METROLOGY & CALIBRATION TECHNOLOGY

Technical Degree Program — Associate of Applied Science

A Strategic Partnership:
Technical Colleges & the Metrology Institute, Inc.

15,800	$65,040	5%	1,400+
U.S. Jobs (2024)	Median Annual Wage	Job Growth 2024–34	Annual Openings/Yr

Presented by: Ken Racen | Founder & CEO, Metrology Institute, Inc. (501(c)(3))

SOC Code: 17-3028 | CIP Code: 15.0303 | 72 Credit Hours | ASQ CCT Certification Pathway

PROGRAM CONCEPT

What We Are Proposing and Why It Matters

METROLOGY Institute®

The Metrology & Calibration Technology Technical Degree

A two-year, standards-based Associate of Applied Science that trains students to ensure the accuracy, reliability, and safety of precision measurement instruments across America's most critical industries — **filling a nationally recognized workforce gap**.

First-in-Class

Among the very few dedicated metrology programs in the entire nation — a true first-mover position.

ISO/IEC 17025

Integrates ISO/IEC 17025:2017 quality systems compliance and measurement uncertainty.

ASQ CCT Certification Prep

Graduates are fully prepared to sit for the ASQ Certified Calibration Technician (CCT) national exam.

Industry-Grade Training

Hands-on with DMMs, oscilloscopes, CMMs, dimensional, torque tools, force, thermal, pressure instruments, and metrology software.

Summer Internship

Structured internship in an ISO/IEC 17025-accredited calibration lab — real-world application.

OEM Equipment Partnerships

Fluke, Mitutoyo, Hexagon, Keysight, Mettler Toledo, Druck, Additel, Morehouse — equipment donations and employer pipelines.

ECONOMIC IMPACT

Why Now

31%
Above National Median Wage

$105K+
Top 10% Annual Earnings

$65,040
Median Wage (BLS 2024)

ZERO
Midwest Programs (First-Mover)

Wage Percentile	Annual Wage	Hourly Wage
Lowest 10%	$44,730	$21.50
25th Percentile	$53,800	$25.87
MEDIAN (50th) — Benchmark	**$65,040**	**$31.27**
75th Percentile	$82,400	$39.62
Highest 10%	**$105,440+**	**$50.69+**
National All-Occupations Median	$49,500	$23.80

