

Robotics II YAG

One Credit | Single-Blocked | Full Year | 36 Weeks (4 Grading Periods) | Recommended Grades 10–12

Course Information: Prerequisite: Robotics I. ROB2 = §127.396 Robotics II. CTE Employability Skills §127.15(d)(2) are integrated throughout. Robotics II advances students into artificial intelligence, programming, advanced mathematics and physics, feedback control, sensors, navigation, manipulators, engineering design, quality systems, simulation, fabrication, formal testing, and project management. Students build prototypes and use software to test designs in a project-based environment. ACCESS may support robotics/automation career exploration, postsecondary planning, credential research, and portfolio development.

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated TEKS	Extension Activities
1	1–2	Unit 1 – Advanced Robotics Careers, Professional Standards & Mathematical Processes	• Compare technician, technologist and engineer roles and investigate robotics/automation careers and certifications • Research regulations, safety/labor codes, ethics, diversity and professional responsibilities • Apply mathematical problem-solving processes, representations and precise technical communication to robotics scenarios • Establish advanced engineering notebook, teamwork and professional communication expectations	• ROB2-1(A–K) • ROB2-2(A–G) • §127.15(d)(2)	• ACCESS: robotics pathways • Certification/career research • Ethics/regulation case
1	3–4	Unit 2 – Team Operations, Project Management & Laboratory Safety	• Establish team procedures/norms and apply cooperative problem solving • Implement initiating, planning, executing, monitoring/controlling and closing phases • Develop a project schedule and translate a Project Management Plan into production tasks • Master safety testing, OSHA hazard/waste practices, lab procedures, inventory, storage and maintenance expectations • Operate a simulated engineering project using assigned roles	• ROB2-3(A–E) • ROB2-4(A–D) • ROB2-5(A–H)	• Project management plan • Safety assessment • Team operations simulation
1	5–7	Unit 3 – Advanced Robotic Systems, Feedback & Sensors	• Use computers to manipulate robotic/automated systems and associated subsystems • Troubleshoot and maintain systems for safe, precise operation • Implement feedback-control loops and multiple sensor types • Interpret sensor feedback and calculate threshold values • Use software simulations to model robot behavior and subsystem interaction	• ROB2-6(A–D) • ROB2-7(H) • ROB2-11(D)	• Sensor calibration • Feedback-control lab • Troubleshooting task
1	8–9	Unit 4 – Advanced Robotics Physics: Motion, Momentum & Degrees of Freedom	• Apply acceleration and velocity to robotic motion • Analyze degrees of freedom and joint design • Apply angular momentum and impulse-momentum theory to joint motion, stability and mobility • Differentiate translational, rotational and oscillatory motion • Use mathematical models and experimental evidence to predict system behavior	• ROB2-2(A–G) • ROB2-7(A–E)	• Motion investigation • DOF/joint model • Momentum analysis
2	10–12	Unit 5 – Motors, Encoders, Geometry & Autonomous Navigation	• Apply DC and servo motor control, speed, angle and torque • Use measurement and geometry to calculate robot navigation • Implement encoder-based movement control • Develop path planning using geometry and multiple-sensor feedback • Test navigation accuracy and use data to refine autonomous movement	• ROB2-7(F–K) • ROB2-6(C–D) • ROB2-2(A–G)	• Encoder lab • Autonomous navigation challenge • Path-planning analysis

