

Robotics I YAG

One Credit | Single-Blocked | Full Year | 36 Weeks (4 Grading Periods) | Recommended Grades 9–10

Course Information: Recommended prerequisite: Principles of Applied Engineering. ROB1 = §127.395 Robotics I. CTE Employability Skills §127.15(d)(1) are integrated throughout. Robotics I is project based: students apply the design process, build prototypes or use simulation software, and develop knowledge of robotic and automated systems, controls, sensors, engineering physics, manipulators, tools, fabrication, testing, refinement, and technical presentation. ACCESS may support robotics career exploration, postsecondary planning, certification research, and portfolio development.

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated TEKS	Extension Activities
1	1–2	Unit 1 – Robotics Careers, Professionalism & Teamwork	• Differentiate engineering technician, technologist and engineer roles • Explore robotics/automation careers, certifications, preparation programs, ABET accreditation and work-based learning • Apply engineering ethics, workplace respect and appropriate professional conduct • Establish effective team roles, collaboration, conflict-resolution and leadership routines	• ROB1-1(A–I) • ROB1-2(A–C) • §127.15(d)(1)	• ACCESS: robotics pathways • Career/certification research • Team challenge
1	3–4	Unit 2 – Project Management, Safety & Robotics Lab Operations	• Apply initiating, planning, executing, monitoring/controlling and closing phases to robotics projects • Develop schedules and individual production plans • Master safety expectations and follow manuals, instructions and regulations • Identify OSHA-related hazards/materials, proper disposal, maintenance, storage and consequences of improper maintenance • Establish safe tool/equipment and project documentation routines	• ROB1-3(A–D) • ROB1-4(A–H)	• Safety assessment • Project schedule • Lab/tool audit
1	5–7	Unit 3 – Robotic Systems, Computers, Feedback & Sensors	• Use computers/software to manipulate robotic or automated systems and subsystems • Maintain systems for safe, proper and precise operation • Describe feedback-control loops and their role in system behavior • Identify sensor types/functions and connect sensing to robotic decision making • Use simulation software to investigate system behavior and communicate concepts	• ROB1-5(A–D) • ROB1-9(C)	• Sensor investigation • Feedback-loop model • Robot simulation
1	8–9	Unit 4 – Engineering Physics for Robotics	• Apply Newton's Laws to rotational dynamics, torque, weight, friction and traction • Investigate motors, gears, gear ratios and gear trains • Relate the six simple machines to robotic mechanisms • Explain DC motor control, speed and torque • Explain servo motor control, angle and torque through hands-on/simulated applications	• ROB1-6(A–E)	• Gear-ratio challenge • Motor/servo investigation • Traction/torque lab
2	10–12	Unit 5 – Manipulators, Robotic Arms & End Effectors	• Analyze the relationship between robotic arm construction and robot stability • Analyze torque, gear ratio and payload relationships in robotic arm operation • Investigate linkages and gearing in end effectors • Design/model a manipulator or end effector for a defined task • Use precision measurements and safe construction practices	• ROB1-7(A–C) • ROB1-9(A–B) • ROB1-6 reinforcement	• Robotic arm model • End-effector challenge • Payload analysis
2	13–15	Unit 6 – Engineering Design, Constraints & Quality	• Apply the engineering design process to a robotics problem • Identify system constraints and make fact-based design decisions • Use decision-making strategies and testing/reiteration to improve solutions • Identify quality-control issues and analyze how perceptions of quality affect engineering decisions • Maintain the engineering notebook as a legal project record and interpret industry-standard system schematics	• ROB1-8(A–H)	• Engineering notebook review • Decision matrix • Schematic interpretation

