ECE-GY-9941 and ECE-GY-9953 (Advanced Projects)

Course Section format:

Independent Study (no regular class, assignment, exams). If needing any personal assistance, a zoom meeting can be arranged on a request basis, on Sunday only.

This course will be purely on project development with advanced database features.

Start Date: 09/02/2025
End Date: 12/11/2025

Bi-Weekly "Status and Progress report "is required to submit on Brightspace. The due date will be Alternative Saturday at 11 PM EST. The dates for submitting "Status and Progress Report" are as follows.

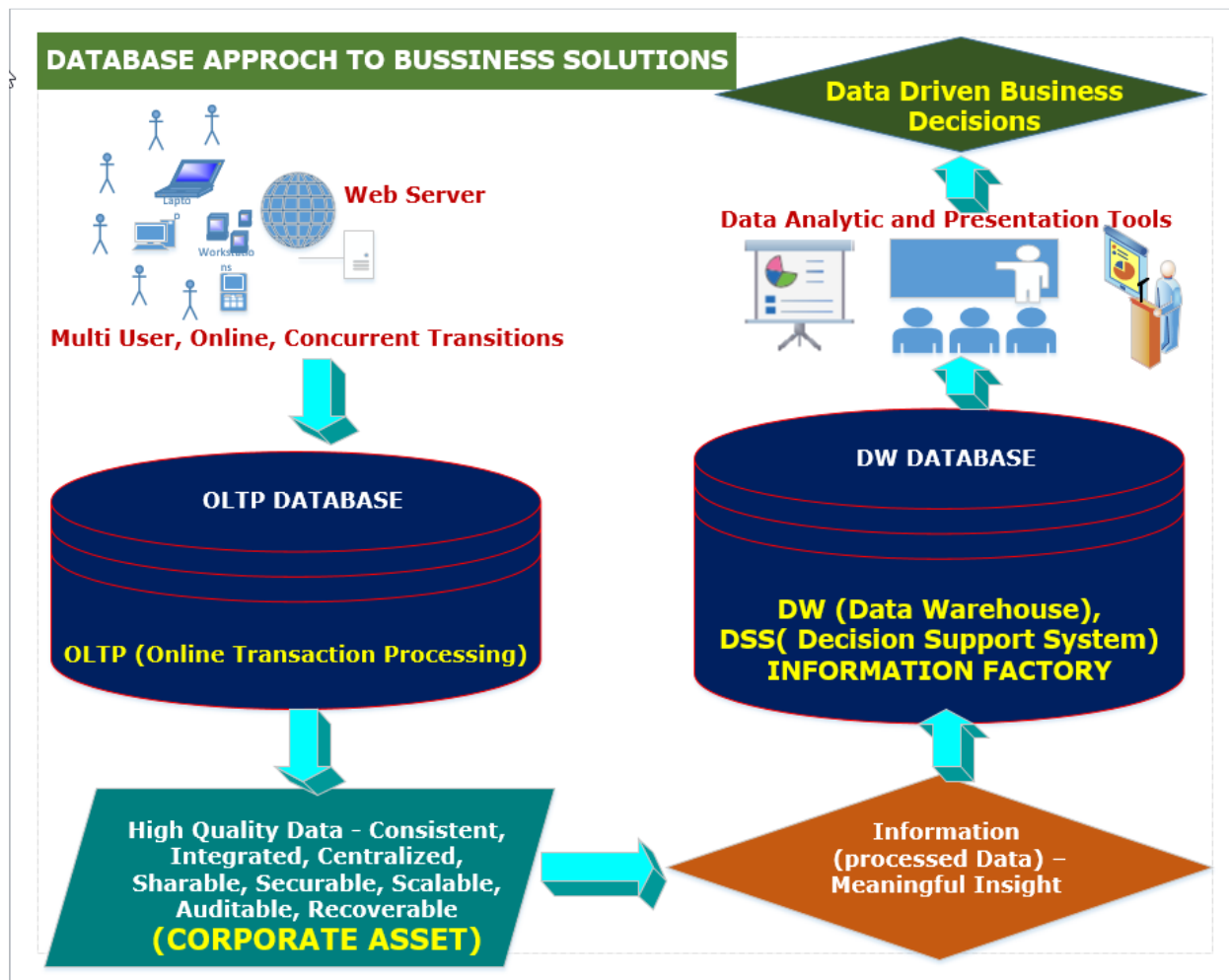**09/13/2025**
09/27/2025
10/11/2025
10/25/2025
11/08/2025
11/22/2025

