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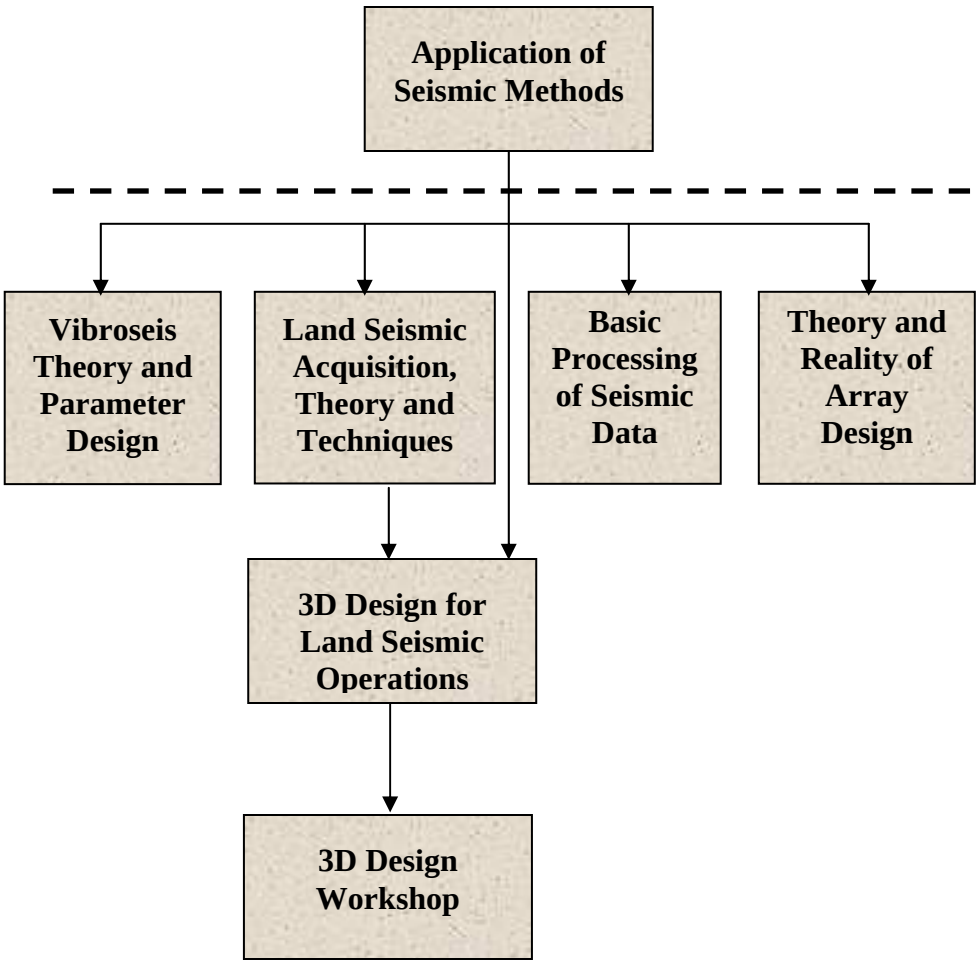
SUGGESTED COURSE FLOW

COURSE FLOW **WHO SHOULD ATTEND:**



Non-geophysicists or Junior geophysicists

Experienced geophysicists and/or those who have taken the Application of Seismic Methods course.

Experienced geophysicists and those who have taken either the Application of Seismic Methods or the Land Seismic Acquisitions course.

Experienced geophysicists who have taken the 3D Seismic Acquisition course.

COURSE DESCRIPTIONS

"Application of Seismic Methods". Is an overview of reflection seismic methods that lasts 5 days and is for non-geophysicists or junior geophysicists who are interested in a good understanding of the seismic tool. The interplay of acquisition, processing and interpretation is emphasized. Some of the areas covered are: basic background geology, rock properties, resolution and bandwith, energy loss mechanisms, the receiver, energy source, correlation and vibroseis, design of vibroseis parameters, convolution and deconvolution, the CDP method and stacking charts, basic processing, aliasing, instrumentation, array theory and evaluation of noise, 3D design and case histories.

