: Use the online homework system.

4. Additional Comments: The student refused to follow instructions of following understandable approach to answer questions. The student reasoned it to be the way it was learned in the high school. Frequent remarks have been submitted and a discussion with the student has taken place, but the student insisted on the same approach.

2. Learning Outcome #2: The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis in order to generate solutions to problems in Physics I topics.

1. Measure #1: Simulations were used to measure this outcome.

1. Target Goal: 80%

2. Data: 76%

2. Results: This learning outcome was Not MET.

3. Future Changes: None at this time

4. Additional Comments: The student was not keeping track on turning in the assignments and never reacted to class announcements regarding the missing grades.

1. Learning Outcome #3: The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics I topics, selecting relevant information, selecting an approach to solving the problem and

carrying out the analysis needed to generate and communicate solution(s).

1. Measure #1: Exam
 1. Target Goal: 75%
 2. Data: 76%
 2. Results: This learning outcome was Met
 3. Future Changes: None at this time
 4. Strengths: N/A
 5. Weaknesses: N/A
 6. Additional Comments: Although instructions have not been followed in different situations, at the exam the student put the effort to change the approach to a known scientific way of communication.
-
2. Learning Outcome #4: The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics I topics.
 1. Measure #1: Labs
 1. Target Goal: 80%
 2. Data: 72%.
 2. Results: This learning outcome was NOT MET
 3. Future Changes: N/A
 4. Strengths: N/A
 5. Weaknesses: Lack of student involvement.
 6. Additional Comments: None at this time

Assessment Report for *College Physics (PHS1055)*

Term: Fall 2020; Prepared by: Mona Saleh

This is a KBOR aligned course.

The following assessment data represents one student, the other three withdrew from the course when classes moved to online instruction due to the Covid-19 pandemic. The performance of the remaining student started to decline then.

One of the withdrawals was a result of many factors, among which lack of attendance, being ill prepared for such class, and feeling intimidated by other students' performance. The second withdrawal was because of moving the instruction to online, although the student was at a good standing with a B grade average. The third student did very well, with a B grade average as well, and quit performing as soon as the class switched to remote learning.

.....Column Break.....Measures, Data, and Results:

1. Learning Outcome #1: The student will be able to evaluate situations involving Physics I topics by choosing the appropriate conceptual frameworks.

1. Measure #1: chapter exercises.

1. Target Goal: 80%

2. Data: the student attained 68%.

2. Results: This learning outcome was NOT MET.

3. Future Changes: Use the online homework system.

4. Additional Comments: The student refused to follow instructions of following understandable approach to answer questions. The student reasoned it to be the way it was learned in the high school. Frequent remarks have been submitted and a discussion with the student has taken place, but the student insisted on the same approach.

2. Learning Outcome #2: The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis in order to generate solutions to problems in Physics I topics.

1. Measure #1: Simulations were used to measure this outcome.

1. Target Goal: 80%

2. Data: 76%

2. Results: This learning outcome was Not MET.

3. Future Changes: None at this time

4. Additional Comments: The student was not keeping track on turning in the assignments and never reacted to class announcements regarding the missing grades.

1. Learning Outcome #3: The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics I topics, selecting relevant information, selecting an approach to solving the problem and

carrying out the analysis needed to generate and communicate solution(s).

1. Measure #1: Exam
 1. Target Goal: 75%
 2. Data: 76%
 2. Results: This learning outcome was Met
 3. Future Changes: None at this time
 4. Strengths: N/A
 5. Weaknesses: N/A
 6. Additional Comments: Although instructions have not been followed in different situations, at the exam the student put the effort to change the approach to a known scientific way of communication.
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2. Learning Outcome #4: The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics I topics.
 1. Measure #1: Labs
 1. Target Goal: 80%
 2. Data: 72%.
 2. Results: This learning outcome was NOT MET
 3. Future Changes: N/A
 4. Strengths: N/A
 5. Weaknesses: Lack of student involvement.
 6. Additional Comments: None at this time

Assessment Report for Chemistry II for Majors/PHS1035
Term: Spring 2021 Prepared by: Nathan Chaplin, PhD

Summary Table

KBOR Learning Outcome	Met/ Partially Met/ Not Met	Summary of Future Planned Action(s)
1. Colligative Properties	Partially Met	Provide a brief review of first-semester concepts prior to covering new material
2. Chemical Kinetics	Partially Met	Provide a brief review of first-semester concepts prior to covering new material
3. Chemical Equilibria	Met	Further develop course content to provide more learning supplements.
4. Thermodynamics	Met	See #3.
5. Electrochemistry	Met	See #3.
6. Organic Chemistry	Met	Set #3.
7. Laboratory Skills	Met	See #3.

Assessment Report for **Course Name/Engineering Physics II**
Term: Spring 2021

Summary Table

Learning Outcome	Met/ Partially Met/ Not Met	Summary of Future Planned Action(s)
1. 1. Evaluate situations involving Engineering Physics II topics by choosing the appropriate conceptual frameworks.	Met at 86.9%	
2. Recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis to generate solutions to problems in Engineering Physics II topics.	Met at 78.7%	
3. Think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Engineering Physics II topics, selecting relevant information, selecting an approach to solving the problem and carry out the analysis needed to generate and communicate solution(s).	Met at 94.6%	
4. Perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Engineering Physics II topics.	Met at 95.6%	

Assessment Report for *Course Name/College Physics II*

Term: Spring 2021

Summary Table

Learning Outcome	Met/ Partially Met/ Not Met	Summary of Future Planned Action(s)
1. The student will be able to evaluate situations involving Physics II topics by choosing the appropriate conceptual frameworks.	Met at 79.7%	
2. The student will be able to recall relevant physical models and to successfully apply these models using techniques of symbolic and numerical analysis in order to generate solutions to problems in Physics II topics.	Met at 80.6%	
3. The student will be able to think critically by utilizing problem solving techniques to evaluate and analyze context rich, multi-step problems in Physics II topics, selecting relevant information, selecting an approach to solving the problem and carry out the analysis needed to generate and communicate solution(s).	Partially met at 72.8%	The student missed few classes and was unable to get her grade back up in this category. It was expected that the student will be able to end up with a grade $\geq 75\%$
4. The student will be able to perform measurements using physical apparatus, analyze the collected data including appropriate treatment of errors and uncertainties, generate and communicate conclusions based on the data and analysis for experimental investigations in Physics II topics.	Met at 92.5%	