

BMI 6001: Special Topics in Biomedical Informatics

AI Agent Design and Human-AI Collaborations in Healthcare

Spring 2026 – 3 Credit Hours

Instructor Approval Required

Recommended Pre-requisites: Successful completion of BMI 5310

Course Description:

This course introduces the design and evaluation of agentic artificial intelligence (AI) systems in healthcare. Students will explore how AI agents can support clinical and operational decision-making, collaborate with human stakeholders, and adapt to feedback in complex environments. Emphasis is placed on agentic reasoning frameworks, Human-in-the-Loop (HITL) design, prompt engineering, interaction modeling, and governance strategies. Through case-based discussions and a semester-long design project, students will develop a structured approach to designing AI agents that are transparent, trustworthy, and aligned with healthcare quality and safety goals. Students will have the option to demonstrate their agent prototypes using any of the following tools: low/no-code design studio, programming languages or interface mockups, depending on their technical background. The course prepares students to collaborate with AI developers, lead responsible innovation, and contribute to the safe and effective integration of AI agents in healthcare systems.

Learning Objectives

Upon successful completion of the course, students will

1. Analyze healthcare use cases to identify opportunities for agentic AI support, including Human-in-the-Loop (HITL) integration and stakeholder collaboration.
2. Apply agentic reasoning frameworks to design decision-support workflows and adaptive agent behavior.
3. Design agent architectures and interaction models that incorporate autonomy, planning, prompt engineering, and human-agent teaming.
4. Evaluate agent designs using criteria for usability, trust, safety, and explainability, and plan for governance, risk mitigation, and continuous monitoring.
5. Communicate agent design specifications and implementation strategies through structured documentation, visual modeling, and prototype demonstrations.