"Seismic Overview for Managers and Non-Geophysicists" This two-day course is the newest addition to our training services. It was developed for those who need an overview of the seismic tool but cannot devote too much time in the classroom. The topics covered are waves and wavefields, bandwidth, resolution vs. detectability, limits of seismic, types of noise, geometry, basic processing corrections, interpretation basics, and the value of seismic.

"Land Seismic Acquisition, Theory and Techniques". It is a two-day course in 2D acquisition tools and methods designed for the experienced geophysicist. It reviews technical and operational considerations to optimize programs for your exploration targets. Each program parameter is discussed and its impact on the success of the program is examined. An appreciation of the impact of field techniques on the quality of the final interpreted product will be emphasized. In more depth, some of the subjects discussed are: the energy source, receivers, CDP Method and stacking charts, instrumentation, spatial sampling and aliasing, evaluation of noise and array designs, and what to do during the field visit. This course also offers a half-day workshop in 2D parameter determination. It is assumed that participants have a thorough understanding of and experience using the seismic method.

"Vibroseis Theory and Parameter Design". Is a two-day course for experienced geophysicists, Vib technicians and those who have taken the Application of Seismic Methods course, that provides an overview of the myriad of parameters available in modern vibroseis programs. The significance of each parameter is discussed and guidance is provided for optimizing parameters for your objectives. This course also reviews the physical and electronic construction of the vibrator system, the correlation technique, sweep effort and production time, tapers, non-linear sweeps, dual source vibroseis, as well as modern techniques such as HI-FI and slip sweep. By developing a sound understanding of the working of vibrators, participants will gain an appreciation for the techniques used to quality control vibroseis operations.

"3D Design for Land Seismic Operations". Develops a logical sequence of procedures used to determine the optimum 3-D parameters to meet your exploration objectives. The success of 3-D programs depends a great deal on achieving the correct spatial and statistical sampling of the wavefield taking into consideration the realistic implementation of the design. The areas studied in this two day course are: overview of the 3D technique, considerations of the geology and the seismic program, 3D design, fold, offset considerations, line spacing, bin size, skids and offsets, 3D model types, channel requirements, array theory, advanced 3D techniques and case histories. This course is recommended for experienced geophysicists.

“3-D Design Workshop” The purpose of this one-day workshop is to provide the students with the hands-on experience required to design 3D surveys. From beginning to end the participants will be guided throughout the complex task of determining the best design parameters for orthogonal and MegaBin surveys based on the exploration objectives such as the zones of interest, surface limitations, seismic acquisition, economics, etc using Mustagh’s DirectAid software. It is recommended for geophysicists experienced in 3D design who have taken the 3D Seismic Acquisition course.

“Theory and Reality of Array Design for 2D and 3D Seismic Programs” This half-day seminar is prompted by the controversy over the benefits and detriments of arrays in modern seismic programs. It will provide a discussion of all aspects of array implementation with specific regard to the impact on both signal and noise. A review of theory will be complemented by practical considerations and guidelines for field operations will be addressed. Various aspects will be covered, including geophone arrays (potted vs. distributed), vibroseis arrays, digital sensors and arrays in a 3-D world. Participants will receive a handy software tool for signal and arrays analysis.

“Basic Processing of Seismic Data” It is a 4 day course that covers the basics of seismic signal processing. It offers an overview of seismic concepts, signal and noise analysis of shot records, first breaks and datum corrections, stacking charts and CDP method, deconvolution, velocity analysis, surface consistent statics, F-K transforms and filters, and post and pre-stack migration. This course is suggested for those wanting a familiarity with seismic processing and is not intended as a training ground for processors.

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3D Seismic Design and Quality Control for Land Acquisition

2-DAY COURSE OUTLINE

Day One

1. **Overview and Introduction (8:00-8:30)**
   Introduce Mustagh and instructor(s)
   Introduce participants and background

2. **Review of Basic Concepts (8:30-10:00)**
   Stacking and Random Noise
   Bandwidth and Resolution
   The Seismic Wavefield
   Spatial sampling at the surface
   Sparse sampling of wavefield
   Case history 2D vs 3D

   - 15 Minute Coffee Break -

3. **Types of Noise (10:15-12:00)**
   Random – time variant
   Source Generated – offset variant
      Trapped Mode
      Guided waves
      Scattered surface waves
      Ground Roll
      Shear converted surface waves

