

Electronics Technology Supplement: AI Guardrails for Technical & Industrial Assignments

In engineering technology, the primary risks of AI usage include "black box" calculations, a lack of physical safety context, and the potential for non-functional designs. This supplement provides a framework for integrating AI into technical labs and design projects at TCSG.

1. The "Calculated Risk" Guardrail (Verification of Math)

Large Language Models are not calculators; they are word predictors. They frequently make errors in multi-step physics or electrical calculations.

- **Instructional Strategy:** The "Hand-Calculation Audit." If a student uses AI to generate a formula or solve a circuit problem, they must submit a side-by-side hand-calculation or a screenshot from a dedicated engineering tool (like MATLAB or CAD) to verify the AI's result.

2. The "Safety & Standards" Check

AI often ignores local building codes, OSHA standards, or specific material limitations.

- **Assignment Modification:** Have the AI propose a material list or a workflow for a project (e.g., a welding sequence or a PLC logic flow). The student's task is then to "Stress Test" the output against the National Electrical Code (NEC) or specific OSHA safety standards.
- **The Grade:** Points are awarded for identifying where the AI's suggestion violates safety protocols or technical standards.

3. AI-Augmented Assignment: Troubleshooting & Logic

The AI Task	The Student Task (The Real Grade)
Generate a step-by-step troubleshooting guide for a specific equipment failure (e.g., a hydraulic leak or a motor fault).	Perform the physical troubleshooting in the lab. Note where the AI's steps were out of order, physically impossible, or missed a crucial safety lockout/tagout (LOTO) step.

The AI Task	The Student Task (The Real Grade)
Write a basic Python or C++ script for a robotic arm movement.	Annotate the code line-by-line explaining the <i>logic</i> . If the AI included a library or function the student cannot explain, the code is considered non-functional for grading.

4. Guarding Against "Design Atrophy"

To ensure students are not losing their "intuition," require a **"Pre-AI Sketch."** Before consulting an AI for a design or solution, students must submit a 5-minute hand-drawn sketch or a bulleted list of their own ideas. This forces the human brain to engage with the problem first.

5. Local Industry Integration

Ask students to evaluate AI-generated solutions based on the specific equipment available in their campus lab or used by local Georgia employers (e.g., Gulfstream, Rivian, or Kia). If the AI suggests a part that isn't in the college's tool crib, the student must find the real-world equivalent.