Data Analysis In Meteorology and Oceanography

For Whom: For Meteorologists & Oceanographers and other related fields.

Course Description:

The course provides a basic introduction to the statistical methods commonly applied in oceanography and meteorology. This includes descriptive statistic, hypothesis testing, and probability distribution. The course will further contain frequency analysis and filtering of time series, and methods for identifying spatial coherences such as linear regression, correlation analysis, and empirical orthogonal functions.

Course Objective:

By the completion of this course, the student should be able to:

1. Repair and systemize observational and modeled data for statistical analysis,
2. Compute and describe basic statistical properties,
3. Apply and understand regression and correlation analysis.
4. Perform hypothesis testing,
5. Obtain and interpret the spectrum for a time series,
6. Deduce the spatial structure of data,
7. Synthesize the result of analyzes in a scientific report.

Course Contents:

1. Data Acquisition and Recording,

2. Data Processing & Data Presentation,
3. The Spatial Analyses of Data Fields,
4. Time-series Analysis Methods.

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted at AAST&MT and EMA or at your firm.

Cost: Please contact us for a detailed quotation.

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Atmospheric & Ocean Modeling

For Whom: Training for Oceanographers & Meteorologists.

Course Description:

The numerical methods, formulation and parameterizations used in models of the circulation of the atmosphere and ocean will be described in detail. Widely used numerical methods will be the focus but we will also review emerging concepts and new methods. The numeric underlying a hierarchy of models will be discussed, ranging from simple GFD models to the high-end GCMs. In the context of ocean GCMs, we will describe parameterization of geostrophic eddies, mixing and the surface and bottom boundary layers. In the atmosphere, we will review parameterizations of convection and large scale condensation, the planetary boundary layer and radiative transfer.

Course Objective:

After completing this training, the learner should be able to do the following things:

Course Contents:

1. The finite difference method
2. Spatial discretization and numerical dispersion
3. Series expansion methods
4. Time-stepping methods
5. Space-time discretization

6. Discretization in more than one dimension
7. Shallow water dynamics and numerical dispersion
8. Barotropic models
9. Quasi-geostrophic equations
10. Quasi-geostrophic models
11. Eddy parameterization
12. The primitive equations
13. Vertical coordinates
14. Boundary layer parameterizations
15. Parameterizing geostrophic eddies
16. Overview and summary of GCM issues

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT and EMA or in your company.

Cost: Please contact us for a detailed quotation.

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Tides and Currents for Mariners

For Whom: Training for Oceanographers & Meteorologists.

Course Description:

Ocean tides and currents profoundly impact coastal maritime operations. Predicting and measuring tides and currents is important for things like getting cargo ships safely into and out of ports, determining the extent of an oil spill, building bridges and piers, determining the best fishing spots, emergency preparedness, tsunami tracking, marsh restoration, and much more.

This training provides an introduction to the origin, characteristics, and prediction of tides. After introducing common terminology, the training examines the mechanisms that cause and modify tides, including both astronomical and meteorological effects. A discussion of tide prediction techniques and products concludes the module. This module includes rich graphics, audio narration, embedded interactions, and a companion print version.

This training discusses the origin of ocean currents in both the open ocean and in coastal areas. The training focuses on the driving mechanisms for currents, along with influences that modify existing currents. Driving mechanisms include wind, horizontal density differences, and tides, while modifying effects include friction, bathymetry, and the Ekman spiral. The training concludes with a demonstration of data products and a brief overview of forecast considerations.

Course Objective:

After completing this training, the learner should be able to do the following things:

1. List and define terms used to describe tides.
2. List and define the forces that cause and modify tides.
3. Define tidal constituents.
4. Describe tidal datum and why it is important.
5. Ability to calculate tidal conditions
6. Identify the locations of the major and minor ocean currents and describe their origin.
7. List the factors that cause ocean currents.
8. Describe how each factor influences ocean currents.
9. Characterize open-ocean currents in terms of temperature, volume (transport), and speed.
10. Describe the origin of strong horizontal and vertical temperature, salinity, and density gradients in both open Ocean and coastal ocean environments.
11. Describe the effects of friction, bathymetry, and Coriolis force on ocean currents in both open Ocean and coastal ocean environments.
12. Explain the role of ocean currents in the global distribution of heat (i.e., the earth's heat budget).

Course Contents:

1. Introduction.
2. Astronomical Tides: Earth-Moon System.
3. Other Astronomical Effects.
4. Actual Tidal Variability.
5. Tide Prediction Methods.
6. Nautical publications on tides and currents and information which can be obtained via internet and email.
7. Open Ocean Currents.
8. Coastal Currents.
9. Measurement Techniques.

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT and EMA or in your company.

Cost: Please contact us for a detailed quotation.

