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| **ROSEMONT COLLEGE**2022-2023 Yearly Discipline Assessment Report **Discipline:** Mathematics and Physics**Discipline Coordinator:**Name: Dennis Perkinson Phone: 3116 Email: dennis.perkinson@rosemont.edu **Date Submitted:** 4 June 2023   |
| **Mission Statement 2016**: *Rosemont College is a community of lifelong learners dedicated to academic excellence and fostering joy in the pursuit of knowledge. Rosemont College seeks to develop in all members of the community open and critical minds, the ability to make reasoned moral decisions, and a sense of responsibility to serve others in our global society.**Rooted in Catholicism, Rosemont welcomes all faiths and is guided by the principles of Cornelia Connelly and the Society of the holy Child Jesus to meet the needs of the time. Rosemont College values: Trust in and reverence for the dignity of each person; Diversity with a commitment to building an international community; Persistence and courage in promoting justice with compassion; Care for the Earth as our common home.**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***PART A:**INSTRUCTIONS**:** Save this form as a Word file. Please fill in the fields below; they will expand as you type. You may separate out majors and non-majors in your descriptions of outcomes. Then fill in Part B. Return to the Director of Strategic Planning and Assessment by June 30th.  |
| **Student Learning Objectives/Outcomes** | **Courses taught during year assessing the objective/outcome** | **Results of Assessment (include majors and non-majors in the classes)** | **Planned Improvements Based on Assessment (List here; elaborate in Part B below)** |
| **Objective #1:** Students will accurately explain information presented in mathematical form. | MAT 120 – Calculus IMAT 225 – Foundations of Advanced MathematicsMAT 255 – Statistics IMAT 256 – Statistics IIPHY 100 – Physics IPHY 101 – Physics II | * The lack of basic arithmetic and algebraic skills continues to hinder student learning in all math courses
* Some students taking the physics courses have issues working with trigonometric functions, even though a course covering trigonometry is a prerequisite for physics
 | * Continue implementing active-learning and “visual mathematics” approaches to instruction in all math courses
* Continue the implementation of Inquiry-Based Learning (IBL) techniques where possible
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| **Objective #2:** Students will make accurate inferences based on information presented in mathematical form. | MAT 115 – College AlgebraMAT 116 – Pre-CalculusMAT 225 – Foundations of Advanced MathematicsMAT 255 – Statistics IMAT 256 – Statistics IIPHY 100 – Physics IPHY 101 – Physics II | * The lack of basic arithmetic and algebraic skills continues to hinder student learning all too often in courses taken mainly by the general student population – MAT 112, 115, 116, 120Most Rosemont students taking the early (100-level) math courses continue to be ill prepared for performing accurate, detailed, and informed inferences
* Majors taking “theoretical” math courses (MAT 225) continue to have significant difficulty grasping the concepts of pure mathematics
* Some students taking the physics courses have issues working with trigonometric functions, even though a course covering trigonometry is a prerequisite for physics
 | * Continue implementing active-learning and “visual mathematics” approaches to instruction in all math courses
* Continue the implementation of Inquiry-Based Learning (IBL) techniques where possible
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| **Objective #3:** Students will be able to skillfully convert relevant information into an insightful mathematical portrayal in a way that contributes to a deeper understanding of the relevant material. | MAT 112 – Introductory AlgebraMAT 115 – College AlgebraMAT 116 – Pre-CalculusMAT 200 – Number TheoryMAT 225 – Foundations of Advanced MathematicsPHY 100 – Physics IPHY 101 – Physics II | The shortcomings in Objectives #1 and #2 concerning explaining and making inferences generally carry over to student abilities to perform competent analysis:* Most Rosemont students taking the early (100-level) math courses continue to be ill prepared for performing accurate, detailed, and informed inferences
* The lack of basic arithmetic and algebraic skills hinder student learning all too often in courses taken mainly by the general student population – MAT 112, 115, 116, 120
 | * Continue attempts to gain better insights into student weaknesses, particularly in the early courses taken by the general student population, by performing beginning of course and end of course assessments in order to identify specific areas for review on how they are taught
* Continue the implement Inquiry-Based Learning (IBL) techniques where possible
* Expand the use of teaching “visual mathematics” where possible and appropriate
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| **Objective #4:** Students will be able to present the results of their quantitative analysis effectively in both written and oral forms. | MAT 112 – Introductory AlgebraMAT 115 – College AlgebraMAT 225 – Foundations of Advanced Mathematics  | * Oral presentation of results is a significant struggle for most students
* Written work is too often incomplete and messy
 | * Continue implementation of specific instructional methods designed to teach students how to do the mathematics required for theoretical math subjects rather than expecting students to learn how to “think mathematically” while they are in the midst of learning a new topic (e.g., number theory)
* Continue the implement Inquiry-Based Learning (IBL) techniques where possible
* Expand the use of teaching “visual mathematics” where possible and appropriate
* Incorporate more “board” time into classes above MAT 116
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| **Objective #5:** Students will be able to correctly apply methodologies in order to draw accurate judgements and conclusions for quantitative analysis of data. | MAT 115 – College AlgebraMAT 116 – Pre-CalculusMAT 120 – Calculus IPHY 100 – Physics IPHY 101 – Physics II | * We continue to see students who are unable to read and understand word problems, then transfer the content of the word problem to an appropriate framework for performing analysis
* Students who wish to pursue either a major or minor in mathematics nearly always have trouble making the transition from doing “calculation math” (algebra and calculus) to classes in which the focus is “theoretical mathematics” (proofs, number theory, etc.)
 | * Identify and select math tutors who are particularly good at applying methodologies and have SASC focus their tutoring efforts on helping students learn to solve word problems
* Expand the use of the Math Learning Resource Center to provide substantive support for all levels of math abilities and generate enthusiasm for mathematics in the Rosemont student body population
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| **Objective #6:** Students will demonstrate the ability to analyze alternate methods of performing quantitative analysis of data and decide on the most appropriate method for a given situation. | MAT 115 – College AlgebraMAT 116 – Pre-CalculusMAT 120 – Calculus IPHY 100 – Physics IPHY 101 – Physics IICSC 140 – Introduction to Computer Programming | * We continue to see students who are unable to read and understand word problems, then transfer the content of the word problem to an appropriate framework for performing analysis
* Students who wish to pursue either a major or minor in mathematics nearly always have trouble making the transition from doing “calculation math” (algebra and calculus) to classes in which the focus is “theoretical mathematics” (proofs, number theory, etc.)
* Students in CSC 140 exhibited a significant lack of ability to think critically
 | * Identify and select math tutors who are particularly good at this skill and have SASC focus their tutoring efforts on helping students learn to solve word problems
* Expand the use of the Math Learning Resource Center to provide substantive support for all levels of math abilities and generate enthusiasm for mathematics in the Rosemont student body population
* Change the CSC 140 curriculum to include specific units focused on critical thinking
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**Part B: (Please use the space available to elaborate)**

