Institute of Business & Information Technology
University of the Punjab
Quaid-e-Azam Campus, Lahore

Spring Term

Basic Information:

Title:	DDBS~ Cloud Computing	**Code**	IT 368
Program:	BBIT	**Credit Hours:**	Three (03)
Sessions:	30 Classes + Mid Term + Final Term	**Pre-Requisite:**	Good Programming skills

Course Description:

This course is an advance course that will include both theoretical and as well practical concepts and experience with cloud computing services and use cases. This course will also include high level concepts of Data Warehousing and Big Data along with their implementation using AWS services. It will help the students to find good jobs in IT industry.

Learning Outcomes:

After the completion of this course, it is expected that students who will involve themselves in the knowledge base working of the course will be capable to
1. *Understand and implement cloud computing services*
2. *Use AWS services*
3. *Code using Python Language*
4. *Understand Big Data and its use cases*
5. *Understand Data warehousing concepts and design*

Teaching Learning Methodology:

The formal teaching component of this course consists of active student participation in and contribution to all forms of teaching and learning i.e. lectures, discussions, research assignments and projects. Lectures will be twice a week of 90 min each.

Group Configurations:

One of the objectives of this course is to encourage and facilitate teamwork. Class will have to make a group of four for projects and research assignments. It is recommended that student will form their own groups. As a general guideline, your group should have members with diverse skill sets including people who are proficient or have aptitude for different subject areas.

Weekly Term Plan

Wk	Lecture Topic
01	*Introduction to Cloud Computing (Definition, Benefits, Types, Examples)*
02	*Python language (basics and advance topics)*
03	*Python libraries for Cloud Computing - hands on*
04	*Introduction to AWS (Security Services)*
05	*AWS Compute Services (EC2)*
06	*AWS Storage Services (S3, RDS)*
07	*Cloud Computing use cases*
08	*Mid Term Examination*
09	*Introduction to NoSQL*
10	*AWS DynamoDB for NoSQL storage*
11	*Serverless computing (AWS Lambda)*
12	*Introduction to Big Data*
13	*Data Warehousing design and applications*
14	*Data Warehousing implementation with AWS*
15	*Term Project presentations (Evaluation)*
16	*Final Term Examination*

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Topics in Detail

Cloud Computing
Definition
Pros and cons with case studies
Service Models;
Description and examples of:
    Infrastructure as a service (IaaS)
    Platform as a service (PaaS)
    Software as a service (SaaS)
Deployment Models
Description and examples of:
    Public cloud
    Private cloud
    Community cloud
    Hybrid cloud

Python Language
Overview
Environment setup
Syntax
Basic topics (data types, decision making, loops, functions, etc.)
Advanced topics (classes, multi-threading)
Libraries (NumPy, pandas, boto3)

AWS Services
Under this section, we'll cover the following AWS services:
    IAM (for access management)
    EC2 (virtual machine for computation)
    S3 (storage service)
    RDS (structured storage - SQL)

    DynamoDB (NoSQL storage)
    Lambda (serverless computing)
    Redshift (data warehouse)

Data warehousing
Definition
Dimensions
    Slowly changing dimensions - types
Facts
Design schemas
    Star schema
    Snowflake schema
    Fact constellation
Analytics and reporting introduction
AWS Redshift

Big Data
Definition
Types
    Structured data
    Unstructured data
    Semi-structured data
Characteristics
    Volume
    Variety
    Velocity
    Variability
Benefits and use cases
Tools (Hadoop, Map reduce, spark)

Text & Recommended Readings	**Suggested Research Papers**
1. AWS Documentation (https://aws.amazon.com/getting-started/) 2.	**Next generation cloud computing: New trends and research directions** (https://www.sciencedirect.com/science/article/pii/S0167739X17302224)
	Secure integration of IoT and Cloud Computing (https://www.sciencedirect.com/science/article/abs/pii/S0167739X1630694X)
	Cloud-Trust—a Security Assessment Model for Infrastructure as a Service (IaaS) Clouds (https://ieeexplore.ieee.org/document/7072526)
	Connecting Fog and Cloud Computing (https://ieeexplore.ieee.org/document/7912254)
	Containers and Cloud: From LXC to Docker to Kubernetes (https://ieeexplore.ieee.org/document/7036275)

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Grading Policy:

Final Grade for this course will be the cumulated result of the following term work with relevant participation according to the quoted percentage.

Sessional	**25%**		*Mid Term*	**35%**		*Final Term*	**40%**
Assignments	10 %		*Mid Term Exam*	25%		*Final Exam*	30%
Quizzes	10%		*Major Report/Work*	10%		*Case Study/ Project/ Term Paper*	10%
Presentations	05%						

Remember subdivision of Mid Term and Final Term Examination should be done only in extreme cases of very essential and major Grading Instruments.

Dishonest Practices & Plagiarism

Any student found responsible for dishonest practice/cheating (e.g. copying the work of others, use of unauthorized material in Grading Instruments) in relation to any piece of Grading Instrument will face penalties like deduction of marks, grade 'F' in the course, or in extreme cases, suspension and rustication from IBIT.
For details consult Plagiarism Policy of PU at http://pu.edu.pk/dpcc/downloads/Plagiarism-Policy.pdf

Grading System:

Letter Grade	Grade Point	Num Equivalence
A	4.00	85 – 100 %
A-	3.70	80 – 84 %
B+	3.30	75 – 79%
B	3.00	70 – 74 %
B-	2.70	65 – 69 %
C+	2.30	61 – 64 %
C	2.00	58 – 60 %
C-	1.70	55 – 57 %
D	1.00	50 – 54 %
F	0.00	Below 50 %
I	Incomplete	*
W	Withdraw	*

Norms to Course:

✓ *Submission Date and Time for the term instruments is always* **Un-Extendable**.
✓ *5 Absentees in class will result in forced withdrawal.* (**PU Policy**)
✓ *Re-sit in Mid and Final Term will cause you a loss of 2 and 3 grade marks respectively.* (**PU Policy**)
✓ *This is your responsibility to keep track of your position in class evaluation units.*
✓ *After the submission date, NO excuse will be entertained.*
✓ ***Keep a copy of all submitted Grading Instruments.***
✓ *Assignment is acceptable only in its Entirety.*
✓ *No make up for any assignment and quiz.*
✓ *Copied & Shared work will score Zero.*
✓ *Assignments are Individual.*

Good Luck
For the Spring Term