AMMAN ARAB UNIVERSITY

Faculty of Information Technology

TRACE

WORK BREAKDOWN STRUCTURE

DATE: DECEMBER 14, 2025

Project Title: TRACE - Transfer Recognition and Automated Course Engine

Project Start Date:	**Projected Finish Date:**
November 1, 2025	June 15, 2026

Students

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Amman - Jordan
2025/2026

This Work Breakdown Structure (WBS) represents a deliverable-oriented decomposition of all work required to complete the TRACE project. The WBS is organized hierarchically from high-level deliverables down to work packages that can be assigned, estimated, and managed. Each work package represents a discrete deliverable or set of deliverables that contribute to the overall project success.

TRACE Project WBS (List Format)

1. **PROJECT MANAGEMENT**
   1.1. Project Initiation
   1.2. Project Planning
   1.3. Monitoring and Control
   1.4. Project Closing

2. **REQUIREMENTS AND DESIGN**
   2.1. Requirements Analysis
   2.2. System Architecture Design
   2.3. Database Design
   2.4. User Interface Design

3. **SYSTEM DEVELOPMENT**
   3.1. Development Environment Setup
   3.2. Core System Modules
       3.2.1. Authentication and User Management
       3.2.2. Course Management Module
       3.2.3. Transfer Request Module
       3.2.4. Course Matching Engine
       3.2.5. Evaluation and Approval Module
       3.2.6. Report Generation Module

4. **TESTING AND QUALITY ASSURANCE**
   4.1. Test Planning
   4.2. Unit and Integration Testing
   4.3. System Testing
   4.4. User Acceptance Testing

5. **DOCUMENTATION**
   5.1. Technical Documentation
   5.2. User Manuals
   5.3. Training Materials

6. **DEPLOYMENT**
   6.1. Deployment Planning
   6.2. Production Environment Setup
   6.3. System Deployment and Go-Live
   6.4. User Training

WBS Summary Statistics:

Total Level 1 Categories:
6 major deliverable categories

Total Level 2 Elements:
22 subcategories

Total Level 3 Elements:
6 detailed work packages

Total Work Packages:
28 deliverables

WBS Notes and Guidelines:

- **100% Rule:** This WBS contains 100% of all deliverables required to complete the TRACE project.
- **Deliverable-Oriented:** All WBS elements represent deliverables (nouns), not activities (verbs).
- **Level 3 Detail:** The WBS breaks down to Level 3 for major development modules to provide adequate detail without becoming overwhelming.
- **Work Package Level:** Level 2 and Level 3 items represent work packages that can be assigned and estimated.
- **WBS Dictionary:** Detailed descriptions for each WBS item are provided in the accompanying WBS Dictionary section below.

WBS Approval:

Dr. Marwan Alseid - Project Supervisor	Date:
Dr. Alaa Abuthawabeh - Project Co-Supervisor	Date:
Rasha Khalid Alsaleh - Co-Project Manager	Date:
Sdra Osama Awameh - Co-Project Manager	Date:

WBS Dictionary

WBS Item Number: 1.1

WBS Item Name: Project Initiation

Description:

The project initiation phase establishes the foundation for the TRACE project. This deliverable includes all documents and activities required to formally authorize and launch the project. Key outputs include the Business Case justifying the project investment, the Project Charter formally authorizing the project and defining high-level scope and objectives, Stakeholder Register identifying all parties affected by or interested in the project, and materials for the Kick-off Meeting to introduce the project to stakeholders and align expectations.

Requirement Trace:

Project Charter approval required before development begins

Responsible Person:	**Estimated Cost:**
Rasha & Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (November 1-15, 2025)	Project team, supervisors, Stakeholder input

WBS Item Number: 1.2

WBS Item Name: Project Planning

Description:

Comprehensive planning documents that guide project execution. This deliverable encompasses all planning artifacts including Requirements Documentation captured through interviews and document analysis, Requirements Traceability Matrix linking requirements to sources, Project Scope Statement defining what is and isn't included, Work Breakdown Structure decomposing work into manageable pieces, Project Schedule with timeline and dependencies, Risk Management Plan identifying and mitigating risks, and Change Control Strategy for managing scope changes.

Requirement Trace:

Must be approved by supervisors before major development work begins

Responsible Person:	**Estimated Cost:**
Rasha & Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
4 weeks (November 16 - December 13, 2025)	Project team, Planning templates, Supervisor guidance

WBS Item Number: 1.3

WBS Item Name: Project Monitoring and Control

Description:

Ongoing activities to track project progress and ensure alignment with plans. This deliverable includes Weekly Status Reports documenting accomplishments, plans, and issues, Progress Tracking Documents comparing actual vs. planned progress, Issue Log capturing and tracking problems, and Change Requests for proposed modifications to scope or plans. These monitoring activities occur throughout the project lifecycle and provide visibility to supervisors and stakeholders.

