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| **Approval date:** |  | **Philadelphia University** |
| **Issue:** | **Faculty** |
| **Credit hours: 3 Credit hours** | **Department: Mathematics** |
| **Bachelor** | **Course Syllabus** | **Academic year:2023/2024** |

**Course information**

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| --- | --- | --- | --- | --- |
| **Prerequisite** | | **Course title** | | **Course#** |
| **250102** | | **Calculus (3)** | | **250202** |
| **Room #** | **Class time** | | **Course type** | |
|  | **Sat-Mon 9:45-11:00 Sat-Mon 12:45-14:00** | | University Requirement  Faculty Requirement  Major Requirement  Elective  Compulsory | |

**Instructor Information**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E-mail** | **Office Hours** | **Phone No.** | **Office No.** | **Name** |
| **aalsoboh@philadelphia.con** | **Sat to Tu. 11:30 -12:30** | **2339** | **2809** | **Dr. Abdullah Alsoboh** |

**Course Delivery Method**

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

**Course Description**

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| The course includes three-Dimensional Space: vectors, lines, planes. Vector-Valued Functions: calculus of vector-valued functions, arc length parameterization, curvature and motion along a curve. Partial Derivatives: limits and continuity, partial derivatives, chain rule, gradient and directional derivatives, Lagrange multipliers. Multiple and Triple Integrals: double integral over (non)rectangular regions, double integral in polar coordinates, applications (area, surface area, and volume), triple integral over (non)rectangular solids, triple integral in cylindrical and spherical coordinates, application (volume) |

**Course Learning Outcomes**

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| --- | --- | --- |
| **Corresponding Program outcomes** | **Outcomes** | **Number** |
| **Knowledge** | | |
| **Kp1** | Recognize the rectangular coordinate systems in three dimensions, and the analytic geometry of lines, planes, and other basic surfaces | **K1** |
| **Kp1** | Understand the calculus of vector-valued functions | **K2** |
| **Kp1** | Know the real valued functions of several variables, their graphs: level curves, and level surfaces, and their analytical geometry | **K3** |
| **Skills** | | |
| **Sp2** | Apply the concepts in the course to describe basic characteristics of curves (as curvature) and to explain various physical phenomena | **S1** |
| **Sp3** | Solve optimization problems involving two and three variables. | **S2** |
| **Competencies** | | |
| **Cp1** | Evaluate double and triple integrals, volumes of bounded solids, and areas of bounded region | **C1** |

**Learning Resources**

|  |  |
| --- | --- |
| Howard Anton, Irl C. Bivens and Stephen Davis, **Calculus: Early Transcendentals, 10th Edition**, JohnWiley & Sons, Inc. 2013. | Course textbook |
| James Stewart, **Calculus: Early Transcendentals, 7th Edition**, Brooks/ Cole 2012.  Saturnino L. Salas, Garret J. Etgen, Einar Hille, **Calculus: One and Several Variables, 10th Edition**, JohnWiley & Sons, Inc. 2007. | Supporting References |
| http://www.sfu.ca/~vjungic/Calculus%203/Calculus3.pdf | Supporting websites |
| **Classroom**  **laboratory Learning platform Other** | Teaching Environment |