   - 1 Hour Lunch Break -

4. **Basic 3D Grid (1:00-2:30)**
   Definition of terminology
   Coverage with single shot
   Basic building blocks – 1 fold
   Fold, Bin Size and Trace Density
   Example of how Fold can be mis-leading
   Development of 3D fold equation
   Offset Limited Fold

   - 15 Minute Coffee Break -

5. **Examples of Design (2:45-3:30)**
   Modeller versus Designer
   2D versus 3D considerations
      Full offset
      Limited offset
      2D vs 3D consequences

6. **Aspect Ratio (3:30-5:00)**
   Bin Size versus Statistics
   “Analogue” statistical patterns
   Box Size versus Statistics
   Aspect Ratio
      Imaging considerations
      Operational considerations
      Cost considerations

Day Two

7. **Geometry Imprinting (8:30-9:30)**
   Statistical patterns
   Patterns due to perturbation
   Skid and Offset guidelines
   Examples

8. **LiDAR (9:30-10:00)**
   As a mapping and planning aid
   Analogy to 3D Philosophies

   - 15 Minute Coffee Break -

9. **Model Types (10:15-12:00)**
   Three Orthogonals
   Two Bricks
   Two Diagonals
   Random
   Available statistics
      Fold, Midpoint Scatter
      Deviation in Offset
      Missing Offsets
   Data Simulation

   - 1 Hour Lunch Break -

10. **Design Considerations (1:00-2:30)**
    Overall Size and Shape
       Rolling the Patch
       Recording limitations
       Migration margin and artefacts
    Deciding on the Desired Fold
       Basic Structure
       Wavelet Analysis
       AVO
       AVA
       Structural Complexity
       Noise

    - 15 Minute Coffee Break -

11. **More Design Considerations (2:45-4:30)**
    Offset Considerations
    Source / Receiver line spacings
       Flared Grids?
    Bin Size
    Bin geometry and mid-point scatter
       Migration
       Pre-Stack Migration
       Limits of Spatial Resolution
       Spatial sampling of 3D operators

12. **Case History and Wrap-up (4:30-5:00)**

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LAND SEISMIC ACQUISITION, THEORY AND TECHNIQUES
COURSE OUTLINE

- **Introduction**
  - The Fundamental Seismic Principle
  - Resolution and Bandwith
  - Energy Loss Mechanisms

- **The Energy Source**
  - Desired source qualities
  - Dynamite
    - Conventional, Poulter
    - Other surface charges
  - Vibroseis
    - Structure of a typical vibrator unit
    - Servo-valve power stage
    - Ground force signal, Correlation
  - Airgun
    - In water, On land
  - Others
    - P-Shooter, Hydra-Pulse, Vacu-Pulse
    - Betsy, Mini-Sosie, Marthor

- **The Receiver**
  - Desired receiver qualities
  - The geophone
    - Frequency, Damping, Coupling
  - The geophone string
    - Electrical advantage
    - Statistical advantage
    - Superposition advantage
    - Spatial anti-alias filter
    - Determination of coherent noise

- **CDP Method and Stacking Charts**
  - The superposition principle
  - The Multi-channel record
  - Calculation of nominal fold
  - Stacking charts
  - Bent lines

- **Analogue, Digital and Aliasing**
  - Analogue signal recording
  - Digital signal recording
  - Aliasing in time

- **Seismic Instrumentation**
  - Need for greater dynamic range
  - Basic structure of IFP instruments
  - Distributed telemetry systems
    - Cables losses, Advantages, Disadvantages
  - Delta Sigma systems
    - Delta Sigma and noise shaping
    - 2^{nd} order modulator
    - Delta Sigma and decimation filtering
    - Delta Sigma and 24-bit recording
    - Delta Sigma and dynamic range
  - ARAM, I/O, Sercel
  - I/O Digital sensor
  - Instrument tests and quality control

- **Spatial Sampling and Aliasing**
  - The seismic record in space
  - F-K plots and geophone intervals
  - Geophone arrays as spatial anti-alias filter
  - F-K filtering

- **Review of the Seismic Record**
  - Direct wave, refractions and other linear events
  - Reflections and multiples, velocity analysis
  - Other noise events
  - Offset considerations