Requirement Trace:
Weekly reports submitted every Wednesday before supervisor meeting

Responsible Person:	**Estimated Cost:**
Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
Ongoing (November 2025 - June 2026)	Project management tools (Miro), Status report templates

WBS Item Number: 1.4

WBS Item Name: Project Closing

Description:

Formal closure and documentation of project completion. This deliverable includes the Final Project Report documenting the complete project journey including objectives, approach, results, and challenges, Final Presentation to supervisors and stakeholders showcasing the completed system, Lessons Learned Document capturing insights for future projects, and Project Archive organizing all project documentation for future reference. These activities ensure proper project closeout and knowledge transfer.

Requirement Trace:
Required for graduation project completion

Responsible Person:	**Estimated Cost:**
Rasha & Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (May 26 - June 15, 2026)	Project team, Presentation materials (Canva, and Miro), Documentation

WBS Item Number: 2.1

WBS Item Name: Requirements Analysis

Description:

Systematic process of gathering, analyzing, and documenting system requirements. This deliverable includes stakeholder interview transcripts capturing needs and expectations from professors, HOD, and students, Document Analysis Report examining historical transfer cases to identify patterns and requirements, System Requirements Specification (SRS) formally documenting all system requirements, and Functional Requirements Document detailing specific system behaviors. This comprehensive requirements package ensures the system addresses real stakeholder needs.

Requirement Trace:
FR-01 through FR-08 from Requirements Traceability Matrix

Responsible Person:	**Estimated Cost:**
Rasha & Sdra with stakeholder input	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
3 weeks (November 16 - December 6, 2025)	Interview participants, Historical transfer case documents, Requirements templates

WBS Item Number: 2.2

WBS Item Name: System Architecture Design

Description:

High-level design of system structure and components. This deliverable defines the overall system architecture including the Architecture Overview Document describing the multi-tier web application structure, Technology Stack Selection Report justifying choices of PHP, MySQL, HTML/CSS/JavaScript, System Component Diagram showing how major system parts interact, and Deployment Architecture specifying hosting and infrastructure. This design provides the blueprint for implementation.

Requirement Trace:
Must support all functional requirements, Must be technically feasible with available skills and tools

Responsible Person:	**Estimated Cost:**
Rasha & Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (December 7-20, 2025)	Architecture design tools (drawio, LucidChart), Technical reference materials

WBS Item Number: 2.3

WBS Item Name: Database Design

Description:

Complete design of the data model and database structure. This deliverable includes Entity-Relationship Diagram (ERD) showing all entities and relationships, Database Schema Document specifying tables, columns, data types, and constraints, Data Dictionary defining each data element precisely, and Database Normalization Report ensuring data integrity and efficiency. The database design is critical as it stores all course, user, and transfer request data that powers the matching engine.

Requirement Trace:
Must support all data requirements, Must ensure data integrity and performance

Responsible Person:	**Estimated Cost:**
Rasha	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (December 21, 2025 - January 3, 2026)	Database design tools (MySQL Workbench), Normalization guidelines

WBS Item Number: 2.4

WBS Item Name: User Interface Design

Description:

Visual and interaction design for all system screens. This deliverable includes UI Wireframes showing screen layouts and navigation flow, Screen Mockups with detailed visual design for key interfaces, Navigation Flow Diagrams illustrating how users move through the system, and UI Design Guidelines establishing consistent styling and interaction patterns. Good UI design is essential for user acceptance as the system will be used by faculty with varying technical skills.

Requirement Trace:
Must support all user roles (Admin, Professor, HOD), Must be intuitive and easy to learn

Responsible Person:	**Estimated Cost:**
Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (January 4-17, 2026)	UI design tools (Figma or Adobe XD), Faculty feedback, Web design best practices

WBS Item Number: 3.1

WBS Item Name: Development Environment Setup

Description:

Preparation of all tools and infrastructure needed for development. This deliverable includes installation and configuration of Development Tools (IDE, web server, database server, Docker Container), Version Control Repository Setup using Git for source code management, Database Server Configuration for development and testing, and Development Standards Document establishing coding conventions and practices. Proper environment setup ensures efficient and consistent development work.

