University of Kerala

Discipline	Mathematics				
Course Code	UK3DSEMAT200				
Course Title	Programming with LaTeX and Python				
Type of Course	DSE				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours per week
	4	3	0	2	5
Pre-requisites	1. Basic computer knowledge				
Course Summary	This course provides basic skill in LaTeX typesetting and python programming				

Detailed Syllabus

Module	Unit	Contents	Hrs
I		**Basics of Type setting using LaTeX**	**9**
	1	Simple typesetting, Fonts, Type size Typesetting Mathematics,	
	2	Typesetting Equations (align, align*, cases), Matrices and Determinants (matrix, pmatrix, bmatrix, vmatrix) Putting one over another (frac, dfrac, int, lim, sum, prod). Chapter 1: Sections 8.1, 8.3.1, 8.3.2, 8.4.2 and 8.4.4 of Text [3].	
II		**Tables, Figures and Presentation**	**9**
	3	Basics of typesetting Theorems and amsthm package (Sections 9.1 to 9.2.1 of Text [3]). Do Exercise questions 4, 5, 6 and 7 of Chapter 9 of Text [3].	
	4	Typesetting basic tables. (Chapter 7: Section 7.2 of Text [3], except the portion using $\backslash renewcommand$)	

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Module	Unit	Contents	Hrs
	5	Inserting pictures using Graphicx package (Chapter 12: Section 12.1.1 to 12.1.3 of Text [1], except the portion on pstricks)	
	6	Creating Floating Figures (Chapter 11: Section 11.1.1 of Text [3])	
III		**The Essentials of Python**	**9**
	7	Absolute Basics - Lists, tuples and sets - Strings - Control Flow - Functions (Chapter 4, 5 (Sections 5.6, 5.8 need not be discussed), 6 (Section 6.5 to 6.9 need not be discussed),8, 9.1 to 9.5 (Section 9.3 need not be discussed) and 13.1 to 13.4 of Text [4])	
IV		**Working with numbers**	**9**
	8	Basic Mathematical Operations - Working with different kinds of numbers - Getting user input - Math Programmes - The Programming challenges mentioned in Chapter 1 of Text [1]	
V		**Suggestions for the teacher designed module**	**9**
	9	Beamer Presentation – Set up a Beamer document and enhance it with various options	
	10	Reading and writing files in Python	

Topics and problems for Practical sessions and practical examinations – 30 hours

1. Typesetting complete documents with the following contents:

    (a) different font styles, font sizes

    (b) various greek alphabets

    (c) demonstrating mathematics equations and cases

    (d) demonstrating matrix, determinant styles

    (e) demonstrating dfrac, frac, int, sum, prod

    (f) theorems, examples using amsthm

    (g) tables

    (h) Inserting pictures

2. Writing and running the following programs

    (a) Defining lists and tuples, and accessing elements in it

    (b) Demonstrating varius actions on lists like inserting new elements, deleting, slicing

    (c) Demonstrating how to use if, else, elif, loops

    (d) Problems from mathematics like finding arithmetic mean, gcd (using Euclidean algorithm), checking primality, summing consecutive integers using loops

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A record should be maintained with atleast 7 problems from the above. Each problem in the record must have a description of the problem, algorithm (step by step procedure), commands used, input given and output obtained accordingly. For the ESE, from the list of above 10 problems, the student should be able to answer two selected (from the 7 available in the record) by the examiner.

Textbooks

1. Amit Saha, Doing Math with Python, No Starch Press, 2015.

2. Donald Binder and Martin Erickson, A student's guide to the study, practice and tools of modern mathematics, CRC Press, 2010.

3. E. Krishnan, The LaTeX Tutorial: A Primer, by The Tutorial Team, Indian TeX Users Group, Sayahna Foundation, http://www.sayahna.org, 2020.

4. Naomi Ceder, The Quick Python Book, Manning, 2018.

References

1. Dilip Datta, LaTeX in 24 Hours, A Practical Guide for Scientific Writing, Springer, 2017.

2. Hubert Partl, Irene Hyna and Elisabeth Schlegl, The Not So Short Introduction to LaTeX2ϵ, Tobias Oetiker, Version 6.4, 09 March 2021.

3. H J Greenberg, A simplified introduction to LaTeX, 1997, https://ctan.org/tex-archive/info/simplified-latex?lang=en

4. Beamer Presentations: A Tutorial for Beginners, https://www.overleaf.com/learn/latex/Beamer_Presentations%3A_A_Tutorial_for_Beginners_(Part_1)%E2%80%94Getting_Started

5. E Balagurusamy, Introduction to computing and problem solving using Python, Mc Graw Hill Education, 2017.

6. Kenneth A Lambert, Fundamentals of Python, First Programs, 2nd Edition, Cengage, 2019.

E- resources

1. https://www.tug.org/texlive/

2. https://www.python.org/downloads/

3. https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes

4. https://en.wikibooks.org/wiki/Python_Programming

Course Outcomes

CO No.	Upon completion of the course the graduate will be able to	PO/PSO	Cognitive Level	Knowledge Category	Lecture(L) Tutorial (T)	Practical (P)
CO 1	Understand the basics of LaTeX and python	PSO1, PO7	U	F,C	L	P
CO 2	Create documents and programs	PSO5, PO3	Ap,C	P	L	P
CO 3	Create good quality presentations	PSO5, PO3, 4	Ap, C	P	L	P
CO 4	Apply to the subject and get more insight to the mathematical concepts	PSO2	Ap	M	L	P

(R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create)
(F-Factual, C-Conceptual, P-Procedural, M-Metacognitive)

Mapping of CO with PSOs and POs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1												3	
CO2					3				2					
CO3			-	-	3				3	3				
CO4		3												

(- -Nill, 1-Slightly/Low, 2-Moderate/Medium, 3-Substantial/High)

Assessment Rubrics

- Quiz/Assignment/Discussion/Seminar

- Midterm Exam

- Programming Assignments

- Final Exam (Theory and Practical)

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Mapping of COs to Assessment Rubrics

	Internal Examination	Assignment	Project Evaluation	End Semester Exam
CO1	✓	✓		✓
CO2	✓	✓		✓
CO3	✓	✓		
CO4		✓		

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