Module 1 Assignment – Foundations, Pitch, and Django Practice

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**1. Abstract**

This submission presents a logistics-focused project under the scope of Electronic Commerce and Web Development. It proposes an AI-enhanced perishable food supply platform that optimizes delivery routing, warehouse coordination, and real-time scheduling—built using a Django-based web framework with HTMX and Bootstrap for rapid, user-facing deployment.

The system is designed to minimize spoilage, reduce dispatch delays, and improve service reliability across airline catering, restaurant supply chains, and grocery retail logistics. The deliverable includes a professional memo (2–3 pages), a series of system architecture diagrams, and a heatmapped AI risk registry.

This solution directly addresses inefficiencies in static routing and manual dispatching using a transparent, modular AI integration approach. It aligns with NIST’s AI Risk Management Framework and draws ethical and implementation guidance from IEEE P7003 and ISO 27001-K standards. The architecture is tailored to support rapid MVP delivery while remaining auditable, secure, and stakeholder-aware.

**2. Project Overview**

**Title**: AI-Enhanced Perishable Food Supply Platform for Regional Distribution and Airline Catering

This platform will streamline the distribution of time-sensitive food products (fresh produce, bakery, and catering supplies) from regional hubs to various client endpoints—grocery stores, restaurants, and airlines. Leveraging AI for route optimization, real-time inventory checks, and predictive delivery adjustments, the system aims to reduce spoilage, increase operational transparency, and enhance service reliability.

**3. Problem Statement**

Current perishable food logistics suffer from:

* Delayed routing decisions and static scheduling
* Poor visibility into real-time delivery status
* High spoilage rates due to suboptimal warehousing or route failures
* Inability to flexibly adapt to airline or catering delivery shifts

Despite some digitization, many mid-tier logistics players still operate on outdated, rule-based scheduling systems without AI augmentation. This leads to inefficiencies in matching supply with real-time demand.

**4. Domain and Concept Focus**

**Domain**:  
AI-augmented logistics for perishable food distribution and regional supply chain coordination.

**Concept Focus**:  
AI-Augmented Routing — Integrating real-time AI-driven route optimization into short-window delivery operations to reduce spoilage, maintain freshness, and ensure just-in-time inventory handoff.

**Core Challenge Exposed**:  
Traditional logistics systems lack adaptability and real-time decision-making, resulting in high spoilage rates, delayed dispatches, and inefficiencies across regional hubs. The absence of AI-driven insight limits responsiveness to dynamic delivery constraints, especially for high-risk perishables and time-sensitive airline or catering contracts.

**5. Stakeholders**

* **Internal**: Logistics Operators, AI Engineers, Warehouse Managers, Customer Support Team
* **External**: Food Suppliers, Airline Catering Teams, Restaurant Managers, Compliance Auditors
* **Overlapping**: Third-party Delivery Partners, Regional Hub Supervisors, Food Safety Inspectors

**6. Scope and Boundaries**

**In Scope**:

* Regional distribution from warehouses to client endpoints
* AI-assisted scheduling, routing, and real-time ETA predictions
* Dashboard and notification features for end-users

**Out of Scope**:

* Global supply chain management (outside regional US)
* AI-based demand forecasting at the source-supplier level
* Inventory procurement logic from farms

**7. Success Metrics**

* ≥ 20% reduction in spoilage or wastage within 6 months of deployment
* ≥ 30% improvement in on-time delivery rates
* Reduction of human dispatch intervention by ≥ 50%
* User satisfaction (Net Promoter Score ≥ 8/10 after 3 months)

**8. Minimum Viable Artifact (MVA)**

A basic Django-based web platform that allows:

* Manual input of incoming food shipments
* AI-generated delivery schedules using mock location and inventory data
* Real-time driver ETA simulation via a dashboard
* Front-end: Bootstrap/HTMX; Backend: Django + SQLite

**9. System Sketch**

This section includes labeled diagrams illustrating:

* Front-end: Ordering Interface
* AI Layer: Route Optimizer, Inventory Sync, ETA Predictor
* Back-end: Django server, database layer, and regional warehouse API simulation
* Clients: Grocery chain, Airline catering, Local restaurant

🖼 *[See Appendix A for diagrams]*

**10. Evidence Base**

* McKinsey Report on AI in food logistics (2024)
* NIST AI RMF for AI risk governance alignment
* IEEE Supply Chain Standards on traceability and reliability

**11. Risk Register**

🟢🟡🔴 Heatmapped AI Risk Registry with detailed risk categories, impacts, mitigation strategies, and governance alignment.  
🖼 *[Risk Table presented earlier – Insert if needed in visual or table form]*

**12. AI Risk Governance – Strategic Question Set**

This section identifies guiding questions aligned with the NIST AI Risk Management Framework (RMF).

1. Has the AI-driven route optimization logic been reviewed for fairness?
2. What traceability mechanisms are in place for AI decision auditing?
3. How is stakeholder feedback integrated into AI improvement?
4. What fallback mechanisms exist if AI predictions fail?
5. Who is accountable for AI oversight in MVP phase?
6. Are data collection practices standards-compliant?
7. Is there a formal cadence for AI risk review?

**13. AI Use Disclosure**

*Note: All AI-related logic (route generation, ETA prediction) is transparently coded and logged for traceability. AI does not make autonomous decisions without human review during the MVP stage.*

**14. Risk Register Validation Note**

The AI Risk Registry was developed in accordance with NIST AI RMF 1.0 and reviewed against early-stage implementation assumptions. Risk severity levels are subject to evolution as the system integrates additional AI modules and data streams.

**15. Conclusion**

This project addresses a high-impact logistics problem using an AI-native architecture aligned with modern ethical, traceability, and efficiency standards. It is scoped realistically to deliver a working MVP in 2 weeks, with tangible outcomes and scalable architecture for future iterations.

**16. Appendix A: System Diagrams**

**A.1 System-Level Architecture Diagram**

🖼 *Placeholder: System-Level Architecture – AI-Enhanced Perishable Logistics Platform*

**A.2 UML Class Diagram (Model-Level)**

🖼 *Placeholder: UML Class Diagram – Core Models*

**A.3 Data Flow Diagram (DFD – Level 1)**

🖼 *Placeholder: DFD – AI Decision Flow in Logistics Platform*

**A.4 Component Architecture Diagram**

🖼 *Placeholder: Component Architecture – Deployment View*

**17. References**

* McKinsey & Company. (2024). *AI in food logistics: The next frontier*. [https://www.mckinsey.com](https://www.mckinsey.com/)
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