Requirement Trace:

Must be completed before coding begins

Responsible Person:

Rasha & Sdra

Estimated Duration:

1 week (January 18-24, 2026)

Estimated Cost:

Included in overall development tools budget ($100)

Resource Requirements:

Development computers, local server, Git hosting (GitHub), Docker

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WBS Item Number: 3.2.1

WBS Item Name: Authentication and User Management

Description:

Core security module providing user login and access control. This module includes User Login System with username/password authentication, Password Encryption Module using secure hashing algorithms, Session Management to maintain user state across requests, and Role-Based Access Control enforcing different permissions for Admin, Professor, and HOD roles. Additionally provides User CRUD Operations for admins to manage user accounts, User Profile Management for users to update their information, and User Activity Logging for audit trail purposes. Security is paramount as the system handles sensitive academic data.

Requirement Trace:

FR-01 (Role-Based Access Control), Must encrypt all passwords, Must prevent unauthorized access

Responsible Person:

Rasha

Estimated Duration:

2 weeks (January 25 - February 7, 2026)

Estimated Cost:

Student labor only (no direct cost)

Resource Requirements:

PHP authentication libraries, Security best practices documentation

WBS Item Number: 3.2.2

WBS Item Name: Course Management Module

Description:

Module for managing the course catalog that powers the matching engine. This module provides Course CRUD Operations (Create, Read, Update, Delete) for maintaining course information, Course Catalog Interface for browsing and searching courses, CSV Import Functionality for bulk loading course data from spreadsheets, and Course Search and Filter to find specific courses quickly. The course database includes fields for course code, name, description, credit hours, level, prerequisites, and learning outcomes for both AAU courses and courses from external universities.

Requirement Trace:

FR-06 (Course Data Management), Must support bulk import, Must validate data quality

Responsible Person:	**Estimated Cost:**
Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (February 8-21, 2026)	CSV parsing libraries, Course catalog data from IT department

WBS Item Number: 3.2.3

WBS Item Name: Transfer Request Module

Description:

Module managing the complete lifecycle of transfer requests. This module includes Request Creation Interface for admins to enter new transfer cases with student information and source university details, Document Upload System for attaching transcripts and supporting documents, Request Status Tracking showing progression through Pending, Evaluated, Approved, and Finalized stages, and Request List and Search with filtering by student name, source university, transfer type, date range, and status. The module serves as the central hub for all transfer evaluation activities.

Requirement Trace:

FR-03 (Transfer Request Management), FR-05 (Multiple Transfer Scenario Support)

Responsible Person:	**Estimated Cost:**
Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
2 weeks (February 22 - March 7, 2026)	File upload handling, Request tracking database tables

WBS Item Number: 3.2.4

WBS Item Name: Course Matching Engine

Description:

The intelligent algorithm that automatically analyzes courses to identify equivalencies. This is the core innovation of the TRACE system. The module includes Text Preprocessing Module for cleaning and normalizing course text, Similarity Algorithm Implementation using TF-IDF and cosine similarity techniques, Scoring and Ranking System to calculate similarity percentages and confidence levels, and Match Display Interface showing the top 3-5 matches for each course. The algorithm compares course names, descriptions, topics, and learning outcomes. Must achieve at least 85% accuracy when validated against expert faculty decisions on test cases.

Requirement Trace:

FR-02 (Automated Course Matching), Must achieve 85% accuracy target, Must process within 5 seconds

Responsible Person:	**Estimated Cost:**
Rasha	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
3 weeks (March 8-28, 2026)	Text processing libraries (PaddleOCR), Sample course data for testing and validation

WBS Item Number: 3.2.5

WBS Item Name: Evaluation and Approval Module

Description:

Interfaces for professors and HOD to review and approve matches. Features include an Evaluation Dashboard for assigned requests, Course Match Review with similarity scores, Decision Entry for accepting or rejecting equivalencies, Comment and Justification for reasoning (FR-07), and an Approval Queue for HOD to finalize decisions. Workflow: Professor evaluates, HOD approves, then report is generated.

Requirement Trace:
FR-03 (Transfer Request Management), FR-07 (Comment System), Must support proper workflow

Responsible Person:	**Estimated Cost:**
Both team members collaboratively	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
3 weeks (March 29 - April 18, 2026)	Workflow logic, Comment system database tables, Faculty input on desired features

WBS Item Number: 3.2.6

WBS Item Name: Report Generation Module

Description:

Module for automatically creating official PDF equivalency reports. This module includes Report Template Engine supporting multiple templates for different transfer scenarios (inter-university, intra-university, bridging), PDF Generation Module creating properly formatted documents, Report Content Assembly pulling data from database including student info, course mappings, credit calculations, and justifications, and Report Download System enabling users to save and print reports. Reports must comply with university and Ministry of Higher Education formatting standards and include all required information for official academic records.