- **Trapped Mode**

- **Evaluation of Noise**
  - Assorted noise
  - Ghost
  - Charge seize and depth tests
  - Random noise and determination of fold
  - Analysis of coherent noise
  - Array Theory
    - Signal to noise ratio in the wave number domain
    - Simple linear array design
    - Effective array length
    - Array response
    - Spatial convolution of linear arrays
    - Vibrator arrays
  - Estimating signal wavelengths
    - Apparent wavelength vs offset plus frequency
    - 3D Response In Line, Cross Line, Combined
  - Ghosting in the dynamite signature

- **What to do in the Field Visit**
  - In the dog-house

- **½ Day Workshop**
  - Parameter determination

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BASIC PROCESSING OF SEISMIC DATA
COURSE OUTLINE

- **Introduction**
- **Overview**
  - Review of basic seismic principles
  - Sampling the wavefield
  - Aliasing in time and space
  - Bandwidth, phase and resolution
  - Energy loss mechanisms
  - 3D basics
  - Acquisition tools and techniques
  - Land versus Marine
  - Recent developments
- **Modeling**
  - Synthetic seismograms
  - Ray tracing
  - Full Wave Equation models
    - Acoustic
    - Elastic
    - Anisotropic
- **Review of some shot records**
  - What is signal?
  - What is Noise?
    - Random, time variant
    - Source variant
    - Receiver variant
    - Offset variant (source generated)
  - Multiples
    - Marine
    - Land
  - Trapped Mode
  - Guided waves
- **First Breaks and LVL**
  - Direct waves
  - Refractors
  - LVL and datum corrections
  - Detailed refraction surveys
  - Uphole surveys
  - Survey tolerances
- **CDP Method**
  - Basic principles
  - Stacking charts
  - Bent line processing and binning
  - Stack array
  - Gaps, skids and offsets
- **Gain Recovery**
  - Exponential
  - AGC
  - Surface consistent
  - AVO considerations
- **Deconvolution**
  - Convolutional model
  - Basic deconvolution
  - Prewhitening
  - Operator length
  - Surface Consistent
  - AVO considerations
- **Velocity Analysis**
  - NMO
  - Semblance
  - Common offset stacks
  - Common velocity stacks
  - Stretch mute
  - Multiples
  - High order moveout
  - Anisotropy and eta terms
  - AVO considerations
- **Statics**
  - Surface consistent
  - Iteration
  - Non-surface consistent
  - Correlation Trim statics
- **Filtering and Noise Suppression**
  - Temporal
  - Spatial
  - Geophone arrays as spatial anti-alias filters
  - F-K filtering
    - Filtering of well sampled data
    - Problems of filtering sparsely sampled data
    - Mild filtering to pass all signal
    - Harsh filtering to attenuate all noise
  - FX Prediction and Projection
  - Karhunnen-Loeve (Eigen filtering)
  - AVO friendly verus non-friendly methods
- **Migration**
  - Basic Principles and Kirchoff methods
  - Migration velocities
  - Aperture
  - FK (Stolt)
  - Finite Difference
  - Post-Stack
  - Pre-stack Time
    - Migration to gathers
    - Migration to non-natural bins
  - Depth Imaging
- **Other considerations**
  - Spectral Balancing
  - Inversion
  - AVO applications
  - AVA applications
  - Converted waves
  - VSPs
- **Case Histories**
  - 3D Seismic and Horizontal Drilling
  - 3D Seismic Out of Plane Resolution
  - Unnecessary dry holes