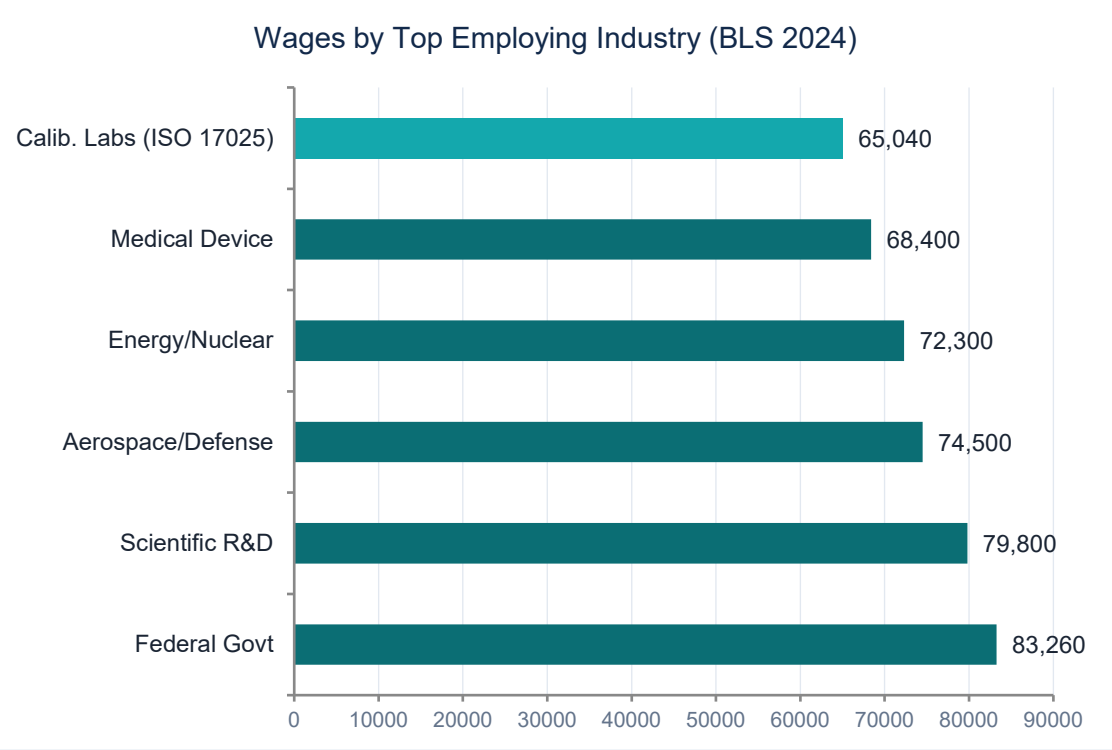
Source: BLS OOH, SOC 17-3028 | May 2024

Economic Benefits for your State

- Fills nationally designated shortage occupation (BLS, ASQ, NCSLI)
- Generates high-wage, non-outsourceable local jobs
- Eligible for Perkins V, NSF ATE, DOE, DoD grants
- Attracts OEM investment & employer partnerships
- Increases Full-Time Equivalent (FTE) enrollment & state appropriations

WORKFORCE BENEFITS

Career Pathways and Graduate Outcomes



Source: BLS OOH, SOC 17-3028, May 2024

Career Pathways for Graduates

- Calibration Technician
- Metrology Laboratory Manager
- Quality Systems Auditor (ISO 17025)
- IM&TE Coordinator (DoD/Defense)
- Process Control Instrumentation Tech
- Medical Device Calibration Specialist
- Dimensional Metrologist (Aerospace/CMM)
- Metrology Software Specialist

PARTNERSHIP: METROLOGY INSTITUTE & INDUSTRY

Your Trusted Partner for Program Success

METROLOGY Institute®

501(c)(3) Nonprofit Organization

Mission: Advance scientific knowledge and practical skills in measurement science.

Vision: A world where measurement science fuels innovation and quality.

Scope: National training, educational and industry partnerships, curriculum development, and workforce advocacy.

Website: metrologyinstitute.org

Ken Racen — Founder & CEO

46+ Years of Hands-On Metrology Experience

Credentials: MBA IT/Business · ASQ Certified Quality Auditor · ASQ CCT · Lean Six Sigma Specialist · NIST/NVLAP ISO 17025:2017 · Advanced GD&T · IEC 60601-1 Medical Device Safety

Experience: VP/Co-Owner ISL Corporation (Midwest's premier commercial metrology lab) · Mitutoyo · SCE Metrology Services · Alcon Laboratories · Applied Technical Services

Industries: Aerospace · Nuclear · Pharmaceutical · Biomedical · Precision Manufacturing

What the Metrology Institute Brings to Your Institution

Complete Curriculum Package

Syllabi, lab procedures, assessments, and instructor guides — ready to deploy.

Faculty Development

ISO 17025 training, ASQ CCT prep, industry leadership, training, and mentoring.

OEM Equipment Donations/Sponsors

Fluke, Mitutoyo, Keysight, Mettler Toledo, Druck, Additel, Hexagon, Morehouse, and others.

Grant Co-Authorship

NSF ATE, Perkins V, DOE, DoD competitive grant applications.

National Lab Network

500+ accredited calibration labs, OEM suppliers, and industry employers.

CROSS-DISCIPLINARY FOUNDATION

Metrology as the Backbone of Every Technical Program

Rather than competing with existing programs — Metrology STRENGTHENS them.

Aviation Maintenance

FAA AC 43.13 & AS9100 mandate certified calibration of all flight-critical instruments.

Biomedical Engineering

FDA 21 CFR Part 820 & Joint Commission require rigorous documented calibration.

Electrical / Electronics Technology

Multimeters, oscilloscopes, power analyzers require routine calibration.

Precision Machining

Calipers, micrometers, CMMs must be NIST-traceable per ISO 9001.

HVAC & Facilities Management

Temperature, pressure, humidity instruments require calibration for code compliance.

Automation & Robotics

Encoders, sensors, load cells rely on calibrated reference signals.

