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Center for Transportation Research  
The University of Tennessee  
309 Conference Center  
Knoxville, TN 37996-4133  
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**Please select your session/s:**

| TRAFFIC SIGNAL ACADEMY                             | FEE   | KNOXVILLE (IN PERSON)<br>OR ONLINE<br>8:30am-4:00pm Eastern |
|--|-------|---|
| MUTCD and Signalized Intersections                 | \$150 | ( ) April 29, 2024  |
| Signal Timing                                      | \$150 | ( ) April 30, 2024  |
| Detection and Advanced Operations                  | \$150 | ( ) May 1, 2024   |
| Traffic Signal Installation and Maintenance        | \$150 | ( ) May 2, 2024   |
| Traffic Signal Controller Programming              | \$150 | ( ) May 3, 2024   |
| Traffic Signal Systems in Oversaturated Conditions | \$150 | ( ) May 6, 2024   |
| TOTAL  |       |   |

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**LOCATIONS/TIME**

**ONLINE WORKSHOPS**  
**(8:30 am - 4:00 pm Eastern)**

**KNOXVILLE**  
**ONSITE WORKSHOPS**  
**(8:30 am - 4:00 pm Eastern)**

ORNL Hardin Valley Campus  
*(formerly known as NTRC)*  
2360 Cherahala Blvd.  
Knoxville, TN 37932  
Tel: 865-946-1500 for directions

**Fee (\$150 per day)**

The workshop registration includes course materials and refreshments for onsite workshops only. Attendees are responsible for meals and lodging. See additional information on the website under *Location and Facilities*.

**PDHs Available**

6 Professional Development Hours (PDHs) can be granted for each session.

**Limited Enrollment**

Due to the nature of the workshops and in order to prioritize the student learning experience there will be a limit of 20 participants.

The University of Tennessee is an EEO/AA/Title VI/Title IX/Section 504/ADA/ADEA institution in the provision of its education and employment programs and services. All qualified applicants will receive equal consideration for employment and admission without regard to race, color, national origin, religion, sex, pregnancy, marital status, sexual orientation, gender identity, age, physical or mental disability, genetic information, veteran status, and parental status.

# 2024 TRAFFIC SIGNAL ACADEMY

## ONSITE OR ONLINE KNOXVILLE, TN

THE UNIVERSITY OF  
**TENNESSEE**  
KNOXVILLE 

CENTER FOR  
TRANSPORTATION RESEARCH

309 Conference Center Bldg.

Knoxville, TN 37996

Tel: 865-974-5255

<http://trafficsignalacademy.utk.edu>

## Overview

Traffic signal operations play an important role in the safe and efficient movement of people, goods and vehicles through our transportation system. The 2012 National Traffic Signal Report Card considered the overall quality of traffic signal operations in the country to be not satisfactory. Among the findings, it identified the need for routine signal timing updates to reflect change in population growth and traffic patterns. With agencies at all levels facing limited fiscal resources, there is a need for less expensive traffic solutions and, optimizing available technology while applying innovative concepts can benefit the transportation system as a whole. The **Traffic Signal Academy** will focus on academic research findings and on appropriate signal timing procedures and policies used around the country to offer reliable information, capable of potentially improving benefit-to-cost ratios by operating new or existing systems with greater efficiency. The Academy will offer a comprehensive discussion on standards, warrants, installation and maintenance guidelines, and strategies to minimize the adverse effects of liability issues. Therefore, investing in traffic signal training, from design to operations to maintenance, demonstrates the necessary commitment to a continuous improvement in the country's transportation system.

## CTR Traffic Signal Laboratory

The Traffic Signal Laboratory is a fully functioning closed-loop traffic control system. It includes a NEMA TS-1 and a NEMA TS-2 cabinet, high performance loop based system, as well as video detection system, plus a multi-mode fiber and spread-spectrum wireless communication. The laboratory will expose the user to the complexities involved in setting up and maintaining traffic signal cabinets, detection and communication systems.

## Who Should Attend

Government employees, consulting engineers, and others involved in traffic signal design, operations and maintenance will benefit from this workshop. The workshop material will serve as an excellent source of current information for people with different levels of experience in traffic signal operations. More specifically, the objectives for the following groups are: Consultant Engineers – present current information on standards, state of the art equipment and signal timing practices and promote consistency on design.

Technicians, Contractors – provide guidelines for efficient installation and maintenance of traffic signal equipment, explore alternatives for established practices and educate on fundamentals of traffic signal engineering.

