COURSE PLAN

**SECTION I**

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| **Semester** | 5 | **Class** | BSc(PCM,PME,CMS,CME,EMS) |
| **Course Code** | MAT551 | **Course title** | **Linear Algebra using Python** |
| **Hours** | 30 | **Hours per week** | 2 |
| **Faculty name** | Tabitha R | **Contact details** | [tabitha.rajashekar@christuniversity.in](mailto:tabitha.rajashekar@christuniversity.in) |
| **Course Description** | This course aims at providing hands on experience in using Python functions to illustrate the notions vector space, linear independence, linear dependence, linear transformation and rank. | | |
| **Course Objectives** | This course will help the learner to gain a familiarity with  COBJ1. The built in functions required to deal with vectors and Linear Transformations.  COBJ2. Python skills to handle vectors using the properties of vector spaces and linear transformations | | |
| **Course Outcomes** | On successful completion of the course, the students should be able to demonstrate sufficient skills in using Pythonfunctions in the applying of the notions of Vector space and Linear transformations | | |
| **Course Guidelines and Policies** | * Each student is expected to bring a laptop, which should be installed with the required software, should be synchronized with University internet access and fully charged. * All the lab sessions will be documented in the form of PDF, in a well-organized manner. The files should compulsorily be named as **Register number\_Date.pdf**. * Follow the instruction given in the class while preparing the record. As per the Faculty instructions all the record submissions will be through Moodle /Google class room/etc. * Each time, a cumulative e-record need to be submitted with dates mentioned. Submission of the completed e-record time to time is mandatory for grading and successful completion of the course. | | |

**SECTION II**

**Lab Sessions**

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| --- | --- | --- |
| **No.** | Dates | **Topic** |
| 1. | 13/06/17 to 22/06/17 | Operations on Matrices and echelon form |
| 2. | 24/06/19 to 29/07/19 | System of Equations |
| 3. | 01/07/19 to 13/07/19 | Eigen values and Eigenvectors |
| 4. | 15/07/19 to 27/07/19 | Expressing a vector as a linear combination of given set of vectors. |
| 5. | 29/07/19 to 3/08/19 | Linear Span, Linear Independence and Linear dependence. |
| LAB EXAM 1 12 -17 August | | |
| 6. | 19/08/19 to 24/08/19 | Linear Transformation and Rank. |
| 7. | 26/08/19 to 31/08/19 | Verifying whether a given transformation is linear. |
| 8. | 3/09/19 to 07/09/19 | Finding matrix of a linear transformation. |
| 9. | 09/09/19 to14/09/19 | Problems on rank |
| 10. | 16/09/19 to 21/09/19 | Problems on nullity |
| LAB EXAM 2 23-28 September | | |

**Remark:**

For all the sessions on Linear Algebra, you are expected to

* Solve the problems
* Obtain the solution using Python
* Analyze the results.

**Essential Text Books:**

1. Amit Saha, *Doing Math with Python: Use Programming to Explore Algebra, Statistics, Calculus, and More!*, no starch press:San Fransisco, 2015.
2. H P Langtangen, *A Primer on Scientific Programming with Python,* 2nd ed., *Springer*, 2016.

**Recommended Reading:**

1. B E Shapiro, *Scientific Computation: Python Hacking for Math Junkies*, Sherwood Forest Books, 2015.
2. C Hill, Learning Scientific Programming with Python, Cambridge University Press, 2016.

**Online Resources:**

1. https://greenteapress.com/thinkpython2/thinkpython2.pdf
2. https://docs.python.org/2/tutorial/

**SECTION III**

**Assessment outline:**

The parameters for evaluation under each component and the mode of assessment are given below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Parameter** | **Mode of Assessment** | **Maximum points** |
| **CIA I** | Mastery of the fundamentals | Lab Assignments and problem solving | 20 |
| **CIA-II** | Conceptual Clarity and software skills | Lab Exam 1 | 10 |
| **Lab Record** | Systematic  Documentation of Lab exercises | e-Record work | 07 |
| **Attendance** | Regularity and Punctuality | Lab Attendance | 03  95%-100%-3  90%-94%-2  85%-89%-1 |
| **CIA III** | Proficiency in executing the problems | Lab Exam 2 | 10 |
| **Total** | | | **50** |

**Evaluation rubrics:**

**Mapping:**  Mapping the Learning Outcomes of the course against the components of assessment is given below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | **Components of assessment** | | | |
| **CIA 1** | **MSE** | **CIA 3** |  |
| **CO 1** |  |  |  |  |
| **CO 2** |  |  |  |  |
| **CO 3** |  |  |  |  |

**CIA I**

|  |  |
| --- | --- |
| Lab Assignments(LA) | Date |
| LA1 | 24-29 June 2019 |
| LA 2 | 30 July-3 August 2019 |
| LA3 | 26-31 August 2019 |
| LA4 | 16-21 Sep 2019 |

|  |  |
| --- | --- |
| Score | If student |
| 5 | Completes activity in the class independently and submits within time |
| 4 | Works independently but not able to complete within time |
| 3 | Completes the task and late submission |
| 2 | Incomplete and late submission |
| 1 | Takes others help and late submission |
| 0 | No submission |

**NOTE:** After every lab evaluation, the faculty will display the marks in the class.

**Lab Exam 1 and Lab Exam 2:**

All the classes will have similar/same question paper and will be conducted at the same time.

**Two 5 MARKS QUESTIONS (2x 5 = 10)**

1. Executes the program without any errors – 5 mark
2. Executes the program with < 25% errors – 3 mark
3. Executes the program with > 50% errors – 1mark
4. Incorrect program – 0 mark

Marks will be approved by HOD and displayed in the class