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Introduction to Observational Physical Oceanography

For Whom: This course is available to all Oceanographer & Meteorologists. It is, as advertised, an introduction to physical oceanography that is intended for students who have had little or no experience in ocean science.

Course Description:

Observational oceanography aims to study the status and the variability of circulation and water masses in the ocean in an interdisciplinary context. To understand the observed variability is a major prerequisite to explain the role of the ocean in the global climate system. Physical conditions strongly influence life in the ocean and consequently the CO2 cycle.

The observations include long-time series which allow detecting variations on climatic time scales and well-focused process studies to understand the interactions of fluctuations on different scales. The data are needed to validate and improve models to predict future change.

This course is an introduction to the results and the methods of observational physical oceanography, a very rapidly developing field. Rapid development is a response to the pressing societal need to understand how the physical state of the oceans might be changing as part of a changing Earth climate — **are the oceans warming? Is the ocean circulation slowing?** Rapid development on these and other questions is made possible by new technology, e.g., satellite measurement

systems and autonomous floats and gliders that enable more efficient and more comprehensive observation of the ocean.

Course Objective:

The broad goal of this course is to understand how the oceans contribute to Earth's climate and biosphere by storing and transporting properties and materials, e.g., heat (energy) and nutrients. Four specific objectives are to:

1. Know (be able to interpret) the large-scale distributions of the ocean's physical properties, e.g., temperature, salinity and currents, and how these are observed.
2. Understand (be able to explain) the basic principles of ocean physics, e.g., equation of state of sea water, consequences of stratification, effects of Earth's rotation, transport by mean and fluctuating ocean currents.
3. Learn how to estimate ocean processes from the observations, e.g., meridional heat transport by geostrophic and Ekman layer currents.

Course Contents:

1. An introduction to Physical Oceanography and to this course.
2. Temperature, salinity and density.
3. Air-Sea interaction.
4. Conservation equations and transport processes of the ocean circulation.
5. Momentum balances, geostrophic and the large scale circulation of the upper ocean.
6. Wind-driven circulation.

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT and EMA or in your company.

Cost: Please contact us for a detailed quotation.

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Basic Maritime Meteorology

For Whom: Training for able seamen upgrading to 3rd/2nd Mate.

Course Description:

The goal of this training course is to provide trainees with knowledge, understanding and proficiency in Meteorology at the Operational Level for Officers in Charge of a Navigational Watch. It provides students with knowledge of the characteristics of various weather systems, reporting procedures and recording systems and onboard meteorological instruments. Attendees will gain the ability to apply the meteorological information available.

This course satisfies the following STCW95 training requirements: Table A-II/1 of the STCW Code for Officer in Charge of a Navigational Watch on vessels of 500 or more gross tonnage

Course Objective:

By the end of this course the candidate should be able to:

1. Read weather maps and analyze the prevailing weather.
2. Understand the relationship between surface pressure, temperature and wind.
3. Forecast the weather expected in the near future.
4. Predict the movement of weather systems such as lows, TRS etc. so as to be able to take avoiding action in proper time.
5. Route the vessel optimally utilizing data obtained from routing charts, Ocean Passages of the World, weather facsimile charts and weather reports.

6. Utilize the advice provided by Commercial Ocean routing services to best advantage.

Course Contents:

1. Ship-borne Meteorological Instruments
2. The Atmosphere, its Composition and Physical Properties
3. Atmospheric Pressure
4. Wind
5. Cloud and Precipitation
6. Visibility
7. The Wind and Pressure Systems over the Oceans
8. Structure of Depressions
9. Anticyclones and other Pressure Systems
10. Weather Services for Shipping
11. Recording and Reporting Weather Observations
12. Weather Forecasting

Course Duration: 10 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT or in your company.

Cost: Please contact us for a detailed quotation.

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Oil Spill Risks, Effects and Cleanup

For Whom: The course provides training to environmental officers from industry, national government departments, harbor authorities/port operations, local, municipal and regional authorities, non-governmental organizations, environmental consultants, and others involved in ensuring healthy and productive marine environment.

Course Description:

When oil is spilled into the sea it undergoes a number of physical and chemical changes, some of which lead to its removal from the sea surface, whilst others cause it to persist. Although spilled oil is eventually assimilated by the marine environment, the time involved depends upon factors such as the amount of oil spilled, its initial physical and chemical characteristics, the prevailing climatic and sea conditions and whether the oil remains at sea or is washed ashore.

Course Objective:

After completing this training, the learner should be able to do the following:

1- Understanding of the processes involved and how they interact to alter the nature, composition and behavior of oil with time is fundamental to all aspects of oil spill response.
2- Describing the combined effects of the various processes acting on spilled oil and the implications for cleanup response.
3- Overview of different weathering processes.

4- Obtain open knowledge about how to measure volume of oil spill.