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VIBROSEIS THEORY AND PARAMETER DESIGN
COURSE OUTLINE

- **Introduction**
- **The Fundamental Seismic Principle**
  - Average velocity
  - Modes of acoustic energy propagation
    - Compressional wave, Shear wave
    - Raleigh wave, Others
  - Rock properties
    - Interval velocity
    - Density
    - Poisson's ratio
  - Propagation of a P-wave
  - A simple seismic experiment
  - A basic reflection model
    - Effect of wavelet length
    - Effect of signal to noise ratio
- **Basic Signal Theory**
  - Properties of the cosine wave
  - Fourier decomposition
  - The effect of phase
  - The effect of amplitude
  - Principles of filtering
- **Resolution and Bandwith**
  - Simple wedge model – variable bandwith
  - Simple wedge model – variable phase
  - Simple wedge model – variable signal/noise ratio
  - Bandwith
- **Energy Loss Mechanisms**
  - Reflection coefficients and transmission losses
  - Mode conversion and energy partition
  - Spherical divergence
  - Absorption
- **The Energy Source**
  - Desired source qualities
  - Dynamite vs Vibroseis
  - Vibroseis – Structural aspects
  - Vibroseis – Hydraulic aspects
  - Vibroseis – Electrical aspects
  - Vibroseis – Signal theory
- **Correlation and Vibroseis**
  - Overview of correlation
  - Sweep length and noise
  - Noise suppression tools
    - Sweep length
    - Number of sweeps
    - Noise edit algorithms
    - Number of vibrators
    - Array effect
  - Types of noise
  - Balancing sweep effort with production time
    - Sweep effort
    - Pad time
    - Sweep length vs number of sweeps
    - Number of sweeps vs daily production
    - Sweeps vs vibrators
  - Tapers
    - Effect on sidelobes
    - Effect on signal energy and bandwith
    - Tapers as filters
    - Effect on machinery
  - Non-Linear sweeps
    - Linear vs +3 dB/oct Hi-Dwell non-linear sweep
    - +3 dB/oct with tapers
    - +6 dB/oct with tapers
    - -3 dB/oct with tapers
    - Comparison of linear, +3dB/oct & +6 dB/oct sweeps
    - Linear vs Non-linear sweeps –Effect on tapers
    - Linear, +3dB/oct, +6dB/oct and star tapers
    - Linear, +3dB/oct, +6dB/oct and sweep rate
    - Linear, +3dB/oct, +6dB/oct vs –3dB/oct
  - Vari-Sweep
  - Coupling
    - Upsweep vs downsweep
    - Effect of coupling
  - Time delay to onset a distortion
  - Harmonic distortion
  - Benefits of sweep length
  - SerQC plots
- **Evaluation of Noise**
  - Analysis of coherent noise
  - Array Design
    - Simple linear array design
    - Optimizing a two sub-array system
    - Optimizing a three sub-array system
    - Spatial convolution and sub-arrays
- **Trapped Mode and Guided Waves, A common noise problem**
- **Dual Source Vibroseis**
  - Plus-Minus method
  - Up-Down method
  - Vari-Sweep
  - Dual sourcing (Ping-Pong)
  - Slip sweep
- **Sei-Fi Technology**
  - Introduction
  - Data Acquisition: Techniques and equipment
  - Data Processing: Separation and Inversion
  - Pre-stacked and stacked data examples
  - summary

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APPLICATION OF SEISMIC METHODS
COURSE OUTLINE

- **Introduction**
- **Basic Background Geology**

Composition of the earth and crustal rock types
Sedimentary basins – The layer cake model
Some basic structures in a sedimentary basin
Fluid migration and hydrocarbons traps
Typical hydrocarbon trap types

- **The Fundamental Seismic Principle**

Average velocity; the time distance translator
Modes of acoustic energy propagation
    Compressional wave, Shear wave
    Raleigh wave, Others
Rock properties
    Interval velocity, Density, Poisson's ratio
Propagation of a P-wave
A simple seismic experiment
    A basic reflection model
    Effect of wavelet length and signal to noise ratio

- **Basic Signal Theory**

Properties of the cosine wave
Fourier decomposition, The effect of phase
The effect of amplitude, Principles of filtering

- **Resolution and Bandwith**

Simple wedge model – variable bandwith
Simple wedge model – variable phase
Simple wedge model – variable signal/noise ratio
Bandwith

- **Energy Loss Mechanisms**

Reflection coefficients and transmission losses
Mode conversion and energy partition
Spherical divergence, Absorption

- **The Energy Source**

Desired source qualities
Dynamite
    Conventional,
Vibroseis
    Structure of a typical vibrator unit

    Ground force signal
    Correlation & basic sweep theory
        Basic correlation of a linear sweep
        Effects of sweep length and noise
Airgun
    In water, On land
Others
    P-Shooter, Hydra-Pulse, Vacu-Pulse
    Betsy, Mini-Sosie, Marthor

- **The Receiver**

Desired receiver qualities
The geophone
    Frequency, Damping, Coupling
The geophone string
    Electrical, statistical & superposition advantages
    Spatial anti-alias filter
    Determination of coherent noise

- **Convolution and Deconvolution**

The synthetic model, Convolution
The synthetic seismogram and dispersion
Deconvolution

