Space Situational Awareness (SSA) and Space Domain Awareness (SDA) Training Course

Professional Development Training Course Outline

Category	Defense and Security	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Space operations have become increasingly complex as the number of satellites, spacecraft, debris objects, and hostile threats continues to grow across Earth's orbits. Space Situational Awareness (SSA) and Space Domain Awareness (SDA) have therefore emerged as critical capabilities for governments, defense institutions, commercial operators, and global space agencies. These capabilities help ensure the safety, security, and sustainability of space activities by delivering accurate tracking, orbit prediction, threat monitoring, collision avoidance, and real-time decision support. With increasing congestion in low Earth orbit, emerging threats in geostationary orbit, and rising concerns about anti-satellite weapons, electromagnetic interference, and cyber vulnerabilities, SSA and SDA are now central to national security, commercial strategy, and international space governance.

Space Situational Awareness (SSA) and Space Domain Awareness (SDA) Training Course equips participants with the analytical, technical, operational, and strategic tools required to monitor orbital environments, classify threats, manage conjunction risks, and support mission assurance. The course blends advanced space surveillance techniques, tracking and sensor technologies, data fusion, orbital mechanics, behavioral characterization, and decision intelligence frameworks. Through deep-dive case studies and scenario-based simulations, participants will gain practical skills to interpret space data, generate actionable insights, and implement governance systems that protect satellites, strengthen space resilience, and support responsible space operations.

Programme Curriculum

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Course Objectives

1. Understand the foundations and strategic importance of Space Situational Awareness and Space Domain Awareness.
2. Analyze global space traffic trends using advanced SSA and SDA analytics.
3. Apply trending technologies such as AI-driven tracking, machine learning forecasting, and data fusion engines.
4. Identify orbital risks, collision threats, and potential hostile activities.
5. Use sensor networks, optical telescopes, and radar systems for real-time monitoring.
6. Evaluate space debris dynamics and implement mitigation strategies.
7. Interpret orbital mechanics, propagation models, and trajectory prediction tools.
8. Integrate cybersecurity and electromagnetic protection within SSA/SDA systems.
9. Develop decision-support frameworks for operational command and control.
10. Assess international policies, legal compliance, and space governance standards.
11. Strengthen resilience of space assets through risk management and contingency planning.
12. Build multi-stakeholder coordination for space traffic management.
13. Produce accurate SSA/SDA reports, alerts, and response recommendations.

Organizational Benefits

- Enhanced operational safety and mission assurance
- Improved real-time monitoring and orbital risk detection
- Strengthened national security and defense readiness
- Reduced collision risk and space asset loss
- Better forecasting using AI-enabled analytics
- Improved data integration from multi-sensor systems
- Stronger compliance with international space norms
- Enhanced resilience to space threats and interference
- Increased capacity for large-scale space traffic management
- Strengthened organizational decision-making capabilities

Target Audiences

- Space agency analysts and mission planners
- Defense and military space operations teams
- Satellite operators and commercial space companies
- Aerospace engineers and orbital analysts
- Intelligence and security professionals
- Space policy, governance, and regulatory officers
- Research institutions and academic programs in space sciences
- Technology developers and system integrators in the space sector

Course Duration: 10 days

Course Modules

Module 1: Foundations of SSA and SDA

- Define core concepts, terminology, and operational significance
- Review evolution of SSA and SDA in global space operations
- Understand risks associated with congestion and proliferation of satellites
- Examine key drivers of military and commercial SSA/SDA demand
- Explore global space architecture and orbital regimes
- Case Study: Rapid growth of LEO constellations and its impact on SSA

Module 2: Space Environment and Orbital Mechanics

- Identify major orbital zones and their characteristics
- Apply orbital mechanics principles to tracking and prediction
- Understand forces affecting satellite motion and debris propagation
- Interpret orbital elements and propagation models
- Evaluate limitations of traditional tracking models
- Case Study: Orbital decay of a spacecraft due to atmospheric drag

Module 3: Space Surveillance Sensors and Technologies

- Explore radar, optical, infrared, and space-based sensors
- Compare capabilities of ground-based vs. space-based platforms
- Understand detection ranges, limitations, and accuracy
- Integrate multi-sensor networks for enhanced visibility
- Examine emerging sensor innovations for SDA
- Case Study: Telescope network tracking geostationary satellites

Module 4: Data Fusion, Analytics, and AI in SSA/SDA

- Combine multi-source data for improved situational awareness
- Apply AI and machine learning for behavior prediction
- Use data fusion systems to enhance tracking precision
- Analyze large-scale space traffic datasets
- Generate actionable insights from complex orbital data
- Case Study: AI-enabled anomaly detection in satellite movement