**Meetings and subjects timetable**

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| **Learning Material** | **Tasks** | **Learning Methodsl** | **Topic** | **Week** |
| Ch. 11 |  | Lecture | **Three-Dimensional Spaces; Vectors:** Rectangular Coordinates in3-Space; Spheres; Cylindrical Surfaces. | **1** |
| Ch. 11 | Quiz (1) 5 points | Lecture | Vectors ,Dot Product; Projections. | **2** |
| Ch.11 |  | Lecture | Cross Product. Parametric Equations of Lines. | **3** |
| Ch. 11 | Assignment (1) 5 points | Lecture | Planes in 3-Space. | **4** |
| Ch.11 |  | Lecture | Cylindrical and Spherical Coordinates. | **5** |
| Ch.12 | Quiz (2) 5 points | Lecture | **Vector-Valued Functions:** Introduction to Vector-Valued Functions | **6** |
| Ch.12 |  | Lecture | Calculus of Vector-Valued Functions. | **7** |
| Ch.12 | Assignment (2) 5 points | Lecture | Arc Length. Unit Tangent, Normal, and Binormal Vectors. Curvature. | **8** |
| Ch. 13 |  | Lecture | **Partial Derivatives:** Functions of Two or More Variables. Limits and Continuity. | **9** |
| Ch. 13 | Quiz (3) 5 points | Lecture | Partial Derivatives. Differentiability. | **10** |
| Ch. 13 |  | Lecture | The Chain Rule. Directional Derivatives and Gradients. | **11** |
| Ch. 13 | Assignment (3) 5 points | Lecture | Tangent Planes and Normal Vectors. Maxima and Minima of Functions of Two Variables. | **12** |
| Ch. 13 |  | Lecture | Lagrange multipliers. | **13** |
| Ch. 14 |  | Lecture | **Multiple Integrals:** Double Integrals. Double Integrals over rectangular and Non-rectangular Regions. | **14** |
| Ch. 14 |  | Lecture | Double Integrals in Polar Coordinates,  Triple Integrals over rectangular coordinate. | **15** |
| Ch. 14 |  | Lecture | Triple Integrals in Cylindrical and Spherical Coordinates.  **Final Exam** | **16** |

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

**Course Contributing to Learner Skill Development**

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| Using Technology |
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| Communication skills |
| Improve the communication skills of students by giving oral quizzes and discuss the assignments at the class |
| Application of concepts learnt |
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**Assessment Methods and Grade Distribution**

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| --- | --- | --- | --- |
| **Link to Course Outcomes** | **Assessment Time**  **(Week No.)** | **Grade Weight** | **Assessment Methods** |
| **K1,K2** | **Week 11** | **30 %** | **Mid Term Exam** |
| **S2, C1** | **Continued** | **30 %** | **Various Assessments \*** |
| **K1,K2 K3** | **Week 16** | **40 %** | **Final Exam** |
|  |  | **100%** | **Total** |

\* 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**

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| --- | --- | --- | --- |
| **Assessment Method\*\*** | **Learning Method\*** | **Learning Outcomes** | **Number** |
| **Knowledge** | | | |
| **Quiz** | Lecture | Recognize the rectangular coordinate systems in three dimensions, and the analytic geometry of lines, planes, and other basic surfaces | **K1** |
| **Quiz** | Lecture | Understand the calculus of vector-valued functions | **K2** |
| **Assignment** | Lecture | Know the real valued functions of several variables, their graphs: level curves, and level surfaces, and their analytical geometry | **K3** |
| **Skills** | | | |
| **Midterm Exam** | Lecture | Apply the concepts in the course to describe basic characteristics of curves (as curvature) and to explain various physical phenomena | **S1** |
| **Midterm Exam** | Lecture | Solve optimization problems involving two and three variables. | **S2** |
| **Competencies** | | | |
| **Final Exam** | Lecture | Evaluate double and triple integrals, volumes of bounded solids, and areas of bounded region | **C1** |

\* 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**

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| **Policy Requirements** | **Policy** |
| The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%). | **Passing Grade** |
| * Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment. * A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from the an exam or assessment due date. * 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. | **Missing Exams** |
| 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,R). 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. | **Attendance** |
| 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. | Academic Honesty |

**Program Learning Outcomes to be Assessed in this Course**

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| **Target Performance level** | **Assessment Method** | **Course Title** | **Learning Outcome** | **Number** |
| 75 % have a degree above 8 | Quizzes | Calculus (3) | Understanding the main concepts | Kp1 |
| 75 % have a degree above 5 | Assignment | Calculus (3) | Apply mathematical concepts in real life problems | Sp2 |
| 60% have a degree above 20 | Final Exam | Calculus (3) | Apply critical and logical thinking in solving many problems | Cp1 |

**Description of Program Learning Outcome Assessment Method**

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| **Detailed Description of Assessment** | **Number** |
| Short quizzes mainly (3) with 5 points each | Kp1 |
| Assignment to solve real life problems with 5 points | Sp2 |
| Final Exam with 40 points | Cp1 |

**Assessment Rubric of the Program Learning Outcome**

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| Under Construction |