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| **Philadelphia University** | PHILADELPHIA UNIVERSITY THE WAY TO THE FUTURE | **Approval date: 22/02/2025** |
| **Faculty of Science** | | **Issue:** |
| **Department of Math** | | **Credit hours: 3** |
| **Academic year 2024/2025** | **Course Syllabus** | **Bachelor** |

## Course information

| Course# | Course title | Prerequisite |
|---|---|---|
| **250102** | **Calculus (2)** | **Calculus (1) 216111** |

| Course type | | | Class time | Room # |
|---|---|---|---|---|
| ☐ University Requirement | ☐ Faculty Requirement | | ST 11:15 – 12:30 | 6717 |
| ☒ Major Requirement | ☐ Elective | ☒ Compulsory | | |
| **Degree / NQF Level** | ☒ Diploma degree (6) | ☐ Bachelor degree (7) | | |

## Instructor Information

| Name | Office No. | Phone No. | Office Hours | E-mail |
|---|---|---|---|---|
| Feras Awad | 822 | 2132 | SM 11:15 – 12:15<br>ST 12:30 – 13:30 | fawad@philadelphia.edu.jo |

## Course Delivery Method

| Course Delivery Method | | | |
|---|---|---|---|
| ☒ **Physical** | ☐ **Online** | ☐ **Blended** | |
| **Learning Model** | | | |
| **Precentage** | **Synchronous** | **Asynchronous** | **Physical** |
| | **0%** | **0%** | **100%** |

## Course Description

In this course, students will dive into three main areas of study: Techniques of integration, Sequences and Series, and Applications of the Definite Integrals in Geometry, Science, and Engineering.

## Course Learning Outcomes

| Number | Outcomes | Corresponding Program outcomes |
|---|---|---|
| | **Knowledge** | |
| **K1** | Students will learn advanced integration techniques, and study sequences and series for convergence. | **$K_p1$** |
| | **Skills** | |
| **S1** | Students will apply integration techniques and series analysis to solve complex problems, evaluating and selecting appropriate methods effectively. | **$S_p2$** |
| | **Competencies** | |
| **C1** | Students will develop the ability to communicate their mathematical reasoning and problem-solving processes effectively, both in writing and orally. | **$C_p1$** |

## Learning Resources

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|---|---|
| **Course textbook** | Howard Anton, Irl C. Bivens, and Stephen Davis. (2016) Calculus: Early Transcendentals. (11th ed.). Wiley. |
| **Supporting References** | • James Stewart. (2015) Calculus: Early Transcendentals. (8th ed.). Brooks Cole.<br>• Joel R. Hass, Christopher E. Heil, and Maurice D. Weir. (2017) Thomas' Calculus. (14th ed.). Pearson.<br>• Dennis G. Zill. (2009) Calculus: Early Transcendentals. (4th ed.). Jones and Bartlett.<br>• Ron Larson, Bruce H. Edwards. (2018) Calculus: Early Transcendental Functions. (7th ed.). Cengage Learning. |
| **Supporting websites** | GeoGebra: https://www.geogebra.org/ |
| **Teaching Environment** | ☒**Classroom** ☐ **laboratory** ☐**Learning platform** ☐**Other** |

## Meetings and Subjects Timetable

| Week | Topic | Learning Methods | Tasks | Learning Material |
|---|---|---|---|---|
| **1** | Explanation of the study plan for the course, and what is expected to be accomplished by the students.<br>**Principles of Integral Evaluation**<br>7.1 An Overview of Integration Methods | Lecture | | Course Syllabus<br>Chapter 7 |
| **2** | 7.2 Integration by Parts | Lecture | | Chapter 7 |
| **3** | 7.3 Integrating Trigonometric Functions | Lecture | | Chapter 7 |
| **4** | 7.4 Trigonometric Substitutions | Lecture | Quiz | Chapter 7 |
| **5** | **Blessed Eid al-Fitr holiday** | | | |
| **6** | 7.5 Integrating Rational Functions by Partial Fractions<br>7.8 Improper Integrals | Lecture | | Chapter 7 |
| **7** | **Infinite Series**<br>9.1 Sequences | Lecture | | Chapter 9 |
| **8** | 9.3 Infinite Series | Lecture | Midterm Exam | Chapter 9 |
| **9** | 9.4 Convergence Tests<br>9.5 The Comparison, Ratio, and Root Tests | Lecture | | Chapter 9 |
| **10** | 9.6 Alternating Series; Absolute and Conditional Convergence | Lecture | | Chapter 9 |
| **11** | 9.8 Maclaurin and Taylor Series; Power Series<br>9.10 Differentiating and Integrating Power Series; Modeling with Taylor Series | Lecture | | Chapter 9 |
| **12** | **Applications of Definite Integral in Geometry, Science, and Engineering**<br>6.1 Area Between Two Curves<br>6.2 Volumes by Slicing; Disks and Washers | Lecture | Quiz | Chapter 6 |
| **13** | 6.3 Volumes by Cylindrical Shells<br>6.4 Length of a Plane Curve | Lecture | | Chapter 6 |
| **14** | 6.5 Area of a Surface of Revolution<br>6.6 Work | Lecture | Quiz | Chapter 6 |
| **15** | **Blessed Eid al-Adha holiday** | | | |
| **16** | **Final Exam** | Lecture | | |

* Includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

## Course Contributing to Learner Skill Development

| Using Technology |
|---|
| Students will use mathematical software (e.g., GeoGebra) to solve complex integration and series problems, enhancing their computational and analytical skills for academic and real-world applications. |
| **Communication Skills** |
| Group projects and discussions foster collaboration, communication, and teamwork skills. |
| **Application of Concepts Learnt** |
| Students apply calculus to real-world problems, strengthening their problem-solving skills. |

## Assessment Methods and Grade Distribution

| Assessment Methods | Grade Weight | Assessment Time (Week No.) | Link to Course Outcomes |
|---|---|---|---|
| **Mid Term Exam** | **30%** | **8** | **K1** |
| **Various Assessments *** | **30%** | **Continuous** | **S1, C1** |
| **Final Exam** | **40%** | **16** | **K1** |
| **Total** | **100%** | | |

* Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

## Alignment of Course Outcomes with Learning and Assessment Methods

| Number | Learning Outcomes | Learning Method* | Assessment Method** |
|---|---|---|---|
| **Knowledge** | | | |
| **K1** | Students will learn advanced integration techniques, and study sequences and series for convergence. | Lecture | **Exam** |
| **Skills** | | | |
| **S1** | Students will apply integration techniques and series analysis to solve complex problems, evaluating and selecting appropriate methods effectively. | Lecture | **Quiz** |
| **Competencies** | | | |
| **C1** | Students will develop the ability to communicate their mathematical reasoning and problem-solving processes effectively, both in writing and orally. | Collaborative learning | **Homework** |

* Includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

** Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.

## Course Polices

| Policy | Policy Requirements |
|---|---|
| **Passing Grade** | The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%). |
| **Missing Exams** | • Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment.<br>• A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from an exam or assessment due date.<br>• A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date. |

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|---|---|
| **Attendance** | The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lectures days (M, W) and seven lectures (S, T, T). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, s/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded. |
| **Academic Honesty** | Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights. |

## Program Learning Outcomes to be Assessed in this Course

| Number | Learning Outcome | Course Title | Assessment Method | Target Performance level |
|---|---|---|---|---|
| **$S_p2$** | The ability to employ mathematics in various life problems. | Calculus 2 | Homework | 100% of the students get 60% or more on the rubric |

## Description of Program Learning Outcome Assessment Method

| Number | Detailed Description of Assessment |
|---|---|
| **$S_p4$** | The student selects a real-life problem or scenario that requires mathematical analysis and provides a comprehensive solution. |

## Assessment Rubric of the Program Learning Outcome

| | **Excellent (**4 pts**)** | **Good (**3 pts**)** | **Fair (**2 pts**)** | **Poor (**1 pt.**)** |
|---|---|---|---|---|
| **Problem Selection** | Relevant, complex, and mathematically rich problem chosen. | Relevant problem selected. | Basic problem with limited mathematical relevance. | Irrelevant or inappropriate problem chosen. |
| **Problem Definition** | Clear, thorough, and context-rich problem definition. | Adequate problem definition with context. | Basic problem definition, lacking depth. | Unclear or inadequate problem definition. |
| **Mathematical Analysis** | Skillful application of appropriate mathematical concepts. | Effective use of relevant mathematical concepts. | Some mathematical concepts applied with limited depth. | Inaccurate or incomplete mathematical analysis. |
| **Solution Clarity** | Highly detailed, organized, and clear solution. | Clear and organized solution. | Somewhat clear solution, lacking organization. | Unclear, disorganized, or incomplete solution. |