LEVEL I SUAS THERMOGRAPHY CERTIFICATION TRAINING

The ITC sUAS Level I Thermography Certification course is geared to the individual or corporation wanting focused training on aerial IR inspections and applications. This four-day course is designed for the sUAS pilot who needs the background, skills, and knowledge to properly capture and interpret thermal images from the air. Topics include infrared science, popular applications, sUAS safety, and how to select the proper camera and lens combination for your application's needs.

LEVEL I SUAS TOPICS INCLUDE:

- Applied thermography theory, science, and techniques including interpretation of radiometric survey results specific to aerial applications.
- How to plan your flight's altitude and range-to-target so that you can get accurate thermal information about your target of interest.
- sUAS anatomy and inspection points.
- sUAS IR solutions and specifications to make informed decisions as to what platform and IR cameras are best for your application.
- How to maximize post-processing software for image analysis, report generation, and video editing.

ACCREDITATION

The learning objectives, contact hours, and written exam of ITC's courses are based on the requirements outlined by ANSI/ASNT CP-105 of the American Society for Non-Destructive Testing.

- 32 hours (24 ITC certification renewal credits)

INSTRUCTORS

Infrared courses are developed and taught by ITC's Level III, ASNT Level III, or EPRI Level III Instructors. ITC's domestic and international training staff includes several Level III thermographers certified by ASNT and BINDT with over 100 years combined infrared thermography applications experience. The Level II infrared training courses are taught by certified instructors with extensive experience in a wide variety of infrared thermography and thermal imaging applications.

SOFTWARE TRAINING

An overview of image analysis and reporting is provided for the latest FLIR software.

CAMERA TRAINING

Our instructor led training classes cover basic camera operation. We highly recommend viewing one of our free on demand courses for your specific FLIR camera before coming to class. Please visit http://www.infraredtraining.com to view available courses.

Please note that on demand courses may not be available for some camera models. If a course is not offered for your camera type, please refer to your user's manual. All manuals and datasheets for FLIR cameras can be found at http://support.flir.com. For other vendors please visit the vendor's website.

TOPICAL OUTLINE

1. Introductions
2. Certification Overview
3. Introduction to Thermography
    a. Definition of Thermography.
    b. How it compares to Night Vision.
    c. Benefits of Thermography and how it can be applied.
    d. Examples of common applications.
4. IR Camera Operation Principles
    a. List the components necessary to acquire a good Infrared Image.
    b. Discuss the impact of Focus and Range on your images.
    c. Learn the effect of High Gain and Low Gain temperature ranges.
    d. Evaluate the impact of different color palettes.
    e. Discuss and evaluate different sUAS Cameras for your mission.
5. Thermal Science Fundamentals
    a. Explain the difference between heat and temperature.
    b. Identify common heat measurement units.
    c. Explain the difference between absolute and relative temperature scales.
    d. Demonstrate how to convert between Celsius and Fahrenheit temperature differentials.
    e. Discuss the laws of thermodynamics.
6. Heat Transfer
    a. Define heat transfer.
    b. Explain the difference between Steady State and Transient heat transfer.
    c. Identify various thermal patterns.
    d. Explain wind speed effects on temperature and differentials.
    e. Identify a thermal capacitance application.
7. Fundamentals of IR Science
    a. Define qualitative and quantitative thermography.
    b. Describe the electromagnetic spectrum.
    c. Identify infrared wave bands with emphasis on usefulness.
    d. Identify what objects emit infrared energy and how this is affected by temperature.
8. sUAS Infrared Science
    a. Calculate the ground field of view given a FLIR Vue Pro camera resolution and lens.
    b. Understand how a combination of resolution and lens determine the correct FOV for a mission.
    c. Apply measurement field of view and spot size ratio to a mission based on a FLIR Vue Pro camera resolution and lens.
    d. Identify low emissivity targets from flight imagery.
9. sUAS Applications Overview
10. sUAS Camera Overview
    a. Identify the different FLIR sUAS Cameras.
    b. List different camera capabilities and describe their importance to collecting useful data.
    c. Describe the types of lenses available and how they relate to FOV and IFOV.
    d. Select which camera will best fit your application.
11. sUAS Safety
    a. Evaluate safety and hazardous conditions associated with Small Unmanned Aerial Systems.
        i. Batteries
        ii. Propellers
        iii. EMI
        iv. Controllers

INFRARED TRAINING CENTER

SYLLABUS

Time	Day 1	Day 2	Day 3	Day 4
0800 – 0830	Class Introductions	Thermal Science Fundamentals	Fundamentals of IR Science	Applications
0830 – 0900	Resources and Support			
0900 – 0930	Goals and Certification			
0930 – 1000	Introduction to Thermography			
1000 – 1030				
1030 – 1100			Knowledge Check	
1100 – 1130				
1130 – 1200	**Lunch**	**Lunch**	**Lunch**	**Lunch**
1200 – 1230				
1230 – 1300	Camera Operation	Heat Transfer	sUAS IR Science	Study Guide Review
1300 – 1330				
1330 – 1400				Final Exam
1400 – 1430				
1430 – 1500				
1500 – 1530	Labs	Labs	Labs	
1530 – 1600				
1600 – 1630				
1630 – 1700	Study Guide Review	Study Guide Review	Study Guide Review	