Module 5: Space Debris Tracking and Mitigation

- Understand sources and categories of space debris
- Track debris across LEO, MEO, and GEO environments
- Evaluate mitigation strategies and active debris removal
- Reduce risk through responsible mission design
- Assess debris collision probability and risk models
- Case Study: Fragmentation event leading to major orbital debris

Module 6: Conjunction Assessment and Collision Avoidance

- Perform conjunction screening and risk assessment
- Analyze probability thresholds for avoidance maneuvers
- Examine operational coordination between space operators
- Develop collision avoidance protocols and decision trees
- Integrate automated warning systems
- Case Study: Maneuver decision for a satellite in high-risk conjunction

Module 7: Threat Assessment and Behavioral Characterization

- Identify potential hostile or suspicious space activities
- Monitor unusual satellite maneuvers and proximity operations
- Evaluate electromagnetic interference and cyber vulnerabilities
- Analyze dual-use satellites and counterspace capabilities
- Use behavior models for threat classification
- Case Study: Close approach by an unregistered foreign spacecraft

Module 8: Electromagnetic Spectrum Monitoring

- Understand spectrum dependencies in satellite operations
- Monitor interference affecting communication links
- Evaluate jamming, spoofing, and signal anomalies
- Use spectrum monitoring tools for anomaly detection
- Strengthen resilience through spectrum protection strategies
- Case Study: Signal interference affecting GEO communications

Module 9: Space Weather and Environmental Impacts

- Analyze solar activity, geomagnetic storms, and radiation belts
- Predict impacts on satellites and communication systems
- Integrate space weather alerts into SSA
- Use forecasting models to reduce operational risk
- Understand vulnerabilities of different spacecraft types
- Case Study: Solar flare disrupting satellite operations

Module 10: Space Traffic Management

- Define global space traffic challenges
- Coordinate between military, commercial, and civil actors
- Understand data-sharing frameworks and interoperability
- Support safe orbital operations through standardized procedures
- Review emerging international STM initiatives
- Case Study: International coordination during predicted orbital congestion

Module 11: SSA/SDA Systems Architecture

- Understand key components of SSA/SDA systems
- Integrate sensors, databases, analytics, and decision engines
- Build architectures for national and commercial networks
- Deploy automated alerting and monitoring systems
- Manage system-level reliability and redundancy
- Case Study: Deployment of a national SDA architecture

Module 12: Governance, Treaties, and Space Law

- Review global legal frameworks regulating space activity
- Understand obligations under treaties and international agreements
- Assess national regulatory requirements for operators
- Navigate space traffic standards and guidelines
- Examine compliance issues related to SDA operations
- Case Study: Legal dispute over orbital slot interference

Module 13: Mission Assurance and Risk Management

- Identify operational risks across mission phases
- Integrate SSA/SDA into mission planning
- Apply risk management methodologies
- Improve decision-making with predictive analytics
- Strengthen contingency and emergency plans
- Case Study: Mission preserved due to early detection of a collision risk

Module 14: Space Security and Defense Applications

- Understand military interest in SDA for strategic advantage
- Detect counterspace threats and hostile maneuvers
- Integrate SDA with national defense command structures
- Protect assets through resilience and redundancy
- Develop rapid response protocols
- Case Study: Defensive maneuvering in response to military threats

Module 15: Future Trends and Innovation in SSA/SDA

- Examine megaconstellations and their monitoring implications
- Review new sensor technologies and automation
- Explore opportunities for commercial SSA/SDA markets
- Understand AI-driven future architectures
- Predict policy and governance shifts
- Case Study: Next-generation SDA solutions for global operators

Training Methodology

- Instructor-led presentations using real SSA/SDA operational frameworks
- Hands-on exercises using tracking, prediction, and data fusion tools
- Group-based problem-solving using space environment scenarios
- Case study analysis for mission assurance and threat assessment
- Simulations of conjunction alerts and response procedures

- Development of action plans for integrating SSA/SDA in organizations

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
02 Nov 2026	13 Nov 2026	Online	$2,000
02 Nov 2026	13 Nov 2026	Physical	$3,000
02 Nov 2026	13 Nov 2026	Physical	$6,000
02 Nov 2026	13 Nov 2026	Physical	$6,000
02 Nov 2026	13 Nov 2026	Physical	$12,000
02 Nov 2026	13 Nov 2026	Physical	$9,000
02 Nov 2026	13 Nov 2026	Physical	$12,000
02 Nov 2026	13 Nov 2026	Physical	$12,000

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