**Advanced Pilot Training Platform - Missing Features Frontend Prompt**

**Project Overview (Frontend Focus)**

Develop the frontend UI components and interaction workflows for the **Advanced Pilot Training Platform**, ensuring seamless integration with the **enhanced backend features** across training intelligence, analytics, compliance, debriefing, and gamification. Built using **Next.js (React, TypeScript, Tailwind CSS, MUI)**, the frontend must deliver an adaptive, responsive, and real-time collaborative experience.

**1. Training Content Intelligence & Syllabus UI Enhancements**

**Document Intelligence UI**

* Create UI components to display **AI-extracted document intelligence**:
  + **Multi-format document previews** (PDF, DOCX, XLSX, PPTX).
  + **Cross-referenced training material viewer**.
  + **Regulatory compliance indicators** highlighting mapped standards.
  + **Terminology glossary and knowledge graph visualization**.

**Syllabus Template Builder UI**

* Extend **Syllabus Builder UI**:
  + **Template selector** for pre-configured syllabus structures.
  + **Drag-and-drop customization** with compliance visualization.
  + **Versioning controls** with change impact indicators.
  + **Dynamic template recommendations** via AI-based user patterns.

**2. Advanced Analytics & Adaptive Learning UI**

**Predictive Analytics UI**

* Develop **real-time analytics dashboard widgets**:
  + **Skill decay visualization graphs** (time-series charts).
  + **Fatigue risk monitoring UI** with interactive workload tracking.
  + **Training effectiveness forecasts** using AI-driven predictive insights.
  + **Instructor dashboard with proactive intervention alerts**.

**Performance Analytics UI**

* Build **real-time performance tracking interfaces**:
  + **Reaction time, cognitive load, and procedural adherence graphs**.
  + **Automation awareness scoring UI** with cockpit mode visualizations.
  + **SOP compliance heatmaps** based on user performance trends.
  + **Drill-down trainee performance insights with trend analysis**.

**3. Compliance, Security & Access Control UI**

**Audit & Regulatory Compliance UI**

* Design **compliance tracking dashboards**:
  + **Regulatory mapping visualizer** linking training elements to standards.
  + **Auto-updating compliance matrices**.
  + **Automated audit trail logs UI** for historical tracking.

**Security & Authentication UI**

* Implement **multi-layer authentication UI components**:
  + **MFA with biometric authentication support** (WebAuthn/FIDO2).
  + **Role-based permission management UI** with real-time updates.
  + **Encryption settings visualization** with secure data handling insights.

**4. Instructor & Management UI Features**

**Debriefing & Session Analytics UI**

* Expand **Debriefing UI**:
  + **Session replay interface** with event markers.
  + **Annotation tools for instructor feedback**.
  + **AI-generated performance summary panels**.
  + **Exportable debrief reports** with interactive review modes.

**Administrative Dashboard Enhancements**

* Upgrade **Admin Dashboard UI**:
  + **Fleet-wide KPI monitoring UI** with AI-based insights.
  + **Instructor performance standardization graphs**.
  + **Training bottleneck visualizer with resource allocation heatmaps**.
  + **Student success prediction dashboards** with AI-driven alerts.

**5. Gamification & Community Collaboration UI**

**Community Knowledge Sharing UI**

* Implement **collaborative learning UI components**:
  + **Peer learning forums** with interactive Q&A.
  + **Scenario sharing marketplace UI** with ratings and recommendations.
  + **Instructor leaderboard UI** for validated best practices.

**Gamification UI Components**

* Design **achievement and progression tracking UI**:
  + **Dynamic leaderboard with AI-powered ranking adjustments**.
  + **Training milestone progress trackers**.
  + **Daily challenges and performance streak indicators**.
  + **Custom rewards dashboard for AI-generated training goals**.

**6. API Integration & Performance Optimization**

* **Enhance API service layer** to interface with the new backend microservices:
  + **Document intelligence API hooks** for real-time content retrieval.
  + **Analytics data polling with WebSockets** for live updates.
  + **Optimized caching and background data preloading** via React Query.
* **Ensure frontend efficiency**:
  + **Lazy load dashboards and analytics charts** for performance.
  + **Implement IndexedDB caching for offline syllabus access**.
  + **Code-split UI modules** for faster initial load times.

**Final Notes & Integration Guidelines**

* Maintain UI **repository structure** for seamless backend integration.
* Write **unit tests (Jest, React Testing Library)** for all UI components.
* Ensure **end-to-end testing (Cypress) for workflow validation**.
* Document **API endpoints and frontend service interactions**.
* **Optimize PWA functionality** for offline access and background sync.

Once complete, the frontend will deliver a **visually rich, highly interactive, and performance-optimized training platform UI**, ensuring a **user-friendly and future-proofed pilot training experience**.