Traffic Crash Investigation
Course Offering Overview

2022

Northwestern
CENTER FOR PUBLIC SAFETY
nucps.northwestern.edu
Since our founding in 1936, Northwestern University Center for Public Safety has been a world leader in traffic crash investigation, reconstruction, and prevention education. We work with all types of law enforcement agencies to create safer communities.

Our programs excel in providing students with the skills and knowledge to meet the most challenging of current and emerging demands.
Crash Investigation and Reconstruction: Core & Elective Courses

Northwestern Center for Public Safety offers five core sequential crash investigation & reconstruction courses as well as eleven advanced courses.

**FOUNDATIONAL COURSES**

Each essential core course builds on the previous courses and is a mandatory prerequisite for the next in the sequence.

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3. Vehicle Dynamics . . p 6
4. Traffic Crash Reconstruction 1 . . . p 7
5. Traffic Crash Reconstruction 2 . . . p 8

**ELECTIVE CLASSES**

Our elective courses may be taken in any order. Some are advanced courses with prerequisites, while other electives are open to participants at all levels of study.

- Advanced Crash Reconstruction Utilizing Human Factors Research . . . p 9
- Motorcycle Traffic Crash Reconstruction . . . p 10
- Heavy Vehicle Forensic Mechanical Inspection for Collision Investigators . . p 11
- Pedestrian & Bicycle Crash Reconstruction . . . 12
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- Using Excel in Traffic Collisions . . . p 15
- CDR Operator . . . p 16
- Advanced Collision Reconstruction with CDR Application . . . p 16
- CDR Analysis and Application . . . p 17
The 5-Course Foundational Sequence

COURSE CONTENT

- Preparation for traffic crash investigation
- Collecting information from involved persons & witnesses
- Obtaining information from vehicles
- Collecting information from roadways
- Measuring & mapping the crash scene
- Photographing the crash scene & damaged vehicles
- Vehicle examinations
- Intro to Event Data Recorders

CRASH INVESTIGATION 1

At-Scene Investigation | 80 Hours

In most jurisdictions, traffic crashes account for more deaths, more injuries, and more property damage than all criminal activity combined. To effectively implement crash prevention programs and improve quality of life, law enforcement agencies need to know the who, what, where, when, and why of crashes. The moments immediately following a traffic collision are crucial, and only a well-trained crash investigator knows how to identify and collect the necessary information at the crash scene and how to begin the interpretation of that evidence.

Crash investigators must work quickly and confidently to preserve significant physical results before the crash scene is altered or evidence disappears. They must anticipate what information will be needed for enforcing traffic laws, planning crash prevention programs and possible case litigation. In addition, they must properly document the at-scene information and evidence because once the scene is cleared, the evidence might be impossible to recover.

“[Crash Investigation 1] will make you think about crashes in a whole new way... Extremely informative and has good hands-on application. Once you finish with this course, you feel empowered to handle traffic crashes.” — Wayne R. Jakobitz, Jr., Bourbonnais (IL) Police Dept.

Crash Investigation 1, based on J. Stannard Baker and Lynn Fricke’s world-renowned text, Traffic Crash Investigation, is an in-depth study of the skills needed to systematically investigate a traffic crash. Students learn techniques for recognizing and properly recording roadway and vehicle crash evidence, measuring and photographing of crash scene, and creating sketches and after-crash diagrams. The course introduces students to the use of electronic devices to collect and record at-scene data (EDR) and addresses how collected data are used to reconstruct crashes.
COURSE CONTENT

- Vehicle damage analysis (describing, reporting & determining direction of forces)
- Vehicle behavior in crashes
- Identifying and interpreting tire marks, road scars & other results of a crash on the road
- Lamp filament analysis
- Tire damage analysis & role of tire failure
- Measurement methods, including perspective grid, photogrammetry, techniques, diagram drawing, aerial imagery & application to crash investigation
- Interpretation of data
- Specialized data gathering, measuring devices & other testing

New Topics include:

- CDR Operator instruction, including Event Data Recorder downloading and preservation
- Technical report writing

CRASH INVESTIGATION 2

Technical Investigation | 80 Hours
Prerequisite: Crash Investigation 1

At-scene traffic crash data collection is useful only if all appropriate data is properly collected, interpreted, and analyzed. Participation in Crash Investigation 2 enhances the capability and credibility of the at-scene investigator.