5- Increasing the awareness for mitigating and minimizing the risks for oil spill.

6- How do oil spill damage the environment?

Course Contents:

- Oil spill terminology
- Properties of oil
- Potential pathways for oil to each bottom sediments
- Weathering process (Spreading, Evaporation, Dispersion, Dissolution, Emulsification, oxidation, Sedimentation, and Biodegradation)
- Implications for clean-up and contingency planning
- Mechanical Recovery: Skimmers and Separators
- Prevention
- Environmental Sensitivity Index (ESI) mapping
- Estimating the volume of a spill
- Effects of oil spill on human health, navigation and wildlife

Practical Part:

- Differentiation between oil spills
- Calculation of specific gravity or relative density of oil
- Calculation of wind speed and current velocity to predict how oil drift
- Drawing wind, current, and wave rose by using WRPLOT program (Wind rose program)

Computer Usage:

- Display properties of oil spill
- Display cleanup and recovery techniques

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT or in your company.

Cost: Please contact us for a detailed quotation.

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Marine Pollution

For Whom: The course provides training to environmental officers from industry, national government departments, harbor authorities/port operations, local, municipal and regional authorities, non-governmental organizations, environmental consultants, and others involved in ensuring healthy and productive marine environment.

Course Description:

Marine environments are subject to increasing threats from pollution. A failure to monitor the marine environment of the coastal zone and recognize and deal with the effects of marine pollution result in negative impacts at all levels of economic activity, from artisanal and subsistence uses of marine resources to commercial fisheries, fish processing, aquaculture operations and tourism.

Pollution of marine environments is a global issue threatening the health and productivity of the world's oceans. Such pollution arises from both land- and sea-based activities, including storm water, sewage and industrial discharges, marine litter, illegal dumping, oil spills, etc. In many cases, although national legislation aimed at minimizing and mitigating marine pollution exists, there is a shortage of capacity of training professionals to develop management and contingency plans, and to implement these.

Course Objective:

After completing this training, the learner should be able to do the following:

1- Can accurately define marine pollution and their sources and effects ,

2- Distinguish between point and non-point sources of pollution,

3- Obtain open knowledge about how to measure and analysis different marine pollutants,

4- Increasing the awareness for mitigating and minimizing the risks for marine pollution

5- What may result when marine pollution occurs?.

Course Contents:

- Definition of marine pollution
- Pathways of marine pollution
- Types of marine pollution
- Sources of marine pollutants
- Point and non-point source pollution
- Impacts of marine pollution
- Cost of marine pollution
- Environmental low of marine pollutants
- Marine pollution convention
- Solutions of marine pollution
- Adaption and mitigation
- Case studies for marine polluted areas in Egypt

Practical Part:

- Determination of physical parameters of seawater
- Measuring of marine nutrients
- Analysis of organic pollutants
- Analysis of petroleum hydrocarbons

- Methodology for heavy metals
- Measuring of toxic metals

Computer Usage:

- Display different marine pollutants
- Case studies displaying

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT or in your company.

Cost: Please contact us for a detailed quotation.

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Wave Analysis & Forecasting

For Whom: This course is available to all Oceanographer & Meteorologists.

Course Description:

An introduction to ocean surface waves, including: Dispersion relation, group velocity, and ray tracing, Sources of wave energy, Wave measurement and prediction, Tsunamis, Shoaling waves, breaking waves, Long-shore currents.

Course Objective:

After completing this training, the learner should be able to do the following things:

1- Define ocean waves & its characteristics.
2- Describe how the ocean waves generated.
3- Understand how the ocean waves are forecasted.
4- Describe the types of ocean models.
5- Analyze wave data.

Course Contents:

1- An Introduction to Ocean Waves.
2- Ocean Surface Winds.
3- Wave Generation and Decay.
4- Wave Forecasting by Manual Methods.
5- Introduction to Numerical Wave Modeling.

6- Operational Wave Models.
7- Waves in Shallow Water.
8- Wave Data, Observed, Measured and Hindcast.
9- Wave Climate Statistics.

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT and EMA or in your company.

Cost: Please contact us for a detailed quotation.

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Using GIS to safely and effectively navigate shipping movements

For Whom: Training for port administrators.

Course Description:

The use of the Geographic Information System (GIS) is vital for the continual operation and maintenance of the harbor and to assist with any future developments

Course Objective:

After completing this training, the learner should be able to do the following:

1- Can accurately direct all shipping movements.
2- Quick, up to date and straightforward interpretation of large amounts of data,
3- Improved safety measures, mapping ship movements aids with the compliance of Health & Safety Regulations.
4- Using GIS enables Port Operations to meet the specific need of their customers.
5- More effective operations of the Port.

