

# Technical Instrument Course Abstract

---

## Quantitative Imaging Fundamentals

### Course Description:

Provides on hands experience and technical explanation of the fundamental operating principles which govern research grade CCD cameras and resulting image formats. Course attendees will obtain a comprehensive understanding of how CCD's operate, what CCD's are capable of and how to use these functions to obtain quantitative, repeatable images which can be used for processing and analysis. Course also describes fundamental concepts on image storage and image archiving structure.

### Course Layout

1. **Description of parameters which affect image quality**
  - a. **Spatial, intensity and temporal domains**
  - b. **Electronic conversion options**
  - c. **Discuss live examples**
2. **Operation capabilities**
  - a. **Binning, sub arrays and readout speeds**
  - b. **Impact ionization**
  - c. **Making tradeoffs to produce best images**
  - d. **Discuss live examples**
3. **Understanding Gain and Bit Depth**
  - a. **Using Gain to achieve sensitivity or dynamic range**
  - b. **Bit depth options and how to use them**
  - c. **Discuss live examples**
4. **Resolution**
  - a. **Raleigh criterion**
  - b. **Example calculations**
5. **Understanding noise**
  - a. **Description of noise sources**
  - b. **Finding the dominant noise source**
  - c. **Examples of noise tradeoffs**
  - d. **Discuss live examples**
6. **Image storage and display concepts**
  - a. **Scaling and lookup tables**
  - b. **Using image analysis to analyze signal distribution**
  - c. **Save methods and how they relate to image display**
  - d. **File save format options**
7. **Archival procedures**
  - a. **Operating system limitations**
  - b. **Naming conventions**
  - c. **Backup options**
8. **Overview of comprehensive image acquisition and analysis workflow**