Welding Technology

Current meters, flow meters, temp monitoring require documented calibration.

Quality Management

ISO 9001, ISO 17025, AS9100, and ISO 13485 mandate calibration programs for all M&TE.

Calibration is a Professional Skilled Trade: 2 yrs formal training · ASQ CCT National Certification · BLS SOC 17-3028 · Safety-Critical Environments (FAA, FDA, NRC, DoD) · Defined Career Ladder

CALIBRATION TECHNICIANS:

A Professional Skilled Trade Deserving Formal Recognition

2 Years Formal Education

Comparable in depth to electronics technology, HVAC, Biomedical, Nuclear, Automation, Process Control, or industrial maintenance — combined with supervised lab training.

Multidisciplinary Mastery

Measurement science, electronics, physics, applied mathematics, statistics, and quality management.

National Professional Certification

ASQ Certified Calibration Technician (CCT) — rigorous written examination, recertification every 3 years.

Safety-Critical Environments

Operates under FAA, FDA, NRC, DoD, DoE, EPA — measurement errors can have life-or-death consequences.

Distinct BLS SOC Code

SOC 17-3028 — the hallmark of a recognized, distinct profession with its own occupational classification.

National Security Role

Maintains accuracy of defense & intelligence measurement systems — irreplaceable and ITAR-controlled.

MARKET DEMAND & WORKFORCE GAPS

The Data Behind the Urgency

5%
Projected Job Growth 2024–34 (vs. 3% avg.)

1,400+
Annual Job Openings Nationwide

15,800
Total Jobs (2024 BLS Baseline)

<12
U.S. College Programs Nationwide

BLS Metric	Data
2024 Employment (Base)	15,800 jobs nationally — SOC 17-3028
Projected 2034 Employment	~16,600 jobs — continued growth
Projected Growth Rate	5% — faster than 3% national average
Average Annual Openings	~1,400/year (growth + retirements)
Typical Education Entry	Associate's Degree — ideal for 2-yr colleges
STEM Classification	YES — BLS classifies calibration as STEM
Median Annual Wage (2024)	$65,040 — 31% above national median

Source: BLS Occupational Outlook Handbook 2024–34 Edition | SOC 17-3028

The Pipeline Problem

- Aging workforce: majority of technicians are 45+ yrs old
- Retirements accelerating sharply through 2035
- Only 2-3 U.S. colleges offer dedicated A.A.S Metrology Programs (BC3, MCCC)
- Defense/pharma employers require ASQ CCT certification
- ITAR: U.S.-trained personnel ONLY for defense systems
- Rising ISO/IEC 17025 & FDA 21 CFR compliance demands
- IoT, automation & AI systems all require calibrated instruments

INSTITUTIONAL VALUE & ACADEMIC SYNERGY

What This Program Does For Your College

Curriculum & Enrollment Benefits

- Credentialed measurement science pathway enriching EVERY existing program
- Cross-departmental equipment sharing (Aviation, Biomedical, Electrical/Electronic, Machining, Nuclear)
- Stackable credentials for Aviation, Electronic, Biomedical, Nuclear, Instrumentation & Manufacturing students
- Fully aligned with CORE 42 articulation framework
- Supports 2+2 articulation with 4-year engineering technology programs
- New program adds FTE enrollment — increases state appropriation funding

Financial & Grant Opportunities

NSF ATE Program: $200K–$750K for STEM technician education — calibration is explicitly aligned

Perkins V CTE Funding: CIP 15.0303 ensures recurring federal funding eligibility

DoE / DoD SkillBridge: Additional federal workforce development grant avenues

OEM Equipment Donations: Fluke, Mitutoyo, Keysight, and others — substantially reduce startup costs

Employer Scholarships: Direct-hire agreements & scholarships from regional labs

NSF Advanced Technological Education (ATE) Program

NSF ATE specifically funds development of technician education in advanced technology fields. Metrology & Calibration programs are highly competitive ATE candidates. Grants range from $75K (planning) to $750K (full development), covering curriculum, faculty development, equipment, and industry partnerships.