Officers and investigators who successfully complete Crash Investigation 2 develop skills in technically preparing crash investigation data and collecting follow-up data required by prosecutors, defense attorneys, claim adjusters, fleet supervisors, reconstructionists, and highway safety engineers.

Crash Investigation 2 builds upon topics examined in Crash Investigation 1 and provides students with greater knowledge of the information available at the crash scene as well as how to properly collect it and initiate its interpretation. Like Crash Investigation 1, the course is rooted in Baker and Fricke’s Traffic Crash Investigation and emphasizes vehicle behavior in crashes, vehicle damage analysis, advanced mapping and evidence location skills, and properly downloading and preserving digital evidence from collision investigations.

Instructors demonstrate use of such emerging technologies as mapping scenes and recording videos with drones and/or total stations. Our CDR Operator course is now included within Crash Investigation 2, and all students will complete the course certified to download and preserve event data recorders from vehicles.
Vehicle Dynamics introduces students to mathematical formulas and basic physics as they relate to traffic collision investigations. The course focuses on mechanics, the study of motion and forces, and the effects of such forces during a crash.

Vehicle Dynamics is an introduction to basic mathematical procedures and the basic laws of physics necessary for those who wish to attend Traffic Crash Reconstruction 1 and Traffic Crash Reconstruction 2.

Instructors present Newton’s Laws of Motion and proper application of physics principles to equations of motion to solve for velocity, time, acceleration, and distances of travel. Once these concepts are understood, instruction continues to vehicle braking, drag factors, and coefficients of friction and time-distance analysis.
The 5-Course Foundational Sequence

TRAFFIC CRASH RECONSTRUCTION 1

Engineering Mechanics & Momentum
80 Hours | 80 ACTAR CEUs
Prerequisites: Crash Investigation 1 & 2, Vehicle Dynamics

This course teaches the foundations of reconstruction to students who are new to the crash reconstruction profession. In addition to the prerequisite courses, participants should possess an understanding of physics and math skills that include high-school level algebra, geometry, and trigonometry.

In Traffic Crash Reconstruction 1, students utilize the knowledge learned in Crash Investigation 1 and 2, as well as Vehicle Dynamics, to understand the determination of how a crash occurred. Based on Lynn Fricke's greatly expanded textbook, Traffic Crash Reconstruction, this course focuses on analyzing and interpreting information that has been collected at lower levels of investigation in order to describe the crash and the events leading to actual impact in as much detail as possible. Students apply the lessons from daily lecture material to real-world case study situations — an instruction format that provides students with the training necessary to reconstruct traffic crashes.

After successfully completing this course, students will have the ability to reconstruct crash situations using momentum and mechanics.

COURSE CONTENT

- Engineering mechanics
- Equations of motion calculations
- Vehicle behavior in collisions
- Principal direction of force analysis
- Introduction to human factors
- Time-distance analysis
- Conservation of momentum
- Oblique & collinear analysis
- Post-collision drag factors
- Newton's Laws of Motion
- Identifying & analyzing road marks
- Driver strategy & tactics
- Eight real-world case studies
The 5-Course Foundational Sequence

TRAFFIC CRASH RECONSTRUCTION 2

Energy, Statistical & Data Event Recorders
80 Hours | 80 ACTAR CEUs
Prerequisite: Crash Investigation 1 & 2, Vehicle Dynamics, Traffic Crash Reconstruction 1

Designed for the traffic crash reconstruction professional, students must fulfill the prerequisite courses — or equivalent crash investigation courses with prior approval from NUCPS staff. In addition to the prerequisite courses, participants should possess an understanding of physics and math skills that include high-school level algebra, geometry, and trigonometry.

