|  |  |  |
| --- | --- | --- |
| **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**

|  |  |  |
| --- | --- | --- |
| **Prerequisite**  | **Course title** | **Course#** |
| **0250251** | **Real Analysis (1)** | **0250311** |
| **Room #** | **Class time** | **Course type** |
| **6304** | **Mon. and Wed. 9:45-11:00** | [ ]  University Requirement [ ]  Faculty Requirement [x]  Major Requirement [ ]  Elective [ ]  Compulsory |

**Instructor Information**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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**

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

 **Course Description**

|  |
| --- |
| This course includes The Algebraic properties of R, order property, the absolute value function, triangle inequality, bounded sets, the completeness property of R, Archimedean property in R, supremum and infimum.Sequences: Limit of a sequence. convergent sequences. monotone and bounded sequences. Cauchy sequences. Subsequences and limit points. Bolzano-Weierstrass Theorem.Limits of real valued functions. Definition of limits by neighborhoods. Definition of limits by sequences. Limit theorems.Continuous functions on R: Sequence definition and neighborhood definition of continuity. Boundedness of continuous functions on compact intervals. The extreme value theorem. Uniform continuity. The intermediate value theorem. |

**Course Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **Corresponding Program outcomes**  | **Outcomes** | **Number** |
| **Knowledge**  |
| **Kp1** | Understanding of the concepts of limit. | **K1** |
| **Kp1** | Understand the properties of sequences and the fundamental theorems.  | **K2** |
| **Kp1** | Understanding the concepts of continuity. | **K3** |
| **Skills**  |
| **Sp1** | Prove the fundamental theorems for limits and continuity.  | **S1** |
| **Sp2** | Apply the basic properties of real numbers.  | **S2** |
| **Competencies** |
| **Cp1** | Work in a team to implement one of the tasks of the course  | **C2** |

**Learning Resources**

|  |  |
| --- | --- |
|  “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  |
| [x] Classroom [ ]  laboratory [ ] Learning platform [ ] Other  | Teaching Environment  |

**Meetings and subjects timetable**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Material**  | **Tasks**  | **Learning Methods** | **Topic** | **Week** |
| **Ch. 1** |  | Lecture  | **Ch. 1:Preliminaries:** Sets and Functions.Mathematical Induction.Finite and Infinite Sets. | **1** |
| **Ch. 2** |  | Lecture | **Ch. 2: The Real numbers:** The Algebraic properties of R.The order properties of R. | **2** |
| **Ch. 2** |  | Lecture | Absolute Value and Real Line.The Completeness Property of R. | **3** |
| **Ch. 2** | Quiz 1 (10 points)**27/03/2023** | Lecture | Applications of the Supremum Property.Intervals. | **4** |
| **Ch. 3** |  | Lecture | **Ch3**:**Sequences and Series:**Sequences and Their Limits. | **5** |
| **Ch. 3** |  | Lecture | Limit Theorems.Monotone Sequences. | **6** |
| **Ch. 3** |  | Lecture | Subsequences and the Bolzano-Weierstrass Theorem.  | **7** |
| **Ch. 3** |  | Lecture | The Cauchy Criterion.Properly Divergent Sequences. | **8** |
| **Ch. 3** | Quiz 2(10 points)**17/04/2023** | Lecture | Introduction to Infinite Series. | **9** |
| **Ch. 4** |  | Lecture | **Ch4: Limits:**Limits of Functions.Limit Theorems.  | **10** |
| **Ch. 4** |  | Lecture | Some Extensions of Limit Concept.  | **11** |
| **Ch. 5** |  | Lecture | **Ch 5: Continuous Functions :**Continuous Functions. | **12** |
| **Ch. 6** | Assignment (10 points)**22/05/2023** | Lecture | Combinations of Continuous Functions. | **13** |
| **Ch. 5** |  | Lecture | Continuous Functions on Intervals  | **14** |
| **Ch. 5** |  | Lecture | Uniform Continuity. | **15** |
|  | **Final Exam** |  | Review.  | **16** |

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

**Course Contributing to Learner Skill Development**

|  |
| --- |
| Using Technology  |
|  |
| Communication skills  |
| Improve the communication skills of the student by giving oral quizzes and discuss the assignments at the class |
| Application of concepts learnt |
|  |

**Assessment Methods and Grade Distribution**

|  |  |  |  |
| --- | --- | --- | --- |
| **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**

|  |  |  |  |
| --- | --- | --- | --- |
| **Assessment Method\*\***  | **Learning Method\*** | **Learning Outcomes** | **Number**  |
|  **Knowledge** |
| **Quiz** | Lecture | Understanding of the concepts of limit. | **K1** |
| **Assignment** | Lecture | Understand the properties of sequences and the fundamental theorems.  | **K2** |
| **Assignment** | Lecture | Understanding the concepts of continuity. | **K3** |
|  **Skills**  |
| **Assignment** | Lecture | Prove the fundamental theorems for limits and continuity.  | **S2** |
|  **Competencies** |
| **Final Exan** | Lecture | Recognize the sequences and series of real numbers and convergence. | **C2** |
| **Final Exan** | Lecture | Recognize the real functions and its limits, the continuity of real functions. | **C3** |

\* 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 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**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Target Performance level** | **Assessment Method**  | **Course Title** | **Learning Outcome**  | **Number**  |
| 75% have a degree above 8 | Quizzes and Assignment | Real Analysis (1) | Understanding the main concepts  | Kp1 |
|  |  |  |  |  |

**Description of Program Learning Outcome Assessment Method**

|  |  |
| --- | --- |
| **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**

|  |
| --- |
| **Construct during the course.** |