File name format: Groupname_SP_Submittion_#<1/2/3/4/5/6>.pdf

Grading Policy:

Project Status Report:	**12%**
Database Designs:	**15%**
Development and Implementations:	**25%**
Data Analytics and Visualization	**20%**
Project Demo:	**10%**
Project Presentation:	**10%**
Project report:	**8 %**

DB project topology:

DATABASE APPROCH TO BUSSINESS SOLUTIONS

Data Driven Business Decisions

Data Analytic and Presentation Tools

DW DATABASE

DW (Data Warehouse), DSS(Decision Support System) INFORMATION FACTORY

Web Server

Multi User, Online, Concurrent Transitions

OLTP DATABASE

OLTP (Online Transaction Processing)

High Quality Data - Consistent, Integrated, Centralized, Sharable, Securable, Scalable, Auditable, Recoverable
(CORPORATE ASSET)

Information (processed Data) – Meaningful Insight

Suggested inclusions:

- **The project will have two different database systems of different vendor products**
  (E.g. Oracle and MySQL)
- **One database will be of OLTP database (Online Transaction Processing System) and other database will be DW (Data Warehouse – DSS)**
- **Web application will be interfaced with OLTP database**
- **Reporting tool / Analytics tool will be interfaced with DW database**
- **There will be ETL (Extract, Transform, and Load) database code to load data from OLTP database, transform it matching DW schema design, and then loading it to DW database.**
- **There will be CDC approach (Change Data Capture) for ETL database routine to implement incremental ETL**

- **Will use advance database features e.g. External tables, Partitioned Tables, function base indexes, PL/SQL(procedures, functions, packages, triggers, data masking)**
- **The online application will have robust security features, validations, user self-services (password management by users, security questions & validations) etc. [For 3 credit course only]**
- **The DW systems, will have more analytics and reporting for making business decisions**
- **There will be development for EDI (Electronic Data Interface), SQL Loader (DB utility for loading data to database from a text file)**
- **There will be use of data movement utilities (exports/import, SQL Loader etc.)**
- **There will be use of data analytics using data visualization tool, such as Tableau, ClickView etc.**
- **All the tables in your OLTP and DW designs should have your group initial as prefix, such as FA25_GA (initial of each student's first name)**

Suggested Business Case:

Universal Sales and Return Data: **Awesome Inc.**
The datasets in CSV files have been uploaded to "Recourses" content folder.

Each Table in OLTP DB system will have a column called TBL_LAST_DT, and this column should be updated with system timestamp via trigger, whenever record is inserted/updated. This is required to facilitate CDC base incremental ETL to DW system.

Example of trigger code in MySQL. Please keep same trigger code for all OLTP tables, with just replacing EMP to your table name in design, and ap to your group initial.

```
DELIMITER $$
CREATE TRIGGER `TI_EMP_default_date` BEFORE INSERT ON `ap_emp` FOR
EACH ROW
if ( isnull(new.tbl_last_dt) ) then
 set new.tbl_last_dt=current_timestamp();
end if;
$$
delimiter ;
```

```
DELIMITER $$
CREATE TRIGGER `TU_EMP_default_date` BEFORE UPDATE ON `ap_emp` FOR
EACH ROW
set NEW.tbl_last_dt=current_timestamp();
$$
delimiter ;
```

Database Design:
**At least up to 3rd Normal form for OLTP system, De-normalized form for DW
systems**

**YOU MAY BRING YOUR OWN BUSINESS CASE AND/OR OWN PROJECT, which is
subject to approval by the professor. Projects selection need to be completed by
Thursday 01/30/2025 11PM EST and should be reported in first Status and
Progress report submission. If you choose to bring your own project course,
please send me a proposal (Brief Summary, what systems are involved, and what
you will produce as result of the project) by no later than 01/30/2025. You can
deploy DB/Application locally or on cloud platforms (AWS, GCP, Azure etc.).**

Project Demo:
**Demo Date for all group: Week of 8th Dec. 2025. Each group will have 30 minutes
of demo. Time slots will be allotted accordingly. The demo will be via Zoom
meeting. Each team member needs to be present at the demo.**

Final Project Report and Presentation:
Submission deadline 12/11/2025
**A comprehensive project report and a brief power point presentation need to be
submitted. The suggested format will be provided.**