

**Institute of Science Humanities & Liberal Studies**  
**Department of Computer Science**  
**Prof. Kirtankumar Rathod**

**Subject code: IMCA0207**

**Course name: Advanced Database Management System**

Pre-requisites: Basic knowledge of DBMS, SQL queries, C programming

Credit points: 06

Offered: Integrated MCA

Semester number: 2nd

**Course Coordinator**

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Consultation times: Mon – Fri: - 3:30 pm to 4:30 pm

**Course Lecturer**

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Consultation time: Mon – Fri: - 3:30 pm to 4:30 pm

Students will be contacted throughout the Session via E-mail with important information regarding to this course.

**Course Objectives**

- 1) To introduce advanced topics of database management to students.
- 2) Determine database security, concurrency and recovery concepts.
- 3) Prepare students for expertise in developing procedures, functions for their real-time project.

**Course Outcomes (CO)**

- 1) Describe the PL/SQL blocks and its objects with its functionalities.
- 2) To know about concurrency management in multiple transaction system.
- 3) Understand the concepts of security and recovery.
- 4) Students will able to create procedures, functions, triggers and packages for their real-world applications.

## Course Outline

### UNIT-I

[12]

Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Transaction support in SQL, Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multi version Concurrency Control Techniques.

### UNIT-II

[12]

PL/SQL block structure, PL/SQL Types, Expressions and Operators, PL/SQL control structures, PL/SQL records, SQL within PL/SQL, Cursor, Cursor Variables, and Cursor Predicates, Referencing Cursor Variables, Determining the Number of Fetched Rows for a Cursor. Error Handling, Exception.

### UNIT-III

[12]

Recovery Concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, Introduction to Database Security Issues, Discretionary Access Control Based on Granting and Revoking Privileges, Mandatory Access Control and Role-Based Access Control for Multilevel Security, SQL Injection, Challenges of Database Security

### UNIT-IV

[12]

Procedures and Functions, CALL statement, Procedure versus Functions, Triggers, Types of Triggers, Object types and system defined data dictionaries.

## Method of delivery

Lectures – Chalk and Talk  
 Power point presentation  
 Live practical demo session in classroom

## Study time

Lectures: 4 hours / week  
 Lab Sessions: 4 hours / week  
 Extra @ home / self-learning: 4 hours / week

## CO-PO Mapping (PO: Program Outcomes)

| Program Outcomes of Integrated MCA |   |
|------------------------------------|---|
| PO1                                | <b>Computer knowledge:</b> Apply the knowledge of mathematics, science, computer fundamentals and specialization to the solution of complex problems.   |
| PO2                                | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex computer science problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer sciences.  |
| PO3                                | <b>Design/development of solutions:</b> Design solutions for complex computer science problems and design system components or processes that meet the specified needs with appropriate consideration for cultural, social environment.   |
| PO4                                | <b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.   |
| PO5                                | <b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.  |
| PO6                                | <b>The digital youth and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional skill-set.  |
| PO7                                | <b>Environment and sustainability:</b> Understand the impact of the professional computer science solutions in social and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| PO8                                | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the computer science practice.  |
| PO9                                | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.  |
| P10                                | <b>Communication:</b> Communicate effectively on complex activities with the computer science community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| P11                                | <b>Project management and finance:</b> Demonstrate knowledge and understanding of the computer and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.   |
| P12                                | <b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.   |

### Mapping of CO with PO

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b> | √   |     | √   |     |     |     |     |     |     |      | √    |      |
| <b>CO2</b> | √   |     |     | √   | √   |     |     | √   |     |      |      | √    |
| <b>CO3</b> | √   |     | √   |     | √   |     |     |     |     |      |      | √    |
| <b>CO4</b> | √   |     |     |     |     |     |     | √   |     |      | √    |      |

### Blooms Taxonomy and Knowledge retention

(Blooms taxonomy has been given for reference)

