**MATP114** – *Mathematical Analysis 2 for Physics (3 units)  
Prerequisite: MATP113 Prerequisite to:*

**Instructor:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Consultation Hours:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Class days and Time: \_\_\_\_\_\_\_\_\_\_\_\_\_**

**Estimated Time of Study Outside Class: Approximately 13 hours**

**Contact details:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Room Class Schedule:\_\_\_\_\_\_\_\_\_\_\_\_**

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| **Course Description** |
| This is second course in Calculus. It covers techniques of integration, indeterminates, improper integrals, sequences and series, limits and continuity of functions of several variables, partial derivatives and total differentials. |

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| **Final Course Output** | | |
| As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term.   |  |  |  | | --- | --- | --- | | Learning Outcome | Required Output | Due Date | | At the end of the course, the student will be able to apply appropriate differential and integral calculus concepts, thinking processes, tools, and technologies in the solution to various conceptual or real-world problems. | * Carefully crafted compilation of solved problems on integration using various techniques of integration; power series approximation of certain function values as compared to values generated by scientific calculators. | Week 13 | | | |
| **Rubric for assessment for compilation of solutions to problems** | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | CRITERIA | Excellent (4) | Good (3) | Satisfactory (2) | Needs Improvement (1) | | **Understanding**  **(50%)** | The solution shows a deep understanding of the problem including the ability to identify the appropriate mathematical concepts and information necessary for its solution. | The solution shows that student has a broad understanding of the problem and the major concepts necessary for its solution. | The solution is not complete indicating that parts of the problem are not understood. | There is no solution, or the solution has no relationship to the task. | | **Strategies and Procedures**  **(15%)** | Uses a very efficient strategy leading directly to a solution.  Applies procedures accurately to correctly solve the problem and verifies the result. | Uses strategy that leads to a solution of the problem.  All parts are correct and a correct answer is achieved. | Uses a strategy that is partially useful, leading some way toward a solution but not to a full solution of the problem. Some parts may be correct but a correct answer is not achieved. | No evidence of a strategy or procedure uses strategy that does not help solve the problem. | | **Communication**  **(10%)** | There is a clear, effective explanation, detailing how the problem is solved.  There is a precise and appropriate use of mathematical terminology and notation. | There is a clear explanation and appropriate use of accurate mathematical representation. | There is some use of appropriate mathematical representation but explanation is incomplete and not clearly presented. | There is no explanation or the solution cannot be understood or it is unrelated to the problem. | | **Integration**  **(10%)** | Demonstrates integration of the concepts presented | Demonstrates some integration of the concepts presented | Demonstrates limited integration of the concepts presented | Demonstrates no integration of the concepts presented | | **Accuracy of Computations/**  **Solutions**  **(15%)** | Computations /  solutions are correct and explained correctly | Computations/  solutions are correct but not explained well. | Computations/  solutions have some errors. | Incorrect computations/  solutions | | | |
| **Requirements** | |
| **Grading System** | |
| |  |  |  |  | | --- | --- | --- | --- | |  | **FOR EXEMPTED STUDENTS**  **(w/out Final Exam)** | **FOR STUDENTS**  **with FINAL EXAM** | | | *with*  *no missed quiz* | *With*  *one missed quiz* | | Average of quizzes | 90% | 60% | 55% | | Project Output | 10% | 10% | 10% | | Final exam | - | 30% | 35% | | **Scale:**  95-100% 4.0  89-94% 3.5  83-88% 3.0  78-82% 2.5  72-77% 2.0  66-71% 1.5  60-65% 1.0  <60% 0.0 |

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| **Requirements** |
| At least 5 quizzes, 1 final exam, Seatwork, Assignments, Recitation, Group Work |

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| **Learning Plan** |
| |  |  |  |  | | --- | --- | --- | --- | | **LEARNING**  **OUTCOME** | **TOPIC** | **WEEK NO.** | **LEARNING**  **ACTIVITIES** | | At the end of the course, the student will be able to:   * Compute derivatives and integrals of transcendental functions; use some techniques of integration other than the elementary methods; obtain parametric equations and their derivatives. * Sketch the graph of polar curves, cylinders and quadric surfaces, calculate the area in polar coordinates, test convergence or divergence of series and illustrate power series representation of certain functions. * Evaluate limits, determine continuity and find derivatives of functions of more than one variable. | **I. INTEGRALS OF /**  **INTEGRALS**  **YIELDING TRANSCENDENTAL**  **FUNCTIONS**   * 1. Integrals Yielding   Natural Logarithmic  Function   * 1. Integrals of   Exponential Functions  1.3 Integrals of  Trigonometric  Functions  1.4 Integrals Yielding  Inverse  Trigonometric  Functions  **II. TECHNIQUES OF**  **INTEGRATION**   * 1. Integration by Parts   2.2 Integration of  Algebraic  Functions by  Trigonometric  Substitution   * 1. Integration of   Rational Functions by Partial Fractions  **QUIZ 1**  **III. INDETERMINATE**  **FORMS AND**  **IMPROPER**  **INTEGRALS**  3.1 Cauchy’s Mean  Value Theorem and  Indeterminate Form  0/0  3.2 L’Hopital’s Rule and  Other Indeterminate  Forms   * 1. Improper Integrals   with Infinite Limits  of Integration   * 1. Other Improper   Integrals  **QUIZ 2**  **IV. SEQUENCES AND**  **INFINITE SERIES**  4.1 Sequences  4.2 Infinite Series of  Constant Terms   * 1. Infinite Series of   Positive Terms   * 1. Infinite Series of Positive and Negative Terms   4.5 Summary of Tests for  Convergence or  Divergence of an  Infinite Series  4.6 Power Series  4.7 Differentiation and  Integration of Power Series  4.8 Taylor Series and  Polynomial  Formula  **QUIZ 3**  **V. DIFFERENTIAL CALCULUS OF FUNCTIONS OF MORE THAN ONE VARIABLE**  5.1 Functions of More  Than One Variable  5.2 Limits and  Continuity of  Functions of More  Than One Variable  5.3 Partial Derivatives  5.4 Differentiability  and the Total  Differential   * 1. The Chain Rule for   Functions of More  Than One  Variable  **VI. MULTIPLE INTEGRATION**  6.1 Evaluation of  Double Integral  **FINAL EXAMINATION** | Week 1-2  (6) hrs  Week 3 – 4 (6) hrs  Week 5 – 6  (6) hrs  Week 7 – 11  (15) hrs  Week 12-12.5  (4.5) hrs  Week 12.5-13  (1.5) hrs  Week 14  (3 hrs) | * Library work * Cooperative Learning * Skills exercises * Student self-assessment and reflection * Quizzes * Seatworks * *Problem Sets*\* |     **Total: (39 ) hrs** |