List planned improvements here Timeline for planned improvement Reasons for change and desired results?

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| * Continue implementing active-learning and “visual mathematics” approaches to instruction in all math courses
* Continue the implementation of Inquiry-Based Learning (IBL) techniques where possible
* Continue attempts to gain better insights into student weaknesses, particularly in the early courses taken by the general student population, by performing beginning of course and end of course assessments in order to identify specific areas for review on how they are taught
* Incorporate more “board” time into classes above MAT 116
* Identify and select math tutors who are particularly good at applying methodologies and have SASC focus their tutoring efforts on helping students learn to solve word problems
* Change the CSC 140 curriculum to include specific units focused on critical thinking
 | * AY 2023 – 2024 through AY 2025-2026
* AY 2023 – 2024 and beyond
* Already implemented in MAT 200 and MAT 225
* Planned to be implemented in MAT 120, PHY 100, and PHY 101 in AY 2023 – 2024
* Planned for implemented in CSC 140 in AY 2024-2025
* To be implemented in MAT 112 and MAT 115 in AY 2023-2024
* To be implemented in MAT 120 and MAT 225 in AY 2023-2024
* To be implemented in AY 2023-2024
* To be implemented in AY 2023-2024
 | * Studies show that students learn mathematics much more effectively when subject material is presented visually rather than simply through lectures. This will take some time to fully implement, but the goal is to improve the level of understanding students achieve in all math classes, especially the 100-level courses.
* Studies show that students learn mathematics much more effectively when they are more immersed in the learning process.
* Goal is to improve the level of understanding students achieve in all math and physics classes
* This change is planned to assist the instructor in maximizing the areas on which time and emphasis is placed
* Improve oral presentation of results by students and encourage more student interaction by having students critique work presented and assist presenter through areas of difficulty
* Many math students, especially in the 100-level courses, need assistance outside the classroom in learning which methodology to use and how to correctly apply it. With a sufficient level of tutoring, many students should show a marked improvement in their applications of correct methodologies
* Learning computer programming requires the ability to think logically and critically in order to create algorithms that accomplish the desired goal. This past spring, fully 60% of the students taking CSC 140 had significant difficulties thinking through an assignment to come up with a logical response. Adding more focus to critical thinking should allow students to learn to write more effective algorithms
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**Part C: (Please use the space available to elaborate)**

List previous plans here Status of planned improvement Evidence of changes in student learning

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| * Continue implementing active-learning and “visual mathematics” approaches to instruction in all math courses
* Continue the implementation of Inquiry-Based Learning (IBL) techniques where possible
* Establish a Math Resource Center
* Hire a second mathematics professor
* Continue attempts to gain better insights into student weaknesses, particularly in the early courses taken by the general student population, by performing beginning of course and end of course assessments in order to identify specific areas for review on how they are taught
* Continue implementation of specific instructional methods designed to teach students how to do the mathematics required for theoretical math subjects rather than expecting students to learn how to “think mathematically” while they are in the midst of learning a new topic (e.g., number theory)

 * Change the two semesters of Physics courses to being Algebra-based rather than Calculus-based
* Identify select math tutors who are particularly good at this skill and have SASC focus their tutoring efforts on helping students learn to solve word problems
 | * This change is still in its implementation infancy
* IBL was added to MAT 225 and MAT 200 this academic year. Still needs to be expanded
* The Math Learning Resource Center (MLRC) was implemented in Fall 2022. Metrics to help determine its impact will be collected during the coming academic year
* Second mathematics professor added in Fall 2022
* Not yet implemented
* To receive additional focus in AY 2023-2024
* Change was implemented in AY 2022-2023
* This change was not implemented due to inability of SASC to obtain adequate tutors
 | * No quantifiable evidence yet
* No quantifiable evidence yet
* No metrics currently available
* Additional professor has allowed for more detailed development of MAT 112 and MAT 115. Some changes in incorporation of on-line facilities are planned for AY 2023-2024
* No quantifiable evidence yet
* The number of students in Physics is so small as to preclude drawing quantifiable results. However, it appeared this year that students grasped some of the Physics concepts more readily when the Calculus approach was changed to an Algebraic approach. The downside is that, without Calculus, students are occasionally asked to take results on faith rather than being able to see all of the rigor behind development of the results. In a first-year Physics course, this is likely not a bad thing.
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