Traffic Crash Reconstruction 2 is a continuation of the skills learned in Reconstruction 1 and is based on Lynn Fricke’s textbook Traffic Crash Reconstruction. Traffic Crash Reconstruction 2 provides training through lecture and daily real-world case studies to tie lecture material to hands-on analysis. Students expand their understanding of crashes and analyze collisions using conservation of energy. During the second week, instructors cover special velocity calculations for situations involving vehicle falls, flips, and rollovers. Students also learn basic skills for analyzing Event Data Recorder (EDR) information and how to apply such data to traditional reconstructions. Finally, students are introduced to the Monte Carlo Statistical Analysis and learn to solve momentum-based collision sequences using spreadsheet analysis.

Upon successful completion of this course, students will possess the core skills of traffic collision reconstruction and the ability to reconstruct crash situations using energy and statistical analysis of momentum-based collision reconstructions. This course is a prerequisite for other advanced reconstruction offerings.
Elective Courses in Advanced Crash Reconstruction

COURSE CONTENT
- History & foundation of reaction time research
- How to apply PRT
- Driver response terms & definitions
- Research in IDRR
- IDRR tutorial
- Speed choice, weather, window tinting, steering, acceleration, night recognition, headlights, perception response time & gap acceptance
- Evaluating a response during nighttime driving & recognition of hazards
- Changes in perception response times due to methodology
- Headlight analysis
- Evaluating path intrusion crashes
- Response to slow moving vehicles
- Driver search patterns
- Driver response to lead vehicles, expectations, traffic signals & decision making
- Practical experience & research applications

ADVANCED CRASH RECONSTRUCTION UTILIZING HUMAN FACTORS RESEARCH

40 Hours | 40 ACTAR CEUs
Prerequisite: Traffic Crash Reconstruction 1 & 2; Microsoft Excel proficiency is preferred

Building upon skills and knowledge taught in Traffic Crash Reconstruction 1 & 2, this advanced reconstruction course focuses on understanding and assessing the human role in the crash sequence in order to answer key questions in reconstruction cases that may involve some aspect of human behavior, including reaction time, perception, visibility, impairment, and other human factors.

Upon successful completion of this course, each student receives a three-month, personal-use license from CSS, LLC, which allows the licensed user to access:
- Interactive Driver Response Research (IDRR): a human factors-based time/distance program
- V*Star: a momentum calculator that calculates uncertainty in a Monte Carlo-type analysis

IDRR and V*Star will be available for purchase at a discounted class price following the three-month trial period. If a student already has a license for these programs, CSS, LLC will add three months to the licensure for IDRR and three months for V*Star.

INSTRUCTOR

Jeff Muttart, M.S., Ph.D., is an industry expert in human-factor research. Initially a police agency crash reconstructionist, he has become an internationally respected researcher in driver behavior. A recipient of the National Transportation Safety Board Award for Contributions to Safety and the Wallace Award for Excellence in Research, he is the author of more than 50 peer-reviewed articles on traffic safety and driver response in crash and near-crash events. A frequent conference speaker, Muttart was the keynote speaker at WREX16, the world’s largest crash reconstruction conference. He earned his Ph.D. in Industrial Engineering & Operations Research from the University of Massachusetts and his M.S. in Psychology from the University of Hartford.
Elective Courses in Advanced Crash Reconstruction

**COURSE CONTENT**

- Introduction to motorcycle crash causation & motorcycle anatomy
- Introduction to specification research
- Review of kinematics, including units, conversions & derivations of basic equations
- Fundamentals of motorcycle dynamics
- Motorcycle inspection
- Rider perception-response time
- Braking systems & rider performance
- Introduction to Excel for collision reconstruction
- Dynamics of swerving & rider performance
- Acceleration behavior, calculations & gearing analysis
- Analysis of wheelbase reduction for determination of impact speed
- Sliding friction & angular momentum
- Rider & pillion vault analysis
- Event data recorders & dataloggers
- Simulation analyses for impact speed determination
- Monte Carlo Analysis for speed ranges

**MOTORCYCLE TRAFFIC CRASH RECONSTRUCTION**

32 Hours | 32 ACTAR CEUs
Prerequisite: Traffic Crash Reconstruction 1 & 2

Thoroughly redesigned and updated, Motorcycle Traffic Crash Reconstruction examines the unique characteristics and special challenges that arise in collisions involving motorcycles and their operators. This advanced reconstruction course equips analysts with a firm understanding of motorcycle dynamics and current reconstruction techniques through a deep review of literature, sample evidence, and exercises. The course combines lecture with hands-on, practical experiences for all students and follows material included in the upcoming new edition of the *Traffic Crash Reconstruction Manual*.