- **CDP Method and Stacking Charts**

The superposition principle
The Multi-channel record
Calculation of nominal fold
Stacking charts, Bent lines

- **Basic Processing**

Geometry, Stacking charts, Gathers
First breaks and LVL statics, Deconvolution
Reflection and multiples, Velocity analysis
Surface consistent statistics and other algorithms
Trim statics, Stack, Migration aperture

- **Analogue, Digital and Aliasing**

Analogue signal recording, Digital signal recording
Aliasing in time

- **Seismic Instrumentation**

Earth absorption
Need for greater dynamic range
Basic structure of IFP instruments
    Successive approximation A-D converter
        Dynamic range of A-D converter
    IFP amplifier, Multiplexer
    Analogue filters
        Hi Pass filter, Low Pass filter
        Anti-Alias filter, Notch filter
    Pre-Amplifiers
Distributed telemetry systems
    Cables losses, Advantages, Disadvantages
Delta Sigma systems
    Delta Sigma and noise shaping
    2nd order modulator
    Delta Sigma and decimation filtering
    Delta Sigma and 24-bit recording
    Delta Sigma and dynamic range
ARAM 24, I/O System II, Sercel 388, Opseis Eagle
I/O Digital sensor
Instrument tests and quality control

- **Array Theory**

    Apparent wavelength and wavenumber
    Signal to noise ratio in the wave number domain
    Simple linear arrays and effective length
    Combined arrays and spatial convolution
    Vibrator arrays
Estimating signal wavelengths
    Apparent wavelength vs offset plus frequency
    3D Response In Line, Cross Line, Combined
    Ghosting in the dynamite signature

- **Trapped Mode**

- **Spatial Sampling and Aliasing**
  - The seismic record in space
  - F-K plots and geophone intervals
  - Geophone arrays as spatial anti-alias filter
  - F-K filtering

- **Dual Source Vibroseis**
  - Plus-Minus method
  - Up-Down method
  - Vari-Sweep
  - Dual sourcing (Ping-Pong)
  - Slip sweep
  - Sei-Fi Technology

- **Overview of the 3D Technique**
  - Summary of 2D
  - Swath shooting
  - 3D imaging
  - Basic statistics comparing 2D and 3D
  - Basic aspects of a 3D program and definition of terms
  - Rolling the patch and building the fold
  - Determining 3D fold
  - Geometric imprinting

- **3D Design Considerations**
  - Overall survey size and shape
    - Cover beyond the anomaly
    - Margin of poor statistics
  - Migration aperture and Fresnel zone

  - Alignment with strike/dip or land boundaries

    - Avoiding migration artifacts
  - Deciding on the desired fold
    - Signal to noise enhancement
    - 3D advantages of migration
    - 3D advantages of offset distribution
    - Is fold our most important parameter?
  - Offset considerations
    - Maximum limits
      - Interference with muted first breaks
      - Moveout stretch
      - Mode conversion
      - Energy loss due to spherical divergence
    - Minimum limits
      - Sufficient moveout for velocity analysis
      - Sufficient moveout for multiple discrimination
      - Refraction analysis
      - Amplitude vs Offset analysis)
  - Source / Receiver line spacings
  - Desired fold within offset limits (fold driven vs bin driven designs)

    - Fold at shallow events
    - Aspect ratio
    - Desired wave field sampling in all domains
    - Trade offs and compromises
  - Bin size
    - As related to surface sampling
    - Aliasing of structural dips
    - Aliasing of lateral velocity changes (diffractions)
    - Aliasing of NMO at far offsets
    - Interpretation confidence for small features

  - Advanced Techniques: Bin geometry
    - Fractionated bins
    - Bin balancing – offset intelligence
    - Fractionation of bins by mid-point scattering
  - Skidding and offsetting
  - Velocity and azimuth
  - Statistics and surface consistent algorithms

- **Basic 3D Model Types**
  - Offset grid
  - Fractionated grid
  - Double Brick grid
  - Triple Brick grid
  - Diagonal grid
  - Megabin grid
  - Random grid
  - Planned Random grid

- **Case Histories**
  - 3D Seismic and Horizontal Drilling
  - 3D Seismic Out of Plane Resolution
  - Unnecessary dry holes
  - How little we know about geology