Course Contents:

- Fundamentals of GIS
- GIS required functions
- Coordinate system and map projection

- Remote sensing and satellite imagery
- Data model (Vector data)
- Data model (Raster data)
- Topology data structures
- Topology data relationships
- Input geospatial data
- Required hardware and software
- GIS project

Practical Part:

- GIS as a multidisciplinary sciences
- Computer system for GIS
- Map design
- Map digitizing
- Map projection
- Satellite image analysis
- Satellite image classification
- Design of special data base
- Project

Computer Usage:

- Maps and map projection
- ARC View – for training on GIS functions
- ESRI software for image processing and classification

Course Duration: 10 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT or in your company.

Cost: Please contact us for a detailed quotation.

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Fundamental Concepts of GIS

For Whom: Individuals with no GIS background or experience who want to learn the basic features of a GIS and a geographic approach to solving problems.

Course Description:

This course provides a foundation for understanding what a geographic information system is and the possibilities it offers for discovering patterns, relationships, and trends. You will learn how GIS maps are different from other types of paper and digital maps, what makes the data used in a GIS unique, and how to use GIS software to obtain information and create meaningful maps.

Course Objective:

After completing this training, the learner should be able to do the following things:

1. Describe components of GIS.
2. Explain GIS data models and spatial relationships.
3. Describe software environment (Open Source or any other) and demonstrate its functionality.
4. Display geographic data on a GIS map.
5. Query a GIS database to gain information and locate features.
6. Understand different types of spatial relationships among real-world features.
7. Use analysis tools to create new data.
8. Apply a standard approach to solving geographic problems.

Course Contents:

1. GIS Definition and Categories.
    a. Geographic Information System.
    b. GIS History.
2. Data in GIS.
    a. Spatial and Attribute.
    b. Geo-referencing Data.
    c. Raster and Vector.
    d. Layers of Data.
3. Querying a GIS database.
4. Integrating data with GIS.

Course Duration: 3 working days. **A customized version of this generic training extends up to 80 hours, which includes hands on case studies and a role-based group project work.**

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT or in your company.

Cost: Please contact us for a detailed quotation.

Programs in GIS are tailored to meet industry needs. Modular in structure, the pedagogical foundations of program content and delivery offer flexibility, and hinge upon experiential learning through practice-driven case studies and project work.

The programs offered can be customized to meet specific client needs, and are driven through Open Source GIS Software as well as standard industry products.

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Introduction to Marine Geographic Information Systems (GIS)

For Whom: Training for Oceanographers.

Course Description:

This course is an intensive, hands-on tutorial in the use of Geographic Information System software to assemble and analyze coastal and marine data for environmental assessment, research or management purposes. Pre-course reading assignments will provide the fundamental background information for the course, but the heaviest emphasis is on the practical exercises themselves, instead of theory.

Course Objective:

After completing this training, the learner should be able to do the following:

1. Basic concepts/definitions for Geographic Information Systems (GIS)
2. Vector and grid objects that can be mapped
3. Where to find desired m-ap objects online or from published digital sources
4. Necessary conversions between native data formats and formats required by GIS
5. Major collections of GIS data, and catalogs of collections
6. Making “base maps” from coastline and global relief data (vector or gridded)

7. Adding desired socio-economic, physical, and cultural features to base maps
8. Adding polygons of named marine “regions” to maps, from published sources
9. Adding vector arrow visualizations of winds and currents to GIS collections
10. Finding and adding climatological data to maps:
    a. Hydrosphere
    b. Geosphere
    c. Atmosphere
    d. Biosphere
11. Finding and adding synoptic data to maps, when available
12. Methods to edit global data layers down to desired “area of interest” polygons
13. Methods to create new, high resolution vector layers for coasts and other important physical features
14. Methods to find an assimilate remote-sensing imagery into GIS collections
15. Making “standard” products for publications and dissertations
16. Additional topics in operational oceanography, as time permit
17. Synthesis of ensemble GIS products into coherent PPT presentations that meet marine community standards for legibility and understandability

Course Contents:

Lectures:

- Fundamentals of GIS
- GIS required functions
- Coordinate system and map projection
- Remote sensing and satellite imagery
- Data model (Vector data)
- Data model (Raster data)
- Topology data structures
- Topology data relationships
- Input geospatial data
- Required hardware and software
- GIS project

Practical Part:

- GIS as a multidisciplinary sciences
- Computer system for GIS
- Map design
- Map digitizing
- Map projection
- Satellite image analysis
- Satellite image classification
- Design of special data base
- Project

Computer Usage:

- Maps and map projection
- ARC View – for training on GIS functions
- ESRI software for image processing and classification

Course Duration: 5 working days.

Number of Participants: The minimum number of participants is 6.

Location: Course can be conducted in AAST&MT or in your company.

Cost: Please contact us for a detailed quotation.

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