**INSTRUCTOR**

Louis Peck, M.S., is an ACTAR Governing Board member and motorcycle cycle crash reconstruction leader. Peck is a licensed mechanical engineer, published researcher, and retired motorcycle road racer, who possesses a unique understanding of motorcycle dynamics and capabilities. Involved in research on motorcycle operator performance, his paper “Glancing and Stopping Behavior of Motorcyclists and Car Drivers at Intersections” was published in the TRB *Transportation Record* in 2011. He is also the author of “Motorcycle Sliding Friction for Accident Reconstruction” (Proceedings of the 10th International Motorcycle Safety Conference, 2014: Cologne, Germany). Peck has served as an expert witness in state and Federal courts and presents at national and international industry conferences. In 2016, he directed motorcycle crash testing at the World Reconstruction Exposition (WREX16), where his team conducted the first public crash test of Harley-Davidson motorcycles. Those efforts resulted in updated motorcycle impact-speed equations, which SAE published in 2018.
HEAVY VEHICLE FORENSIC MECHANICAL INSPECTION FOR COLLISION INVESTIGATORS

40 Hours | 40 ACTAR CEUs

Traffic collisions that involve heavy vehicles often encompass unique documentation and analysis components. In this new offering, students learn to inspect collision-damaged heavy vehicles and gain the skills required to investigate commercial vehicle traffic collisions.

This is a hands-on, basic investigation course for proper documentation and evidence preservation and is open to students who have not completed our five-course crash sequence.

Course curriculum includes lecture and hands-on experience with collision-damaged trucks. Forensic work is conducted on the braking systems, suspension systems, wheel systems, and steering systems. Instructors provide foundational information about each component, and students learn to use that knowledge to mechanically examine and test a previously damaged heavy vehicle. Additional hands-on training examines undamaged heavy trucks for a better understanding of components.

After successfully completing this course, students are able to demonstrate the ability to restore a damaged air-braking system on a heavy-duty commercial vehicle to its pre-collision condition for the purpose of collecting data to perform calculations that are used in evaluating the braking efficiency of a heavy-duty commercial vehicle. Students also will be able to identify parts and pieces of steering and suspension systems and explain how the components may have been a factor in a crash.

COURSE CONTENT
- Heavy vehicle nomenclature
- Braking systems
- Suspension systems
- Wheel systems
- Steering systems
- Proper forensic investigation methods
Elective Courses in Advanced Crash Reconstruction

PEDESTRIAN & BICYCLE CRASH RECONSTRUCTION

40 Hours | 40 ACTAR CEUs
Prerequisites: Traffic Crash Reconstruction 1; Traffic Crash Reconstruction 2 is encouraged

Vehicle-vs.-pedestrian and vehicle-vs.-bicycle crashes often result in severe injuries to the pedestrian or bicyclist, escalating the importance of investigating and reconstructing these crashes. In Pedestrian & Bicycle Crash Reconstruction, students learn the mathematical equations to model such collisions and the appropriate formulas for varying crash scenarios.

Participants obtain the skills to determine first-contact positions of pedestrians, bicycles, and vehicles and to estimate the speed of a striking vehicle. Other course topics include human body motion as a result of an impact, empirical data for pedestrian walking and running, and bicycle collisions. Students also receive an introduction to injury biomechanics.

This course includes three lab workshops — including a nighttime pedestrian visibility workshop. Participants are exposed to the different effects of illumination, luminance, and glare and learn to discern the roles that visual acuity and contrast sensitivity play in the driving process. Other field projects include developing data from pedestrian and bicycle velocities and studying drag factors of bodies on various surfaces.