2	13–15	Unit 6 – Robotics Programming: Logic, Algorithms & Sensor Control	• Use a coding language with correct syntax and documentation/commenting practices • Explain program-flow logic and create flowcharts/pseudocode • Create decision algorithms and iterative loops • Evaluate sensor data as variables for feedback control and use output commands/variables • Apply selection structures, subroutines and functions to modular robot programs	• ROB2-8(A–J)	• Programming portfolio • Flowchart/pseudocode task • Sensor-controlled program
2	16–17	Unit 7 – Manipulators, End Effectors & Integrated Programming Challenge	• Analyze robotic arm construction, stability and payload • Apply torque, gear ratio, linkage and gearing concepts to manipulators/end effectors • Program coordinated manipulator movement using sensors and feedback • Measure/test precision and optimize performance for a specified task • Document design/program decisions and present performance results	• ROB2-9(A–C) • ROB2-7(B,F–H,J) • ROB2-8(A–J) • ROB2-11(B)	• Manipulator challenge • Payload/torque analysis • Program demonstration
2	18	Semester 1 Exam – Robotics II	• Cumulative written/performance assessment • Programming, advanced physics, navigation and sensor-control application • Engineering notebook and system documentation review	• Cumulative: ROB2-1–9, ROB2-11(B,D) • §127.15(d)(2)	• Targeted review/remediation
3	19–21	Unit 8 – Engineering Design, Quality Control & Six Sigma	• Implement the engineering design process for an advanced robotic problem • Identify constraints and make/defend fact-based decisions • Apply formal testing and reiteration strategies • Identify/improve quality-control issues and apply Six Sigma concepts to product quality • Create/interpret industry-standard system schematics and maintain the engineering notebook as a legal record	• ROB2-10(A–H) • ROB2-2 reinforcement	• Six Sigma quality analysis • Design decision matrix • System schematic
3	22–24	Unit 9 – Tools, Precision Measurement, Component Tracking & Simulation	• Safely use/maintain tools and laboratory equipment to construct and repair systems • Use precision measuring instruments to analyze systems and prototypes • Implement a system to identify/track robotic components and operational/construction elements • Use multiple software applications to simulate behavior and present concepts • Integrate inventory, maintenance and documentation practices into project workflow	• ROB2-11(A–D) • ROB2-5(E–H) • ROB2-10(G–H)	• Component-tracking system • Precision measurement lab • Simulation analysis
3	25–27	Unit 10 – Integrated Autonomous Robotics Engineering Project	• Define criteria/constraints and design an autonomous robotic/automated system • Integrate sensors, feedback, motors, encoders, navigation and programmed control • Apply formal project-management, teamwork and safety procedures • Construct/simulate and formally test the system using measurable performance criteria • Use quality data and iterative design to improve system reliability and efficiency	• ROB2-3–12 • §127.15(d)(2)	• Autonomous systems project • Formal test report • Industry/mentor review
4	28–30	Unit 11 – Artificial Intelligence & Intelligent Automation Applications	• Explore artificial intelligence applications in robotics and automation • Develop intelligent behaviors using sensor data, decisions, feedback and modular programming • Compare rule-based/autonomous strategies for robotic tasks • Analyze ethical, safety and workforce implications of intelligent automation • Prototype or simulate an AI-informed robotic solution and evaluate performance	• ROB2-1(F–K) • ROB2-6(C–D) • ROB2-8(C–J) • ROB2-10(A–F) • ROB2-12(A,C,E–F)	• AI/automation case study • Intelligent behavior challenge • ACCESS: emerging careers

4	31–33	Unit 12 – Independent Robotics II Prototype	• Identify an advanced robotics/automation need and establish criteria, constraints and project plan • Select tools, materials, sensors, controls and programming architecture • Construct the robotic/automated system and implement sensors • Formally test the design and analyze quantitative performance • Refine for quality, efficiency and manufacturability using documented evidence	• ROB2-2–12 • §127.15(d)(2)	• Independent prototype • Formal design review • Testing/quality report
4	34–35	Unit 13 – Final Product, Technical Portfolio & Professional Presentation	• Finalize the independent robotic/automated system • Present the final product using multiple media and defend design/programming decisions • Complete engineering notebook, schematics, code documentation, test evidence and project-management records • Connect technical growth to robotics careers, certifications and postsecondary pathways • Reflect on teamwork, safety, quality, ethics and employability skills	• ROB2-1(A–K) • ROB2-10(G–H) • ROB2-11(C–D) • ROB2-12(E–G) • §127.15(d)(2)	• Robotics portfolio • Professional presentation • ACCESS: transition planning
4	36	Semester 2 Exam & Robotics II Showcase	• Cumulative written/performance assessment • Advanced robotics programming, physics, AI, design and testing application • Final prototype, technical portfolio and professional showcase	• Cumulative: ROB2-1–12 • §127.15(d)(2)	• Stakeholder showcase

Robotics II TEKS Coverage Checklist

Coverage verification: All 12 Robotics II strands and all 83 student expectations are intentionally addressed. Mathematical processes and CTE Employability Skills §127.15(d)(2) are integrated throughout.

Strand	Student Expectations	YAG Placement	Coverage
ROB2-1	A–K	Units 1, 11, 13	100%
ROB2-2	A–G	Units 1, 4–5, 8, 10–12	100%
ROB2-3	A–E	Units 2, 10–12	100%
ROB2-4	A–D	Units 2, 10–12	100%
ROB2-5	A–H	Units 2, 9–12	100%
ROB2-6	A–D	Units 3, 5, 10–12	100%
ROB2-7	A–K	Units 3–5, 7, 10–12	100%
ROB2-8	A–J	Units 6–7, 10–12	100%
ROB2-9	A–C	Units 7, 10, 12	100%
ROB2-10	A–H	Units 8, 10–13	100%
ROB2-11	A–D	Units 3, 7, 9–13	100%
ROB2-12	A–G	Units 10–13	100%
CTE Employability	§127.15(d)(2)	Integrated throughout	100%

Implementation Notes

- Robotics II is a one-credit course recommended for Grades 10–12 with Robotics I as the prerequisite.
- Programming and artificial intelligence should be taught through authentic robotic and automated systems. Students should routinely connect code, sensor feedback, feedback-control loops, motors, encoders, geometry, navigation, manipulators, and physical system behavior.
- Project-based learning should remain central. Students should build physical prototypes and use simulation software to test designs, with formal testing, quantitative evidence, iteration, Six Sigma/quality concepts, and manufacturability incorporated into advanced projects.
- Engineering notebooks, system schematics, commented code, project-management records, component-tracking systems, test reports, precision measurements, and multimedia presentations should provide recurring evidence of mastery.
- Weeks 18 and 36 are reserved for cumulative semester exams. No instructional unit crosses the semester boundary, and no calendar-specific dates are included.