Training Course on Coastal and Marine Remote Sensing Applications

Professional Development Training Course Outline

Category	GIS	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Training Course on Coastal and Marine Remote Sensing Applications outlines a specialized training course designed to equip professionals with cutting-edge **remote sensing** techniques for **coastal and marine environment** management. As global challenges like **climate change**, **coastal erosion** , and **marine pollution** intensify, the demand for **geospatial intelligence** and **Earth observation data** has become critical. This course provides a foundational yet practical understanding of how advanced remote sensing technologies, including **satellite imagery**, **LiDAR**, and **drone photogrammetry**, can be effectively applied to monitor, analyze, and inform decisions for sustainable **ocean and coastal ecosystems**.

Participants will gain hands-on experience with industry-standard **GIS software** and **data analysis platforms**, developing skills in **habitat mapping**, **bathymetry**, **sea-level rise impact assessment**, and **marine resource management**. The curriculum emphasizes practical applications, empowering attendees to leverage **big data analytics** and **AI/ML integration** for enhanced **environmental monitoring** and **disaster preparedness**. Through real-world case studies and interactive exercises, this course fosters the expertise necessary to address complex **oceanographic** and **coastal zone challenges**, contributing to robust **conservation strategies** and **sustainable development goals**.

Programme Curriculum

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Course Duration

5 days

Course Objectives

1. Master **Earth Observation (EO) data acquisition** for coastal and marine environments.
2. Apply **multi-spectral and hyper-spectral image processing** for feature extraction.
3. Utilize **Synthetic Aperture Radar (SAR)** for all-weather coastal monitoring.
4. Conduct **LiDAR data analysis** for high-resolution bathymetry and topographic mapping.
5. Perform **change detection analysis** of shorelines and coastal habitats using time-series imagery.
6. Assess **marine water quality parameters** (e.g., chlorophyll-a, turbidity) using satellite remote sensing.
7. Map and classify **benthic habitats** including coral reefs, seagrass, and mangroves.
8. Model and predict **sea-level rise impacts** and coastal vulnerability zones.
9. Integrate **drone technology** for high-resolution coastal mapping and rapid response.
10. Apply **machine learning (ML) and Artificial Intelligence (AI)** algorithms for automated data analysis in marine remote sensing.
11. Develop **Geographic Information System (GIS)** databases for coastal and marine spatial data management.
12. Conduct **oceanographic parameter retrieval** (e.g., Sea Surface Temperature, ocean currents) from satellite data.
13. Formulate **data-driven strategies** for sustainable coastal zone management and marine conservation.

Organizational Benefits

- Equip teams with data-driven insights for proactive environmental management and policy formulation.
- Reduce reliance on expensive and time-consuming in-situ surveys through widespread remote data acquisition.
- Facilitate early detection and monitoring of coastal hazards like erosion, pollution, and extreme weather events.
- Build in-house expertise in advanced geospatial technologies, minimizing outsourcing needs.
- Support effective conservation and sustainable exploitation of marine and coastal resources.

- Enable robust reporting and compliance with environmental regulations using verifiable remote sensing data.
- Foster a culture of innovation by integrating cutting-edge technologies like AI/ML in environmental analysis.

Target Audience

1. Environmental Scientists and Consultants
2. Marine Biologists and Ecologists
3. Coastal Zone Managers and Planners
4. GIS Professionals and Analysts
5. Researchers in Oceanography and Marine Sciences
6. Government Agency Staff (e.g., fisheries, environmental protection, disaster management)
7. NGO Professionals in Conservation and Development
8. Postgraduate Students in related fields

Course Modules

Module 1: Fundamentals of Coastal and Marine Remote Sensing

- Principles of electromagnetic radiation and spectral signatures in water.
- Overview of remote sensing platforms and sensors (satellite, airborne, drone).
- Understanding spatial, spectral, temporal, and radiometric resolution.
- Introduction to remote sensing software and data formats.
- **Case Study:** Delineating healthy coral reef systems using Sentinel-2 multispectral imagery in the Great Barrier Reef.

Module 2: Pre-processing and Image Enhancement

- Atmospheric correction techniques for aquatic environments.
- Geometric correction and georeferencing of marine imagery.
- Radiometric calibration and normalization for time-series analysis.
- Image enhancement techniques: contrast stretching, filtering, band combinations.
- **Case Study:** Correcting for glint and subsurface scattering in coastal imagery to improve water clarity mapping in tropical lagoons.

Module 3: Mapping Coastal Habitats and Land Cover

- Supervised and unsupervised classification methods for coastal land cover.
- Mapping mangrove forests, salt marshes, and seagrass beds using various sensors.
- Accuracy assessment and validation of classification results.
- Object-Based Image Analysis (OBIA) for detailed habitat mapping.
- **Case Study:** Mapping and monitoring the extent of critically endangered seagrass meadows in the Mediterranean Sea using high-resolution satellite data.

Module 4: Coastal Geomorphology and Shoreline Change

- Techniques for shoreline extraction and change analysis (DSAS tool).
- Monitoring coastal erosion and accretion using historical imagery.
- Application of LiDAR for high-precision coastal elevation models (DEMs/DTMs).
- Analysis of beach morphology and dune systems.
- **Case Study:** Assessing long-term shoreline retreat rates and coastal vulnerability for sandy beaches in West Africa using Landsat archives.

Module 5: Marine Water Quality Monitoring

- Retrieval of water quality parameters: Chlorophyll-a, Suspended Sediment Concentration (SSC), Colored Dissolved Organic Matter (CDOM).
- Algorithms and models for deriving water quality from satellite data (e.g., MODIS, OLCI).
- Detection and tracking of harmful algal blooms (HABs) and oil spills.
- Monitoring ocean turbidity and its impact on marine ecosystems.
- **Case Study:** Tracking the dispersion of river plumes and associated nutrient pollution in estuarine systems using MODIS and VIIRS data.

Module 6: Bathymetry and Seabed Mapping

- Satellite-Derived Bathymetry (SDB) principles and applications.
- Using multi-beam sonar data integration with remote sensing.
- Mapping seabed characteristics and substrate types.
- Identifying navigational hazards and submerged features.
- **Case Study:** Generating high-resolution bathymetric maps for shallow coastal areas for safe navigation and habitat identification using SDB techniques.

Module 7: Advanced Remote Sensing Technologies & AI/ML Integration

- Introduction to Synthetic Aperture Radar (SAR) for ocean surface monitoring
- Drone-based photogrammetry and LiDAR for high-resolution coastal surveys.
- Machine Learning for image classification and feature extraction
- Cloud-based remote sensing platforms (e.g., Google Earth Engine, AWS).
- **Case Study:** Utilizing deep learning models to automatically detect and quantify marine plastic debris from satellite imagery in coastal waters.

Module 8: Applications in Coastal Zone Management & Conservation

- Remote sensing for Marine Protected Area (MPA) planning and monitoring.
- Assessing climate change impacts: sea-level rise, ocean acidification, coastal flooding.
- Disaster risk reduction and emergency response in coastal areas.
- Integration of remote sensing with GIS for integrated coastal zone management (ICZM).
- **Case Study:** Using remote sensing data to assess the impact of a major hurricane on coastal infrastructure and natural habitats, informing post-disaster recovery efforts.

Training Methodology

- Interactive Lectures
- Software Demonstrations
- Practical Labs.
- Case Studies Analysis.
- Group Discussions
- Project-Based Learning.
- Expert-Led Mentorship.

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
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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