COURSE CONTENT

- Identification & documentation of information from the road, vehicle & body
- Investigating pedestrian / bicycle hit-and-run crashes
- Pedestrian motion as a result of a vehicle collision
- Pedestrian & bicycle crash reconstruction techniques
- Vehicle speed estimates
- Vehicle dynamics review along with time-distance analysis
- Pedestrian / bicycle strategy & tactics
- Pedestrian visibility & conspicuity
- Field projects
- Case analysis / case studies
Elective Courses in Advanced Crash Reconstruction

COURSE CONTENT

- History of injury trauma & biomechanics
- Automotive safety systems: seatbelts & airbags
- Mechanism of injury, methods, analyses & tolerances for head injury, neck injury & lumbar injury
- Upper & lower extremity biomechanics
- Vehicle-vs.-vehicle & vehicle-vs.-pedestrian impacts

INJURY BIOMECHANICS & TRAFFIC CRASH RECONSTRUCTION

24 Hours | 24 ACTAR CEUs

This three-day course offers an in-depth examination of injury biomechanics for investigators, reconstructionists, and other professionals involved in vehicle crash investigation. Each topic discusses mechanism and method of injury, analysis, and tolerances. Injury Biomechanics also covers vehicle-vs.-vehicle and vehicle-vs.-pedestrian collisions, the injury investigation, and advanced procedures for matching injuries to vehicle collisions. Case studies are paired with lecture material specific to vehicle-vs.-vehicle collisions (front, side, and rear) and pedestrian-vs.-vehicle to examine injury patterns.

INSTRUCTOR

Sean Shimada, M.S., Ph.D., is the president of Biomechanical Consultants, a West Coast-based forensic biomechanical and engineering firm. His primary consulting and research are focused on injury, including its identification, determining its likelihood, and its prevention. He has conducted a number of biomechanics research studies and presented findings at such meetings and conferences as the International Society of Biomechanics, the IEEE Engineering, Medical & Biology Society, the Rehabilitation Engineering Society of North America, and the Biomedical Engineering Society. Shimada's published work includes several book chapters, nearly 20 peer-reviewed journal articles, more than 20 peer-reviewed conference proceedings, and multiple abstracts. He earned his M.S. in 1994 from the School of Health & Human Services, California State University, Sacramento, where he studied exercise physiology and biomechanics. In 1998, he earned his Ph.D. from the University of Pittsburgh’s School of Health and Rehabilitation Sciences and obtained a M.S. in Bioengineering from Pittsburgh in 2000. He was formerly an instructor of Kinesiology and the Biomechanics Lab director at California State University, Sacramento.
Elective Courses in Advanced Crash Reconstruction

COURSE CONTENT
- Heavy vehicle nomenclature
- Braking systems
- Special component issues
- Off-tracking
- Rollovers
- Basic heavy vehicle EDRs
- Proper data collection
- Conspicuity
- Speed analysis
- Collision behavior, momentum & damage
- Computer analysis
- Field testing & analysis
- Heavy vehicle tire stamping

HEAVY VEHICLE CRASH RECONSTRUCTION

40 Hours | Prerequisites: Traffic Crash Reconstruction 1 & 2
40 ACTAR CEUs

Heavy vehicles provide their own challenges when they are involved in traffic crashes. Their braking systems differ from those found in passenger vehicles, and articulated vehicles (semi-tractor/trailer combinations) also behave differently than single units. Heavy Vehicle Crash Reconstruction examines the critical and unique elements of reconstructing collisions that involve these vehicles.

Through lecture, field work, and case studies, this course expands students' knowledge of heavy vehicle braking systems, vehicle behavior, and specific, complex component issues that can be present in crash reconstruction. Course curriculum also includes speed analysis techniques, Event Data Recorder (EDR) basics, and more. Offering multiple hours of field testing, this course demonstrates various vehicle behaviors and braking and acceleration characteristics as well as provides students with the opportunity to analyze and apply the collected data. Case studies show how various analytic techniques can be applied to real-world crashes.
Elective Courses in Advanced Crash Reconstruction

COURSE CONTENT

- Using Excel in Collision Investigation
  - Basic & advanced spreadsheet operations
  - Working with trigonometric functions
  - Formatting cells, text & numbers
  - Working with borders & cell shading
  - Conditional formatting
  - Naming cells & constants
  - Working with names in functions
  - Writing complex equations
  - Using form controls
  - Working with data validation
  - Conditional / logical functions (“If” statements)
  - Database operations
  - Using goal seeker & solver

USING EXCEL IN COLLISION INVESTIGATION

40 Hours | 40 ACTAR CEUs
Prerequisites: Traffic Crash Reconstruction 1 & 2

In five days students learn how to use Microsoft Excel in the field of crash investigation. Our course sets itself apart from standard college-level Excel courses as those generally feature the application’s use in a business environment. While our class is designed so that no prior Excel knowledge is required, experienced Excel users will benefit from the focus on the application’s use in crash investigation and reconstruction.