COMPETITIVE DIFFERENTIATOR

Elevating America's National Standing in Precision Science

Global Metrology Education Investment

Country	Metrology Training Infrastructure
Germany	Formalized Messtechniker apprenticeship — nationally recognized skilled trade with dedicated institutes.
Japan	Metrology programs at every major polytechnic; JCSS calibration internationally benchmarked.
South Korea	KRISS operates training pipelines with technical colleges nationwide.
China	NIM & provincial technical schools run extensive calibration programs aligned with national quality strategy.
United States	**No federal training mandate; fewer than 3 college-level programs nationally — SIGNIFICANT GAP.**

"STEM occupations are projected to increase at nearly 3× the rate of non-STEM employment between 2023 and 2033. STEM occupations are more likely to have above-average wages and require postsecondary education for entry."

— Andrew Watson, BLS (June 2025) | Calibration is a BLS-classified STEM occupation

First-Mover Advantages for Your Institution

National Recognition

One of <6 U.S. institutions — immediate national visibility.

Federal Attention

DoD METCAL, NIST, NSF ATE actively seek academic partners.

Employer Pipeline

Companies recruit from programs before graduation.

Media & PR Value

Be first-of-kind in your State - generates national press.

Grant Competitiveness

First in state/region — competitive federal advantage.

Articulation Agreements

2+2 pathways to 4-year engineering programs.

NATIONAL SECURITY

Metrology as a Pillar of American Defense and Safety

Precision measurement is the invisible infrastructure of American security. **A shortage of calibration professionals is a national security vulnerability**.

Missile & Guidance Systems

IMUs, accelerometers & gyroscopes require NIST-traceable calibration for precision targeting.

Nuclear Weapons Safety

All safety & security systems are instrumented — calibration errors have catastrophic potential.

Electronic Warfare (EW)

RF/microwave calibration essential for radar, jamming, electronic intelligence, and threat detection.

Unmanned Systems (UAVs)

Navigation sensors, altitude systems & payload instruments must maintain calibrated accuracy.

Military Medical Equipment

Battlefield diagnostic equipment must be calibrated for accurate diagnosis under field conditions.

Defense Manufacturing

AS9100/AS9102 compliance requires NIST-traceable calibration — ITAR mandates U.S.-trained personnel.

*DoD METCAL Program oversees 1.3 MILLION+ pieces of M&TE across all military services — **civilian replacement pipeline is severely underdeveloped**.*

WOMEN IN METROLOGY

An Ideal Career Path for Women in STEM

Women currently represent ~15–20% of the calibration workforce — yet the profession rewards precisely the skills in which women consistently excel.

1. Skill Over Physical Strength

Metrology relies on analytical precision, attention to detail, and mastery of instruments — not physical labor. Women compete on exactly equal technical footing.

2. Competitive Pay & Job Security

Median wage $65,040 (31% above national median). Persistent nationwide shortage creates strong job security and above-average compensation.

3. Clear Leadership Pathways

Defined advancement: technician → lab manager → quality director → standards development. Collaborative leadership styles are highly valued.

4. Cross-Industry Flexibility

Skills transfer across aerospace, healthcare, defense, energy & manufacturing — enabling work in industries that match personal values and interests.

5. Inclusive Professional Community

ASQ, NCSL International, MSC, A2LA & NIST actively promote gender diversity. Mentorship programs and professional networks are expanding rapidly.

Recruitment Partners: AAUW · Women in Manufacturing (WiM) · Women in STEM Networks · Area High Schools · ASQ Diversity Initiatives

OFFICIAL CLASSIFICATIONS

BLS and NCES Regulatory & Academic Foundation

U.S. Bureau of Labor Statistics

SOC Code: 17-3028.00

Title: Calibration Technologists and Technicians

Description: Apply principles of measurement science, physics, electronics, and mathematics to calibrate inspection, measurement, and test equipment. May determine the suitability of standards, perform corrective maintenance, and follow quality system procedures.

Education Entry: Associate's Degree

2024 Employment: 15,800 jobs nationally

Growth (2024–34): 5% — faster than 3% avg.

Annual Openings: ~1,400/year

Median Wage: $65,040 (31% above national median)

STEM: YES — BLS STEM classification applies

National Center for Education Statistics

CIP Code: 15.0303

Program Title: Electromechanical Technology / Engineering Technology

Broader Classification: Electrical, Electronic & Communications Eng. Technology

Definition: Prepares individuals to apply engineering principles and technical skills in support of electrical & electronics engineers. Includes instrument calibration, systems maintenance, testing, and report preparation.

