



AL139: ABB NIR Analyzer Theory and Maintenance



Training Description:

ABB Fourier Transform Infrared (FT-IR) spectrometers and spectrometer-based analyzers are reliable instruments designed for a wide range of analyzes applications in a variety of environments, including factories, quality control laboratories, research laboratories and educational institutions.

This training course covers the fundamental theory and the latest technological developments. It particularly emphasizes field application through lots of practical field examples, exercises and case studies.

This intensive course provides reference information that applies to all ABB FT-IR analyzers and spectrometers. This course is intended for personnel responsible for ensuring optimum performance of the analyzer or spectrometer, and for those who wish to learn more about the system.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Demonstrate principles of ABB FT-IR instrumentation, data processing, sampling techniques
- ✓ Understand the basics of ABB FTIR-FTNIR spectroscopy
- ✓ Develop and update chemometric models using partial least squares (PLS) and classical quantitative tools
- ✓ Develop discrimination models to automatically determine material identification/confirmation
- ✓ Develop/validate quantitative models with appropriate IR/NIR spectra using primary reference data
- ✓ Develop and implement statistical discrimination criteria customized for your specific quality control requirements

Training Designed for:

This course is intended for Analyzer technicians and above, Geologists, Lab Chemists and all current and future users of ABB FTIR.

Training Program:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction
 - ABB spectrometers and analyzers
 - Design features
- ❖ Safety Policies
- ❖ Introduction to ABB FT-IR Spectrometry
 - How light interacts with matter
 - Beer-Lambert's absorption law
 - Absorbance spectra
 - Fingerprint region
 - Overtone and combination region
 - Operation of an FT-IR spectrometer
 - Michelson interferometer
 - Interferogram





- Fourier Transform
- Reference and absorbance spectra

DAY TWO:

❖ Spectrometer Calibration

- Peak height calibration
 - Example: Calibration based on a single spectrum
- Least-squares regression
 - Example: Calibration based on a number of spectra
- Matrices
 - K-matrix
 - P-matrix
- PLS (partial least squares)
 - Example: Calibration using PLS
- Validation and good practice
- Selecting the appropriate calibration algorithm

❖ Calibration Transfer

- Introduction
- Using calibrations on different spectrometers and over time
- Repeatability and reproducibility
 - Spectrometer repeatability
 - Analysis repeatability
 - Spectrometer reproducibility

DAY THREE:

❖ Calibration Transfer (*continuation*)

- Importance of the primary method
- Definition of calibration transfer
- Insuring long term stability and calibration transfer
- Influences on absorbance and transmittance spectra
 - Stray light
 - Frequency scale calibration
 - Line shape function and resolution
 - Scan length and apodization
 - Distribution of angles of IR beam
 - Jacquinet stop
- Verification of IR beam divergence effect

❖ Temperature Effects on the Detector and Fiber-Optic Cables

- Detector
- Fiber-optic cables
- Recommendations

DAY FOUR:

❖ Purging

- Principles and objectives
- Using Nitrogen
- Using Dry Air Generators





- Installation
- Maintenance

❖ **Sampling Accessories**

- Flow-through cells
 - The sampling system
 - Problems to avoid
 - Air bubbles in the cell
 - Deposits on the cell windows
 - Particles in the sample
 - Ambient gas
 - Moving particles or bubbles
- Immersion probes
- Attenuated total reflection (ATR) accessories
- Diffuse reflectance (DRIFT) accessories

DAY FIVE:

❖ **Handling and Care of Hygroscopic Materials**

- Hygroscopic materials
- Handling and care guidelines
 - Environment
 - Handling
 - Storage
 - Desiccant materials
 - Heating
 - Transport
 - Relative humidity

❖ **Using Fiber-Optic Cables**

- Handling and care guidelines
 - Precautions
 - Cable protection
 - Cleaning and maintenance
- Pulling a fiber-optic cable
 - Fiber-optic cables longer than 100 feet (30 m)
- Storing fiber-optic cables
- Connecting fiber-optic cables
 - Optical matching gel
 - Tightening SMA connectors
 - Securing fiber-optic cables

❖ **Course Conclusion**

❖ **POST-TEST and EVALUATION**

Training Requirement:

“**Hand’s on practical sessions, equipment and software** will be applied during the course if required and as per the client’s request.” (This hands-on, highly-interactive training includes simulator, real-life case studies and exercises).





This training course is available upon request in English or Arabic, virtual online live or face to face public/inhouse. Content, location and duration can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Team Training Discount—If you're registering with a company colleague (or two or more) at the same time, you can save an additional 20%. (The 20% discount applies only to two or more participants taking the same course and does not apply to two participants taking separate courses.)

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department