Using Excel in Collision Investigation is hands-on, with students working in Excel the entire week. Participants themselves create all of the spreadsheets used in the class. The course begins with basic Excel operations and builds from there. By the end of the course, participants will be able to complete such advanced Excel functions as writing macros, working complex “if” statements, and creating form controls.

COURSE CONTENT

- Traffic Crash Reconstruction Update & Refresher
  - Engineering mechanics
  - Collinear momentum
  - Oblique momentum
  - After-impact drag factors
  - Work & energy
  - Damage energy
  - Energy & momentum
  - Force balance

TRAFFIC CRASH RECONSTRUCTION UPDATE & REFRESHER

40 Hours | 40 ACTAR CEUs
Prerequisites: Traffic Crash Reconstruction 1 & 2

Our refresher course is designed for those who completed NUCPS’ Traffic Crash Reconstruction 1 & 2 more than three years ago. The course updates reconstruction professionals on industry advances and utilizes real-world case studies to refresh students’ knowledge in the core topics covered in Traffic Crash Reconstruction 1 and Traffic Crash Reconstruction 2.

“I attended Crash 1 & 2, Vehicle Dynamics, and Crash Reconstruction 1 & 2 approximately 10 years ago but haven’t done many major crashes since. This refresher is an excellent way to get my gears moving again and help remember what I have learned. Definitely leaves me more confident moving forward.”

— Louis Easton, Villa Park (IL) Police Dept.
Elective Courses in Crash Data Retrieval

COURSE CONTENT

- CDR System components & required tools
- Software installation / configuration
- Selecting the best method of access
- Software operation, step-by-step guides & nuances
- Common error messages & trouble-shooting steps
- Trouble-shooting connections
- Back powering
- Saving imaged data
- Report generation
- Basic legal issues
- Hands-on practice

CRASH DATA RETRIEVAL OPERATOR

16 Hours | 16 ACTAR CEUs

This two-day, entry-level course is for those new to the Bosch Crash Data Retrieval (CDR) System and to the Hyundai, Kia, and Tesla systems. Instructors start with such basic CDR components as in-vehicle connections (DLC) and direct-to-module cables, add-on adapters, minimum computer requirements, and software installation. Students then learn operation basics: how to determine if a vehicle is CDR supported; selecting the appropriate connection method to safely image the data; using the CDR software application; how to save imaged data for later use; and, creating reports. An emphasis is placed on in-vehicle connections wherever possible, with added explanations of the potential impacts of direct-to-module access. The curriculum also includes back-powering methods, such as back powering through a fuse box and accessing vehicle owner’s manuals. To develop operational fluency, students experience hands-on practice using the Bosch CDR System and Hyundai and Kia EDR Tools to image a variety of modules and vehicles and to back power.

COURSE CONTENT

- Pre-crash data sources & recorded crash pulse data
- Calculating delta-v from acceleration data
- Finding impulse delta-v from x/y delta-v data
- PDOF from x/y delta-v data
- Adjusting x axis delta-v to represent impulse delta-v
- Single Equation Approach to 360° Momentum Analysis
- Finding impact & post-impact velocities from CDR data
- Reconciling pre-crash & post-crash CDR data
- Analyzing CDR data in context of a reconstruction

ADVANCED COLLISION RECONSTRUCTION WITH CDR APPLICATION

40 Hours | 40 ACTAR CEUs
Prerequisites: Traffic Crash Reconstruction 1 & 2, Crash Data Retrieval Analysis & Application

This five-day course explores advanced methods for incorporating CDR data in crash reconstructions. Drawing from skills and lessons taught in the Crash Data Retrieval Analysis & Application, the curriculum takes data analysis further — with particular emphasis on how to properly use delta-v data to determine impact and post-impact velocities in various crash scenarios. Instructors review pre-crash and delta-v data from currently supported vehicles and may include additional updated CDR information.