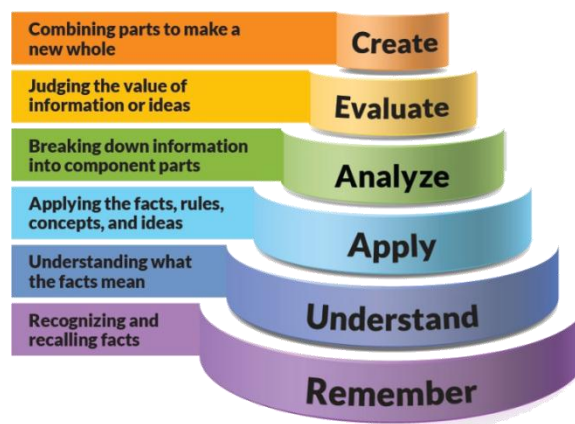


Figure 1: Blooms Taxonomy

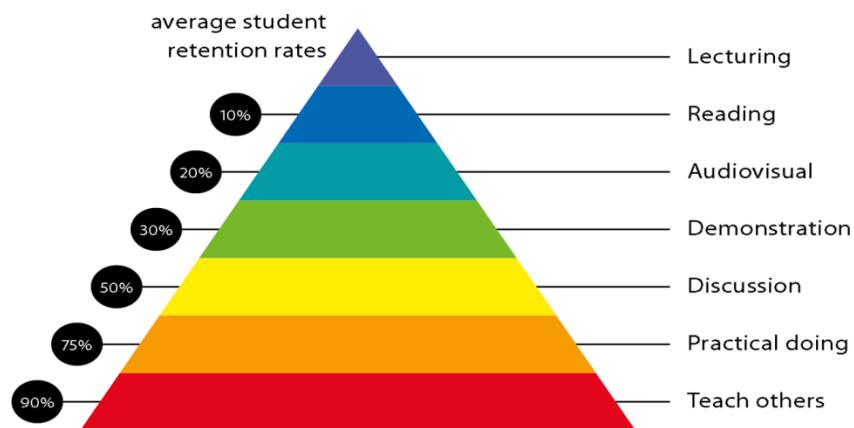


Figure 2: Knowledge retention

### Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

| General Graduate Qualities   | Specific Faculty of Computer Graduate Capabilities         |
|--|--|
| <b>Informed</b><br>Have a sound knowledge of an area of study or profession and understand its current | <b>1 Professional knowledge, grounding &amp; awareness</b> |

|   |   |
|---|---|
| issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.   |   |
| <b>Independent learners</b><br>Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others. | <b>2 Information literacy, gathering &amp; processing</b>     |
| <b>Problem solvers</b><br>Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, and innovative and aim for high standards.  | <b>4 Problem solving skills</b>                               |
| <b>Effective communicators</b><br>Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.  | <b>5 Written communication</b>                                |
|   | <b>6 Oral communication</b>                                   |
|   | <b>7 Teamwork</b>   |
| <b>Responsible</b><br>Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.   | <b>10 Sustainability, societal &amp; environmental impact</b> |

### Practical work:

| UNIT     | TOPICS / SUBTOPICS  | TEACHING HOURS |
|----------|---|----------------|
| <b>2</b> | <b>Basic of PL/SQL block</b>  | <b>14</b>      |
|          | 1 Understanding of DBMS_OUTPUT.PUT_LINE, SET SERVEROUTPUT ON                        |                |
|          | 2 Anonymous block, declaring of variables, data types, % type, %rowtype,            |                |
|          | 3 SQL within PL/SQL, Cursor, Fetch statement, Implicit cursor, Parameterized cursor |                |
|          | 4 Exception, User defined exception, System defined Exception                       |                |
| <b>3</b> | <b>SQL Injection, DCL, TCL commands</b>   | <b>6</b>       |

|          |   |  |           |
|----------|---|--|-----------|
|          | 1   | Commit, Rollback, Checkpoint                       |           |
|          | 2   | Grant, Revoke commands                             |           |
|          | 3   | SQL Injection                                      |           |
| <b>4</b> | <b>Procedure, Functions &amp; Trigger</b> |  | <b>20</b> |
|          | 1   | Declare Procedure, Calling of procedure            |           |
|          | 2   | Declaring of functions, Calling of functions       |           |
|          | 3   | IN, OUT and IN OUT mode in procedure and functions |           |
|          | 4   | Trigger and its types                              |           |
|          | 5   | Audit log table using trigger operations           |           |
|          | 6   | System level triggers                              |           |

### Attendance Requirements

The University Code of Practice Students states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Attendance of practical work exercises is compulsory. In total 80% of attendance for both is mandatory.