\*Problem sets are given weekly and the students are expected to work on the solutions for their fourth hour activity. At the end of the term, the solutions to the problems will be compiled and submitted as course outputs.

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| **References** |
| Anton, H., Biven, I.C., and Davis, S., *Calculus* (10th ed.) Wiley, 2012  Edwards, C.H. and Penney, D.E. (2008) *Calculus: Early Transcendentals* (7th ed.) Upper Saddle River, NJ: Pearson/Prentice Hall, 2007  **Etgen, G., Salas, S., Hille, E., *Calculus: One and Several Variables,* (10th ed.), John Wiley and Sons, Inc. 2007**  Larson, R.E, Hostetler, R. & Edwards, B.H. (2008) *Essential Calculus: Early Transcendental Functions*. Boston: Houghton Mifflin  Larson, R., Edwards, B., *Calculus* (10th ed.) Brooks/Cole, 2014  **Leithold, L. (2002) *The Calculus 7* (Low Price Edition) Addison-Wesley**  Simmons, G.F. (1996) *Calculus with Analytic Geometry* (2nd ed.) New York: McGraw-Hill  Smith, Robert T., Minton, Roland B. (2012), *Calculus* , New York : McGraw Hill  Tan, Soo T. (2012) *Applied Calculus for the Managerial, Life, and Social Sciences : A Brief Approach*, Australia : Brooks/Cole Cengage Learning  Stewart, J., *Calculus: Early Transcendentals* (8th ed.) Brooks/Cole, 2011 |
| **Online Resources** |
| *Free Calculus Tutorials and Problems* Accessed October 11, 2012 from <http://analyzemath.com/calculus/>  *Visual* Calculus Accessed October 11, 2012 from <http://archives.math.utk.edu/visual.calculus>  tutorial.math.lamar.edu  Dawkins, P. (2012) *Paul’s Online Math Notes* Accessed October 11, 2012 from <http://tutorial.math.lamar.edu> |

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| **Class Policies** |
| 1. The required minimum number of quizzes for a 3-unit course is 3, and 4 for 4-unit or 5 unit course. No part of the final exam may be considered as one quiz. 2. Cancellation of the lowest quiz is not allowed even if the number of quizzes exceeds the required minimum number of quizzes. 3. As a general policy, no special or make-up tests for missed exams other than the final examination will be given. However, a faculty member may give special exams for 4. approved absences (where the student concerned officially represented the University at some function or activity). 5. absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious. 6. If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination. 7. If the student has no valid reason for missing an exam (for example, the student was not prepared to take the exam) then the student receives 0% for the missed quiz. 8. Students who get at least 89% in every quiz are exempted from taking the final examination. Their final grade will be based on the average of their quizzes and other prefinal course requirements. The final grade of exempted students who opt to take the final examination will be based on the prescribed computation of final grades inclusive of a final examination. Students who missed and/or took any special/make-up quiz will not be eligible for exemption. 9. Learning outputs are required and not optional to pass the course. 10. Mobile phones and other forms of communication devices should be on silent mode or turned off during class. 11. Students are expected to be attentive and exhibit the behavior of a mature and responsible individual during class. They are also expected to come to class on time and prepared. 12. Sleeping, bringing in food and drinks, and wearing a cap and sunglasses in class are not allowed. 13. Students who wish to go to the washroom must politely ask permission and, if given such, they should be back in class within 5 minutes. Only one student at a time may be allowed to leave the classroom for this purpose. 14. Students who are absent from the class for more than 5 meetings will get a final grade of 0.0 in the course. 15. Only students who are officially enrolled in the course are allowed to attend the class meetings. |

Approved by:

**DR. JOSE TRISTAN F. REYES**

Chair, Mathematics and Statistics Department

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*T1, AY 2018-2019 / S.Y.Tan*