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NOISE AND ARRAY THEORY SEMINAR

1-DAY COURSE OUTLINE

Day One

1. **Overview and Introduction (8:00-8:30)**
   Introduce Mustagh and instructor(s)
   Introduce participants and background

2. **Review of Basic Concepts (8:30-9:30)**
   Stacking and Random Noise
   The Seismic Wavefield
   Spatial sampling at the surface
   Sparse sampling of wavefield

3. **Review of Aliasing (9:30-10:00)**
   Tiled reconstructions
   Wrap-around

   - 15 Minute Coffee Break -

4. **Types of Noise (10:15-12:00)**
   Random – time variant
   Source Generated – offset variant
   Trapped Mode
      Guided waves
      Scattered surface waves
      Ground Roll
      Shear converted surface waves

   - 1 Hour Lunch Break -

5. **Array Fundamentals (1:00-2:30)**
   Definition of terminology
   Introduce software
   Estimation of Signal apparent wavelengths
   Array response function for simple linear arrays
   Effective array lengths

   - 15 Minute Coffee Break -

6. **Complex Arrays (2:45-3:45)**
   Compound arrays
   Spatial Convolution and effective length
   Practical limits of attenuation
   Elevation changes and “in-group statics”
   Arrays in 2D and 3D

7. **Spatial Anti-Alias Filters (3:45-4:45)**
   Group interval aliasing
   Sub-sampling
   Analogy to Delta-Sigma process

8. **Summary and Wrap-Up (4:45-5:00)**

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SEISMIC OVERVIEW FOR MANAGERS AND NON-GEOPHYSICISTS
2-DAY COURSE OUTLINE

Day One

1. **Overview and Introduction (8:30-9:00)**
   Introduce Mustagh and instructor(s)
   Introduce participants and background
   Roll of seismic in exploration cycle
   "Pictures" of the subsurface
   Various displays
      List of numbers
      Trace
      Section
      Chair display
      Time slices

2. **Seismic Fundamentals (9:00-10:00)**
   Elastic Waves – Compressional and Shear
   Surface and boundary waves
   Simple model of wavefield
   Measuring the wavefield at the surface
   The seismic field record
   An example of stacking

   - 15 Minute Coffee Break -

3. **Basic Principles (10:15-12:00)**
   What is a wavelet?
   What is Bandwidth?
   What are vertical and lateral resolution?
   Resolution versus detectability

   - 1 Hour Lunch Break -

4. **Limits of Seismic (1:00-2:30)**
   Transmission losses in a variety of basins
   Mode conversion and AVO
   Spherical divergence
   Absorption – a non-linear loss
   Why is seismic imaging limited?
   Field record versus Stacked data
   Apparent wavelengths
   Measuring the Wavefield

   - 15 Minute Coffee Break -

5. **Types of Noise (2:45-4:45)**
   Random – time variant
   Source Generated – offset variant
      Trapped Mode
      Guided waves
      Scattered surface waves
      Ground Roll
      Shear converted surface waves
   Case histories
   Defence tools?
      Acquisition
      Processing
      Interpretation

Day Two

6. **Geometry principles (8:30-10:00)**
   CDP method
   Normal Move out
   2D Fold
   3D Fold
   Case History (Out-of-Plane effects)

   - 15 Minute Coffee Break -

7. **Basic Processing Corrections (10:15-12:00)**
   The synthetic trace
   Geometry
   Amplitudes in time and offset
   Deconvolution
   Normal Move out
   Statics
   Pre-stack gather
   Migration
      Post-stack
      Pre-stack

   - 1 Hour Lunch Break -

8. **Interpretation Basics (1:00-2:30)**
   Structural
      Time versus Depth
      Lateral position accuracy
   Stratigraphic
      Wavelet characteristics
      Post-stack
      Pre-stack
   Geologic input and calibration
   Case Histories

   - 15 Minute Coffee Break -

9. **The Value of Seismic (2:45-4:15)**
   Cost Factors
      Target depth
      Geographic location
      Geophysical objectives
      Noise conditions
   Image Quality and Confidence
      Design parameters
      Quality of implementation
      Quality of Processing
      Target depth
      Geologic complexity
      Noise conditions
   Value
      Finding desired features
      Avoiding undesired features

10. **Discussion and Wrap-up (4:15-4:45)**