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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:2021/2022** |

**Course information**

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| **Prerequisite** | | **Course title** | | **Course#** |
| **250101** | | **Linear Algebra (2)** | | **250341** |
| **Room #** | **Class time** | | **Course type** | |
| **21009** | **Sun. and Tuesday 11:15-12:45** | | 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. to Wed.**  **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 includes the study of general Vector spaces, Subspaces, Eigenvalues and Eigenvectors, Inner product space, Diagonalization, and linear transformation. |

**Course Learning Outcomes**

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| **Corresponding Program outcomes** | **Outcomes** | **Number** |
| **Knowledge** | | |
| **Kp1** | Understanding of the concepts of vector space. | **K1** |
| **Kp1** | Understanding of the concepts of Rank and nullity. | **K2** |
| **Kp1** | Understanding the concepts of eigenvalues, eigenvectors. | **K3** |
| **Kp1** | Understanding the concept of general linear transformation. | **K4** |
| **Skills** | | |
| **Sp1** | Prove some properties of matrix transformation. | **S1** |
| **Sp2** | Apply the matrix method to analyze the behavior of physical systems that evolve over time. | **S2** |
| **Competencies** | | |
| **Cp1** | Recognize how a set of matrices, a set of vectors with appropriate operations can be considered as vector space | **C3** |

**Learning Resources**

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| --- | --- |
| Elementary Linear Algebra 11th Edition. Author Howard Anton, Chris Rorres Publisher: Wiley 2015 | Course textbook |
| Linear algebra with applications by [Leon](http://library.philadelphia.edu.jo/scripts/minisa.dll/175/PAUTHOR/Leon?KEYSEARCH&amp;DISPLAY=AUTHORS%2B), Steven J., 9th ed. Boston: Pearson Education Limited, 2015.  Linear Algebra by L.W. Jhonson & R.D. Riess & J.T. Arnold- Addisson Wesely 2007. | Supporting References |
| http://videolectures.net/mit1806s05\_linear\_algebra/ | Supporting websites |
| Classroom  laboratory Learning platform Other | Teaching Environment |

**Meetings and subjects timetable**

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| --- | --- | --- | --- | --- |
| **Learning Material** | **Tasks** | **Learning Methods** | **Topic** | **Week** |
|  |  | Lecture | **Review**  Determinants  System of Linear Equations  Inverse of the Matrix | **1** |
| **Ch. 4** |  | Lecture | **CH 04: General Vector Space.**  Real vector space | **2** |
| **Ch. 4** |  | Lecture | Subspaces | **3** |
| **Ch. 4** |  | Lecture | Linear Independence | **4** |
| **Ch. 4** | Quiz 1 (10 points)  **20/11/2022** | Lecture | Coordinates and Basis | **4** |
| **Ch. 4** |  |  | Dimension, Change of Basis | **5** |
| **Ch. 4** |  |  | Row space, Column space and Null space | **6** |
| **Ch. 4** |  |  | Rank, Nullity and fundamental matrix spaces | **7** |
| **Work Sheets** | Quiz 2 (10 ponts  **18/12/2022** |  | Discussion and practice week | **8** |
| **Ch. 5** |  | Lecture | **CH05: Eigenvalues and Eigenvectors.**  Eigenvalue’s and eigenvectors. | **9** |
| **Ch. 5** |  | Lecture | Diagonalization | **10** |
| **Ch. 8+4** |  | Lecture | **Ch08: Linear Transformation**  Matrix transformation, properties of matrix transformation . | **11** |
| **Ch. 8** |  |  | General linear transformation, Inverse transformation. | **12** |
|  |  |  | Composition Transformation. | **13** |
| **Ch. 8** | Assignment  22/02/2023  10 points | Lecture | Matrices for general linear transformations. | **14** |
| **Ch. 6** |  | Lecture | **Ch06: Inner Product Spaces**  Inner product Space | **15** |
| **Ch. 6** |  | Lecture | Review and 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 |
| Using Matlab to find eigenvalues and eigenvectors of matrices. |
| 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 | Understanding of the concepts of vectorspace and subspace. | **K1** |
| **Assignment** | Lecture | Understanding of the concepts of Rank and nullity. | **K2** |
| **Assignment** | Lecture | Understanding the concepts of eigenvalues, eigenvectors. | **K3** |
| **Quiz** | Lecture | Understanding the concept of general linear transformation. | **K4** |
| **Skills** | | | |
| **Midterm** | Lecture | Prove some properties of matrix transformation. | **S1** |
| **Assignment** | Lecture | Apply the matrix method to analyze the behavior of physical systems that evolve over time. | **S2** |
| **Competencies** | | | |
| **Final Exan** | Lecture | Solve system of linear equations in different ways | **C1** |
| **Final Exan** | Lecture | Recognize different types of matrices and their properties and find the determinant of a square matrix in different ways. | **C2** |
| **Final Exan** | Lecture | Recognize how a set of matrices, a set of vectors with appropriate operations can be considered as vector space | **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**

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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 | Linear Algebra (2) | Understanding the main concepts | Kp1 |
| 75% have a degree above 8 | Assignment | Linear Algebra (2) | Using Technology in many mathematical fields. | Sp4 |

**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 to solve system of linear equations with 10 points | Sp4 |

**Assessment Rubric of the Program Learning Outcome**

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| **Construct during the course.** |