Requirement Trace:

FR-04 (Official Report Generation), Must comply with university standards, Must calculate credits correctly

Responsible Person:

Rasha with Sdra assistance

Estimated Duration:

2 weeks (April 19 - May 2, 2026)

Estimated Cost:

$50 for PDF library if needed, otherwise student labor only

Resource Requirements:

PDF generation library (FPDF/TCPDF), Official report templates from registrar

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WBS Item Number: 4.1

WBS Item Name: Test Planning

Description:

Comprehensive planning for all testing activities. This deliverable includes Test Strategy Document outlining overall approach to quality assurance, Test Plan Document detailing specific test phases, schedules, and resources, Test Case Templates providing standard formats for documenting tests, and Test Data Preparation creating realistic data sets for testing scenarios. Good test planning ensures systematic and thorough validation of the system before deployment.

Requirement Trace:

Must cover all functional requirements, Must define clear pass/fail criteria

Responsible Person:

Rasha & Sdra

Estimated Duration:

1 week (April 5-11, 2026)

Estimated Cost:

Student labor only (no direct cost)

Resource Requirements:

Test plan templates, Testing best practices guides

WBS Item Number: 4.2

WBS Item Name: Unit and Integration Testing

Description:

Testing of individual components and their interactions. This deliverable includes Unit Test Cases for testing individual functions and methods in isolation, Component Testing verifying each module works correctly, Integration Test Cases testing how modules work together, and Defect Reports documenting any bugs found. These tests are performed by the development team during and immediately after coding to catch issues early before system-level testing.

Requirement Trace:

All critical functions must have test cases, All high-severity defects must be fixed

Responsible Person:

Rasha & Sdra (test your own and each other's code)

Estimated Duration:

2 weeks (April 12-25, 2026)

Estimated Cost:

Student labor only (no direct cost)

Resource Requirements:

Testing tools (Selenium, Postman, jmeter), Unit test frameworks (Junit), Bug tracking system (jira)

WBS Item Number: 4.3

WBS Item Name: System Testing

Description:

Testing the complete integrated system to validate all requirements are met. This deliverable includes System Test Cases covering end-to-end scenarios, Performance Testing verifying response time requirements (e.g., matching completes within 5 seconds), Security Testing checking for vulnerabilities in authentication and authorization, and System Test Results documenting all findings. System testing validates that the complete application works as intended in an environment similar to production.

Requirement Trace:

All functional requirements must pass testing, Performance requirements must be met, No critical security vulnerabilities

Responsible Person:

Rasha & Sdra

Estimated Duration:

2 weeks (April 26 - May 9, 2026)

Estimated Cost:

Student labor only (no direct cost)

Resource Requirements:

Test environment matching production, Performance testing tools, Security testing tools (fiddler)

WBS Item Number: 4.4

WBS Item Name: User Acceptance Testing

Description:

Final validation with actual end users to confirm the system meets real-world needs. This deliverable includes UAT Test Cases based on realistic faculty workflows, Faculty Testing Sessions where professors and HOD actually use the system, Usability Surveys collecting feedback on ease of use and satisfaction, and UAT Results Report summarizing findings and acceptance decision. UAT success criteria include all test cases passing, 75%+ user satisfaction rating, and formal sign-off from HOD. This is the final gate before deployment approval.

Requirement Trace:

All mandatory features must work correctly, Users must rate system favorably (75%+ satisfaction)

Responsible Person:

Rasha & Sdra coordinate, Faculty participate

Estimated Cost:

Student labor only (no direct cost)

Estimated Duration:

2 weeks (May 10-23, 2026)

Resource Requirements:

Faculty volunteers for testing, Real or realistic test data, Survey tools

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WBS Item Number: 5.1

WBS Item Name: Technical Documentation

Description:

Documentation for system maintenance and future enhancements. This deliverable includes System Architecture Document describing system structure and design decisions, Database Documentation with ERD and schema details, API Documentation if any APIs are exposed, and Code Documentation with inline comments explaining complex logic. Technical documentation enables future developers (or the IT department) to understand, maintain, and enhance the system after the project team has graduated.