2	16–17	Unit 7 – Guided Robotic Prototype Build	- Plan prototype-production steps and select appropriate tools, equipment, machines and materials - Construct a robotic/automated system to perform specified operations - Test the design against pre-established criteria and constraints - Refine for quality, efficiency and manufacturability - Present the final prototype using multiple media	- ROB1-9(A–C) - ROB1-10(A–F) - ROB1-3 reinforcement	- Prototype build - Testing log - Design presentation
2	18	Semester 1 Exam – Robotics I	- Cumulative written/performance assessment - Robotic system, physics, design and safety application - Engineering notebook/prototype documentation review	- Cumulative: ROB1-1–10 §127.15(d)(1)	Targeted review/remediation
3	19–21	Unit 8 – Integrated Robotic Systems & Subsystem Troubleshooting	- Integrate mechanical, motor, sensor, feedback and computer-control subsystems - Use safe maintenance and precision measurement to diagnose system issues - Interpret schematics and system behavior to isolate problems - Modify simulated/physical systems and document troubleshooting decisions - Evaluate system precision, reliability and proper function	- ROB1-5(A–D) - ROB1-6(B, D–E) - ROB1-8(H) - ROB1-9(A–C)	- Troubleshooting lab - Subsystem integration - Maintenance record
3	22–24	Unit 9 – Robotic Mobility, Force & Mechanical Optimization	- Apply Newton's Laws, friction, traction, torque and weight to mobile robotic systems - Select and optimize gears, gear trains, motors and simple machines - Test speed, torque, traction and payload performance - Use data to refine mechanical design for efficiency and task requirements - Document iterative changes and quality-control decisions	- ROB1-6(A–E) - ROB1-8(B–G) - ROB1-10(D–E)	- Mobility challenge - Performance testing - Mechanical optimization
3	25–27	Unit 10 – Team Robotics Engineering Challenge	- Organize and operate a simulated engineering project using formal project-management practices - Rotate team roles and apply collaboration/conflict-resolution strategies - Define constraints, develop alternatives and select a solution - Build/simulate, test and refine a robotic system - Maintain schedules, engineering notebook evidence and professional project communication	- ROB1-2(A–C) - ROB1-3(A–D) - ROB1-8(A–H) - ROB1-10(A–F)	- Team robotics challenge - Peer design review - Industry/mentor feedback
4	28–30	Unit 11 – Automation Applications & Robotic System Design	- Analyze applications of robotics and automation in industry and daily life - Develop a robotic/automated solution for a specified operation - Select sensors, feedback controls, motors, mechanisms and end effectors appropriate to the task - Use simulation and/or physical prototyping to evaluate system behavior - Assess safety, quality, efficiency and manufacturability	- ROB1-5–10 - ROB1-1(B–C, G–H)	- Automation case study - System architecture/design - ACCESS: career research
4	31–33	Unit 12 – Independent Robotics Design Project	- Identify a robotics problem and independently develop a production/project plan - Apply design-process, constraint, quality-control and schematic-reading skills - Construct or simulate a robotic system using appropriate tools/materials - Test and evaluate against criteria/constraints and refine the design - Document decisions, testing, maintenance and revisions in the engineering notebook	- ROB1-3(D) - ROB1-5–10 §127.15(d)(1)	- Independent prototype - Testing/evaluation report - Engineering notebook
4	34–35	Unit 13 – Robotics Portfolio, Career Readiness & Professional Presentation	- Finalize the robotic system for quality, efficiency and manufacturability - Prepare a multimedia technical presentation explaining the design, subsystems, tests and refinements - Connect project skills to robotics careers, certifications, education and work-based learning opportunities - Demonstrate professional teamwork, ethics and communication - Finalize a robotics portfolio with project evidence and reflection	- ROB1-1(A–I) - ROB1-2(A–C) - ROB1-10(D–F) §127.15(d)(1)	- Professional presentation - Robotics portfolio - ACCESS: postsecondary planning
4	36	Semester 2 Exam & Robotics Showcase	- Cumulative written/performance assessment - Robotic-system design, troubleshooting and engineering application - Final project presentation, portfolio and reflection	- Cumulative: ROB1-1–10 §127.15(d)(1)	Stakeholder showcase

Robotics I TEKS Coverage Checklist

Coverage verification: All 10 Robotics I strands and every student expectation are intentionally addressed. CTE Employability Skills §127.15(d)(1) are integrated throughout.

Strand	Student Expectations	YAG Placement	Coverage
ROB1-1	A-I	Units 1, 11, 13	100%
ROB1-2	A-C	Units 1, 10, 13	100%
ROB1-3	A-D	Units 2, 7, 10, 12	100%
ROB1-4	A-H	Unit 2; reinforced throughout lab/build work	100%
ROB1-5	A-D	Units 3, 8, 11-12	100%
ROB1-6	A-E	Units 4-5, 8-9, 11-12	100%
ROB1-7	A-C	Units 5, 11-12	100%
ROB1-8	A-H	Units 6, 9-12	100%
ROB1-9	A-C	Units 3, 5, 7-8, 11-12	100%
ROB1-10	A-F	Units 7, 9-13	100%
CTE Employability	§127.15(d)(1)	Integrated throughout	100%

Implementation Notes

- Robotics I is a one-credit course recommended for Grades 9–10. Principles of Applied Engineering is the recommended prerequisite.
- Project-based learning should be central to the course. Students should repeatedly build physical prototypes and/or use simulation software to test robotic and automated system designs.
- Safety, tool/equipment maintenance, engineering documentation, teamwork, project management, testing, iteration, quality, efficiency, and manufacturability should be reinforced throughout all laboratory and design work.
- Students should have recurring opportunities to connect mechanical systems, motors, gears, sensors, feedback loops, manipulators, end effectors, computer control, engineering physics, and design-process decisions rather than studying these concepts only in isolation.
- Weeks 18 and 36 are reserved for cumulative semester exams. No instructional unit crosses the semester boundary, and no calendar-specific dates are included.