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| **Approval date:** |  | **Philadelphia University** |
| **Issue:** | **Faculty: Science** |
| **Credit hours:3 Credit Hours** | **Department:Basic Science and Mathematic** |
| **Bachelor** | **Course Syllabus** | **Academic year:2022/2023** |

**Course information**

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| **Prerequisite** | | **Course title** | | **Course#** |
| **0250311** | | **Real Analysis (2)** | |  |
| **Room #** | **Class time** | | **Course type** | |
| **21003** | **Mon. and Wed. 11:15-12:30** | | University Requirement  Faculty Requirement  Major Requirement  Elective  Compulsory | |

**Instructor Information**

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| --- | --- | --- | --- | --- |
| **E-mail** | **Office Hours** | **Phone No.** | **Office No.** | **Name** |
| **ralseidi@philadelphia.edu.jo** | **Sun. Tuesday**  **10:00-11:00** | **009626479900/2340** | **1015** | **Dr. Rola Alseidi** |

**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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| This course is the second part of the Real Analysis covering standard and advanced topics in analysis: differentiation, the Riemann integral, sequences of functions, infinite series, and possibly some generalized Riemann integral. |

**Course Learning Outcomes**

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| **Corresponding Program outcomes** | **Outcomes** | **Number** |
| **Knowledge** | | |
| **Kp1** | Understand the mean value theorem and L'Hospitals rules | **K1** |
| **Kp1** | Understand the theory of Riemann integral and the fundamental theorems | **K2** |
| **Kp1** | Define the derivative and related concepts and illustrate them with typical examples. | **K3** |
| **Skills** | | |
| **Sp1** | Derive and apply the basic properties of exponential, logarithmic, and trigonometric functions. | **S1** |
| **Sp2** | Prove the fundamental theorems for series convergence. | **S2** |
| **Competencies** | | |
| **Cp1** | Thinking reasonably and be able to make decisions | **C1** |

**Learning Resources**

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| --- | --- |
| “Introduction to Real Analysis”. Bartle and Sherbert. John Wiley & Sons, Inc.3th Edition,2001. | Course textbook |
| Malik, S. C., and Savita Arora. *Mathematical analysis*. New Age International, 1992.  Stromberg, Karl R. *An introduction to classical real analysis*. 1981. | Supporting References |
|  | Supporting websites |
| Classroom  laboratory Learning platform Other | Teaching Environment |

**Meetings and subjects timetable**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Material** | **Tasks** | **Learning Methods** | **Topic** | **Week** |
| **Ch. 5** |  | Lecture | **Review:**  Continuous functions  Unifom continuity | **1** |
| **Ch. 6** |  | Lecture | The Derivative.  Derivative rules.  The Chain Rule. | **2** |
| **Ch. 6** |  | Lecture | inverse functions.  Interior Extremum Theorem.  The Mean Value Theorem. | **3** |
| **Ch. 6** | Quiz 1 (10 points)  **27/03/2023** | Lecture | Applications on the Mean Value Theorem. Inequalities | **4** |
| **Ch. 6** |  | Lecture | The Intermediate Value Property of Derivatives.  Indeterminate Forms.  Cauchy Mean Value Theorem. | **5** |
| **Ch. 6** |  | Lecture | L'Hospitals rule I.  L'Hospitals rule II. | **6** |
| **Ch. 3** |  | Lecture | **Ch. 7: The Riemann Integral**  Upper and Lower Sums  Upper and Lower Integrals  Darboux Integral | **7** |
| **Ch. 3** |  | Lecture | Integrability Criterion  Riemann Integral.  Riemann Integrable Functions | **8** |
| **Ch. 3** | Quiz 2  (10 points)  **17/04/2023** | Lecture | Some Properties of the Integral. Boundedness Theorem.  Cauchy criterion. | **9** |
| **Ch. 4** |  | Lecture | Classes of Riemann Integrable Functions.  The Additivity Theorem. | **10** |
| **Ch. 4** |  | Lecture | The Fundamental Theorem (First Form)  The Fundamental Theorem (Second Form) | **11** |
| **Ch. 5** |  | Lecture | Substitution Theorem  Composition Theorem.  Product Theorem. | **12** |
| **Ch. 6** | Assignment  (10 points)  **8/05/2023** | Lecture | **Ch. 8: Sequences of functions**  Sequences of Functions:  Pointwise and Uniform Convergence.  The Uniform Norm.  Cauchy Criterion for Uniform Convergence | **13** |
| **Ch. 5** |  | Lecture | Interchange of Limits and Continuity. Interchange of Limits and Derivative. Interchange of Limits and Integral. | **14** |
| **Ch. 5** |  | Lecture | **Ch. 9: The infinite series**  Absolute Convergence  Test for Absolute Convergence | **15** |
|  | **Final Exam** |  | Review. | **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 the student 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** |
| **C2, C3** | **Continued** | **30 %** | **Various Assessments \*** |
| **K1, K2 K3, K4** | **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 | Understand the mean value theorem and L'Hospitals rules | **K1** |
| **Assignment** | Lecture | Understand the theory of Riemann integral and the fundamental theorems | **K2** |
| **Assignment** | Lecture | Define the derivative and related concepts and illustrate them with typical examples. | **K3** |
| **Skills** | | | |
| **Midterm** | Lecture | Derive and apply the basic properties of exponential, logarithmic, and trigonometric functions. | **S1** |
| **Assignment** | Lecture | Prove the fundamental theorems for limits and continuity. | **S2** |
| **Competencies** | | | |
| **Final Exan** | Lecture | Thinking reasonably and be able to make decisions | **C1** |
| **Final Exan** | Lecture | To Work with given information and handle mathematical proofs based on mathematical theorems. | **C2** |

\* 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 and Assignment | Real Analysis (2) | Understanding the main concepts | Kp1 |
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**Description of Program Learning Outcome Assessment Method**

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| **Detailed Description of Assessment** | **Number** |
| Short quizzes mainly (2) with 10 points each | Kp1 |
| Assignment (10) points | Sp4 |

**Assessment Rubric of the Program Learning Outcome**

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| **Construct during the course.** |