ECE194BB/594BB: **AI Agents for the Semiconductor Industry**

(This course will become **ECE157C**, the third course in the ECE 157ABC sequence by **Prof. Li-C. Wang**)

**Description:** Join us this Spring 2025 for an exciting look at how Artificial Intelligence (AI) and Large Language Models (LLMs) are transforming the semiconductor world! Whether you’re new to AI or have some experience, this course invites you to explore semiconductor test and verification practices, then discover how easy it can be to build powerful AI agents using modern tools like LangChain/LangGraph. You’ll learn to integrate industry-specific knowledge into AI solutions, harness the capabilities of LLMs, and verify AI agents. In fun, lab-based homework assignments, we’ll focus on conceptual learning rather than heavy coding—*letting LLMs do the heavy lifting whenever possible*. By the end, you’ll have hands-on experience creating AI agents that can handle real-world tasks in both engineering and management. If you’ve ever thought AI development was too complicated, this course will show you how recent advances have made it more accessible than ever! Join us to see how AI is shaking up the semiconductor landscape, and leave ready to lead the next wave of innovation!

### ****Short Syllabus****

#### **Part I (4 weeks): Semiconductor Testing & Verification Essentials**

* **Introduction to Semiconductor Industry Practices**
  + The chip design and manufacturing workflow
  + Why testing and verification matter so much
* **Diving into Test and Verification Methods**
  + Functional testing vs. structural testing
  + Common challenges and analyzing data effectively

#### **Part II (4 weeks): Building an AI Agent with LangChain/LangGraph**

* **Foundations of AI Agent Development**
  + Introduction to LLMs and how they work
  + Exploring LangChain/LangGraph and Python tools
* **Modeling Domain Knowledge into the AI Agent**
  + Representing knowledge, prompt engineering, and managing contexts
  + Translating semiconductor-specific logic into AI workflows

#### **Part III (2 weeks): Testing & Verification of AI Agents**

* **Evaluation of AI Agents**
  + Measuring performance, debugging, and refining agents
  + Tackling edge cases and increasing reliability
* **Best Practices**
  + Guidelines for deploying and maintaining AI solutions
  + Practical considerations to ensure long-term success

### ****Learning Components****

* **Homework Assignments (Lab Sessions)**
  + Build AI agents using Python, LangChain/LangGraph, and LLMs
  + Encourage LLM-assisted coding and creative problem-solving
  + Emphasis on big-picture understanding over coding intensity
* **Exams (Mid-Term & Final)**
  + Check your grasp of core concepts, not just memorized facts
  + Focus on industry relevance and real-world applications

### ****Who Should Enroll?****

* Anyone curious about applying AI and LLMs to real-world engineering challenges
* Students aiming to get insider knowledge of semiconductor industry practices
* Learners excited to try out state-of-the-art AI agent-building tools with *minimal coding overhead*

### ****Prerequisites****

* Basic familiarity with Python (no advanced coding required—LLMs can help!)
* Interest in how AI reshapes the modern engineering world
* Completion of 157A and/or 157B (preferred but not mandatory)

### ****Ready to build the future of semiconductor AI?****

**Sign up now** and discover how to test, verify, and innovate with AI in chip design—without getting bogged down in heavy programming. Come see how fun and straightforward AI development can be!