Decision Makers – describe the relationship between traffic signal timing and transportation policy, demonstrate the importance of continuous funding for maintenance, retiming and capital improvement.

## Instructors

### Airton G. Kohls, Ph.D.

Dr. Kohls is a Research Associate at UT's Center for Transportation Research. He holds B.S., M.S. and Ph.D. degrees in Civil Engineering from UT and has 10 years practical experience in traffic engineering as an adjunct assistant professor in UT's Department of Civil Engineering, teaching Traffic Engineering Operations.

### Phillip Reyes

Mr. Phillip Reyes has been in the traffic signal and transportation industry since 2007. He currently is the Traffic Engineer for the University of Tennessee, Knoxville campus. Prior to UT he spent 16 years with the City of Knoxville in the Transportation Engineering Department. Phillip holds several International Signal Municipal Association (ISMA) certifications for traffic signals and streetlights. He has been an electrical contractor since 2000. Mr. Reyes has his B.A.A.S in Electrical Engineering Technology from Eastern New Mexico University.

## Program Description

### Day 1 (MUTCD and Signalized Intersections)

A brief introduction to the history of traffic signals will illustrate the evolution of intersection traffic control through the years. The process of justifying the installation of a traffic signal will be discussed, exemplified and supported by a thorough explanation of the current MUTCD Warrants. Additional information on Part 4 of the MUTCD will be presented, focusing on the design and positioning of signal indications and illustrated with examples and tables. New MUTCD provisions, such as the optional use of "flashing yellow arrow" for permissive only or protected-permissive modes will be discussed. Guidance to design of pedestrian control features will also be provided.

A description of commonly used terms in the traffic signal industry will include the definition of phase, a detailed explanation of the standard NEMA ring-and-barrier diagrams, the treatment of left-turn phases being followed by a presentation on operational characteristics of traffic signals.

### Day 2 (Signal Timing)

A discussion on traffic signal timing objectives, benefits and characteristics will lead to the presentation of basic traffic flow principles and traffic signal timing strategies. Isolated signal timing, covering pre-timed and actuated operation will be followed by relevant information on coordinated signal timing. A step-by-step signal timing example will provide the opportunity to explore guidelines on the calculation of signal timing parameters for different modes of operation under different scenarios, covering cycle length, change and clearance intervals, vehicular and pedestrian intervals, etc. An overview of analysis procedures and signal timing tools will briefly instruct on how to evaluate signalized intersection performance.

### Day 3 (Detection and Advanced Operations)

Simulation examples will illustrate the functionality of several controller parameters related to current guidelines on detection system design. The concepts of dilemma and indecision zone will be discussed and, low-speed and high-speed detection designs will be covered. A detailed presentation will provide appropriate values used by agencies on Volume Density settings and information on advanced controller features as well as on video detection will be presented. Relevant guidelines and references on Traffic Signal Priority Control, Traffic Responsive Control, Adaptive Traffic Signal Control and the System Engineering Analysis will be covered. Diamond Interchange Operations will be discussed and controller settings included. Preemption concepts will also be covered.

### Day 4 (Traffic Signal Installation and Maintenance)

Students will become familiar with components of a traffic signal system and with appropriate traffic signal maintenance procedures. The Center for Transportation Research Traffic Signal Laboratory is a unique learning environment that allows the user to be exposed to the complexities involved with setting up and maintaining traffic signal controllers, conflict monitors, load switches, detection and communication systems on both NEMA TS-1 and TS-2 cabinets. Installation and maintenance guidelines of traffic signal supports and indications will also be provided. General information on the design and interpretation of traffic signal plans and a checklist for preventive and responsive maintenance will also be discussed. Appropriate information regarding liability and negligence will be presented in addition to guidelines to reduce exposure to lawsuits.

### Day 5 (Traffic Signal Controller Programming)

Students will experiment with controller parameters on a realistic simulation environment and will be presented with information on how to navigate traffic signal controller menus, including programming instructions and interactive examples on timing parameters, detection, coordination and advanced functions.

### Day 6 (Traffic Signal Systems in Oversaturated Conditions)

Agencies are frequently challenged with moving traffic in congested conditions and situations where the traffic demand exceeds the capacity of the system. The focus of this workshop is to diagnose types and causes of oversaturated conditions at signalized intersections, identify appropriate operational objectives based on observed conditions and discuss available mitigating strategies that can have an appreciable effect on overall system performance.

Website: <http://TrafficSignalAcademy.utk.edu>