Requirement Trace:

Must be clear enough for another developer to maintain the system

Responsible Person:

Rasha & Sdra (document your own modules)

Estimated Cost:

Student labor only (no direct cost)

Resource Requirements:

Documentation tools, Technical writing guidelines

Estimated Duration:

1 week (May 17-23, 2026)

WBS Item Number: 5.2

WBS Item Name: User Manuals

Description:

Comprehensive guides for each user role. This deliverable includes Admin User Manual covering user management, course management, and system configuration, Professor User Manual explaining how to evaluate transfer requests and use the matching engine, HOD User Manual describing approval workflows and report generation, and Quick Reference Guides providing condensed instructions for common tasks. User manuals must be written in clear, non-technical language with plenty of screenshots and examples. Success criteria include 80%+ of test users rating manuals as clear and helpful.

Requirement Trace:

Must cover all user-accessible features, Must be understandable by non-technical users

Responsible Person:	**Estimated Cost:**
Sdra (primary) with Rasha's assistance	Student labor only (no direct cost)
Estimated Duration:	**Resource Requirements:**
2 weeks (May 10-23, 2026)	Screenshot tools, User documentation templates, Faculty feedback

WBS Item Number: 5.3

WBS Item Name: Training Materials

Description:

Materials for teaching users how to use the system. This deliverable includes Training Presentation with slides for faculty training sessions, FAQ Document answering common questions, and Training Handouts for participants to take with them. Training materials are used during the User Training sessions (6.4) and left with users as ongoing references. Materials should enable faculty to become productive with the system quickly.

Requirement Trace:

Must enable users to learn the system effectively

Responsible Person:	**Estimated Cost:**
Sdra	Student labor only (no direct cost)
Estimated Duration:	**Resource Requirements:**
1 week (May 24-30, 2026)	Presentation software, Training best practices, User feedback

WBS Item Number: 6.1

WBS Item Name: Deployment Planning

Description:

Detailed planning for system go-live. This deliverable includes Deployment Strategy Document outlining the deployment approach, Deployment Checklist listing all pre-deployment tasks, Rollback Plan specifying how to reverse deployment if issues arise, and Go-Live Schedule with specific dates and times for deployment activities. Careful planning minimizes deployment risk and ensures a smooth transition to operational use.

Requirement Trace:
Must be approved before deployment execution

Responsible Person:	**Estimated Cost:**
Rasha & Sdra	Student labor only (no direct cost)

Estimated Duration:	**Resource Requirements:**
1 week (May 24-30, 2026)	Deployment planning templates, IT department input

WBS Item Number: 6.2

WBS Item Name: Production Environment Setup

Description:

Preparation of the server and infrastructure where the system will run. This deliverable includes Server Configuration on university server or Hostinger hosting, Database Setup creating the production database, Security Configuration hardening the system for production use, and Backup System Setup establishing automated backups. Production environment must be properly secured and configured for reliability since this is where the real system will run with real data.

Requirement Trace:
Must meet security requirements, Must have backup procedures

Responsible Person:	**Estimated Cost:**
Rasha & Sdra with IT department support if on university server	Hosting fees already budgeted ($51/year)
	Resource Requirements:

Estimated Duration:	
1 week (May 31 - June 6, 2026)	Server access, Database server, Configuration documentation

WBS Item Number: 6.3

WBS Item Name: System Deployment and Go-Live

Description:

Actual installation and activation of the system in production. This deliverable includes Application Installation copying code to production server, Database Migration running scripts to create production database schema, Initial Data Loading importing Faculty of IT course catalog and creating admin user accounts, and Deployment Verification testing that all components function correctly in production. The deployment follows the deployment plan and checklist to ensure nothing is missed. Post-deployment verification confirms the system is fully operational before declaring go-live.

Requirement Trace:

All deployment checklist items complete, System verified functional, Backup system operational

Responsible Person:	**Estimated Cost:**
Rasha & Sdra	Included in hosting budget

Estimated Duration:	**Resource Requirements:**
1 week (June 1-7, 2026)	Deployment scripts, Production server access, Deployment checklist

WBS Item Number: 6.4

WBS Item Name: User Training

Description:

Training sessions to prepare faculty to use the system. This deliverable includes Admin Training Session for system administrators, Professor Training Session for faculty who will evaluate transfers, HOD Training Session for final approvers, and Training Feedback Collection gathering participant input. Training uses the materials from 5.3 and provides hands-on practice with the system. Success criteria include participants able to perform key tasks independently and positive feedback on training effectiveness. Training is essential for user adoption and system success.

Requirement Trace:

All user roles must receive appropriate training, Participants must demonstrate competence

Responsible Person:	**Estimated Cost:**
Rasha & Sdra deliver training	Student labor only (no direct cost) **Resource**

Estimated Duration:	**Requirements:**
1 week (June 8-14, 2026)	Training materials (5.3), Training room, System access for practice