Eligible Degrees: A.A.S., Certificate, Bachelor's (articulation)

Financial Aid: Pell Grant, Title IV federal aid, Perkins V CTE funding

ASQ Certified Calibration Technician (CCT)

Certifying Body: American Society for Quality (ASQ)
Exam Domains: Measurement fundamentals · Calibration systems · Instrumentation · Uncertainty analysis · Quality systems
Maintenance: Recertification every 3 years — continuing education
Recognition: Required/preferred by aerospace, defense, pharma, nuclear & medical device employers

CURRICULUM OVERVIEW

72 Credit Hours — Four Semesters + Summer Internship | Associate of Applied Science

Semester 1 17 Cr.

Foundations of Metrology & Safety

- English Composition, ENG 101 (CORE 42) — 3 cr.
- College Algebra, MAT 115 (CORE 42) — 3 cr.
- Intro to Metrology and IM&TE — 3 cr.
- Professional Ethics & Technical Comm. — 1 cr.
- Quality & Safety in Calibration Lab (OSHA 10) — 2 cr.
- Intro to Calibration Procedures — 3 cr.
- Precision Measurement Tools & Equipment — 2 cr.

Semester 2 19 Cr.

Calibration Methods & Systems

- Intro to Physics with Lab, PHY 100 (CORE 42) — 4 cr.
- Calibration Procedures and Methods — 3 cr.
- Measurement Uncertainty & Data Analysis I — 3 cr.
- Measurement Systems and Error Sources — 3 cr.
- ISO/IEC 17025 and Z540.3 Quality Systems — 2 cr.
- Calibration Lab Practicum I — 2 cr.
- Calibration Equipment and Standards— 2 cr.

Semester 3 16 Cr.

Advanced Calibration Techniques

- Oral Communications, COM 111 (CORE 42) — 3 cr.
- Advanced Dimensional & Mechanical Calibration — 3 cr.
- DC Low/Frequency Calibration — 3 cr.
- ISO/IEC 17025 Internal Audits & QC — 2 cr.
- Calibration Lab Practicum II — 2 cr.
- Process Control Instrumentation — 3 cr.

Semester 4 17 Cr.

Industry Integration & Capstone

- Technical Writing & Reporting for Metrology — 2 cr.
- Measurement Uncertainty & Risk Analysis (GUM II) — 3 cr.
- Instrumentation Maintenance & Troubleshooting — 3 cr.
- Metrology Software & Automation Systems — 3 cr.
- Capstone Project in Applied Metrology — 5 cr.
- Certification Prep & Career Readiness — 1 cr.

Summer Internship (3 Cr.): Structured internship in an ISO/IEC 17025-accredited calibration lab — real-world exposure to procedures and standards.

NEXT STEPS:

Partner With Us — Become a National Pioneer

Phase 1 (Months 1–2)

Partnership Agreement

Execute MOU with Metrology Institute · Establish program advisory board · Identify lead faculty.

Phase 2 (Months 3–6)

Curriculum Development

Develop curriculum with MI and industry leaders' support · Complete CIP registration · Develop syllabi & lab SOPs.

Phase 3 (Months 3–8)

Lab Setup & Equipment

Identify lab space · Facilitate OEM donations and sponsorships· Configure per ISO 17025 layout principles.

Phase 4 (Months 4–8)

Faculty Hiring

Hire lead instructor (ASQ CCT preferred) · MI-sponsored faculty development & ISO 17025 training.

Phase 5 (Months 6–10)

Approvals & Marketing

Complete state/regional approvals · Launch recruitment · Formalize employer partnerships.

Phase 6 (Month 12)

First Cohort Launch

Enroll inaugural cohort · Engage employer advisory board · Begin internship placement.

Contact Ken Racen to Begin the Conversation

Email: kenracen@metrologyinstitute.org | LinkedIn: linkedin.com/in/kenracen/ | Web: metrologyinstitute.org

"Measurement is the foundation of all science, all quality, and all safety. It is time to give measurement professionals the recognition, the training, and the national standing they have always deserved." — Ken Racen