### Text books

1. Avi Silberschatz, Henry F. Korth, S. Sudarshan: Database System Concepts, Seventh Edition, McGraw-Hill ISBN 9780078022159
2. Scoot Urban: Oracle 9i, PL/SQL Programming, Oracle Press.

### Additional Materials

1. Ramkrishnan, Gehrke: Database Management Systems, 3rd Edition, McGrawHill Publication.
2. Ramez Elmasri, Shamkant B. Navathe: Fundamentals of Database Systems, 5th Edition, Pearson Publication.
3. Ivan Bayross: Sql- PL/SQL The Programming Language Of Oracle- 4rd Edition- Bpb Publications
4. S. K. Singh : Database Systems: Concepts, Design and Applications, Pearson Education

### Web References:

1. [http://www.ntu.edu.sg/home/ehchua/programming/sql/Relational\\_Database\\_Design.html](http://www.ntu.edu.sg/home/ehchua/programming/sql/Relational_Database_Design.html)
2. [http://docs.oracle.com/cd/A97335\\_02/apps.102/a81358/05\\_dev1.htm](http://docs.oracle.com/cd/A97335_02/apps.102/a81358/05_dev1.htm)

## ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

**Internal Evaluation: 60 marks**

|                               |                        |
|-------------------------------|------------------------|
| Class Test                    | 40 Marks (Unit 1 to 3) |
| Assignment 1                  | 05 Marks (Unit 1 & 2)  |
| Assignment 2                  | 05 Marks (Unit 3 & 4)  |
| Quiz / Presentation / Project | 10 Marks (Unit 1 to 4) |

**External Evaluation: 40 Marks**

|  |                      |
|--|----------------------|
| <b>Final exam</b> ( <i>closed book</i> ) | 40 Marks (All Units) |
|--|----------------------|

## **SUPPLEMENTARY ASSESSMENT (Courses with Academic Empowerment ONLY)**

The offer of supplementary assessment is not automatic and will be considered on a case by case basis. Precise form of supplementary assessment will be determined at the time the offer of a supplementary assessment is made. Students must make themselves available during the supplementary examination period to take up any offer of supplementary assessment.

### **Practical Work Report/Laboratory Journal:**

A report on the practical work is due the subsequent week after completion of the class by each group.

### **Late Work**

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of 5% of the maximum mark per calendar day.

### **Format**

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the year that is not neat and legible will not be marked and will be returned to the student.**

### **Retention of Written Work**

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

### **University and Faculty Policies**

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

**Plagiarism** - Students should refer to the Indus University policy on Plagiarism available in the University Calendar. Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely and has led to expulsion from the University. Further information on plagiarism can be found in the Faculty Policy document.

***Do not copy the work of other students.***

***Do not share your work with other students (except where required for a group activity or assessment).***



### Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc well in the table under the Teaching Learning Activity Column)

| Week #  | Topic & contents | CO Addressed | Teaching Learning Activity (TLA) |
|---------|------------------|--------------|----------------------------------|
| Weeks 1 | Unit - 1         | 1, 2         | Board work + PPT                 |
| Weeks 2 | Unit - 1         | 1, 2         | Board work + PPT                 |
| Week 3  | Unit - 1         | 1, 2         | Board work + PPT                 |
| Week 4  | Unit - 1         | 1, 2         | Board work + PPT                 |
| Week 5  | Unit - 2         | 1, 2, 3      | Board work + PPT                 |
| Week 6  | Unit - 2         | 2, 3         | Board work + PPT                 |
| Week 7  | Unit - 2         | 2, 3         | Board work + PPT                 |
| Week 8  | Unit - 2         | 2, 3         | Board work + PPT                 |
| Week 9  | Unit - 3         | 2, 3, 4      | Board work + PPT                 |
| Week 10 | Unit - 3         | 3, 4         | Board work + PPT                 |
| Week 11 | Unit - 3         | 3, 4         | Board work + PPT                 |
| Week 12 | Unit - 3         | 3, 4         | Board work + PPT                 |
| Week 13 | Unit - 4         | 3, 4         | Board work + PPT                 |
| Week 14 | Unit - 4         | 3, 4         | Board work + PPT                 |
| Week 15 | Unit - 4         | 2, 3, 4      | Board work + PPT                 |

## Subject Dependency Chart