The techniques taught in this class can be applied to real-world situations. All of the projects that instructors present in this class are based on actual crashes, using downloads obtained from those collisions.
Elective Courses in Crash Data Retrieval

COURSE CONTENT

- Terms & conventions in the CDR / EDR field
- Airbag deployment decision-making basics
- Crash sensing & critical timelines: idealized timeline for decision making & other system inputs
- Crash Pulse recording methodologies (e.g., g vs. time or delta-v)
- Delta-V recording variations: which systems record x-axis only; which record x & y axis; and, for what time period data is recorded
- Calculating principle direction of force from CDR data
- NHTSA CFR 49 Part 563 Rule with examples
- Pre-crash data sources & impacts on accuracy

CRASH DATA RETRIEVAL ANALYSIS & APPLICATIONS

40 Hours | 40 ACTAR CEUs
Prerequisites: Traffic Crash Reconstruction 1 & 2, CDR Operator

Crash reconstruction professionals gain an understanding of the function of the Event Data Recorder information that is obtainable from electronic control modules present in most late-model vehicles. Among many topics, instructors cover Crash Pulse recording methodologies, crash sensing and timelines, delta-v recording variations, and airbag system—deployment decision making related to the recorded data within the airbag control modules of supported vehicles.

Using case studies, CDR reports from actual crashes, and crash tests, the curriculum covers each generation of modules for all supported vehicle families, including line-by-line analysis of most parameters. Students receive copies of the CDR reports used in class for later reference.

Instructors also discuss applying data to the crash at hand, including delta-v and closing-speed analyses, principle direction of force calculation and application, and comparison of such pre-crash parameters as vehicle speed, throttle position, engine speed, and brake application. Further lessons involve methods of comparing internally recorded data, data from external sources, and how they handshake for comparison.

All CDR-supported vehicle systems are discussed in this course, including but not limited to:

- BMW vehicles & data from its ACM (aka ACSM for Advanced Crash Sensing Module)
- Chrysler vehicle reports & recorded data from first coverage through the most recently supported vehicles
- Ford vehicle reports, including ACM and PCM (Powertrain Control Modules) data elements, from the initial Ford CDR up through the latest ACM, which now contains pre-crash data
- Ford PCM data timing relating impact to “time 0” and restraint deployment signal (RDS) reception
- GM CDR reports by generation, including ROS (Rollover Sensor) data & Engineering Translation reports & variants
- Honda CDR reports, including examples from real-world crashes
- Mazda vehicles, including sample reports from real-world crashes
- Mercedes vehicles & their ACM data
- Nissan CDR reports, including a fuse panel guide for all supported Nissan vehicles to assist in back-powering
- Suzuki CDR reports and model-year ACM data and sources for back powering
- Volvo vehicle CDR reports
- Toyota ACM data, from Generation 1 through the new added Gen 3 (12EDR) modules, with & without pre-crash
- Hyundai & Kia EDR Tool reports, content, and data integrity
HOSTING A COURSE
On-site at the location of your choice. Earn free tuition for up to 4 students. Be recognized as a leader in advancing law enforcement education.

Agencies across the US and abroad host Northwestern Center for Public Safety courses, creating opportunities for local and regional law enforcement professionals to attend NUCPS’ exceptional programs closer to home, saving time and money.

HOST BENEFITS
The host agency can receive up to four free seats at the course it is hosting, depending on the number of paying students enrolled in the class. The free seats can be used for the host’s personnel or can be sold to other agencies.

HOST BENEFITS
The host agency incurs no out-of-pocket costs due to Northwestern. In most circumstances, NUCPS will handle student registration and tuition billing.

NORTHWESTERN PROVIDES
• Outstanding instructors
• All required course materials and books
• Promotional PDF flyers / course announcements
• Course listing on the NUCPS website and in e-blasts to prospective students
• Student registration and billing.

HOST AGENCY PROVIDES
• Course promotion to local law enforcement agencies through such channels as emailings, social media, advertising, press releases, presentations, and public relations.
• Suitable classroom in terms of size, internet access, and general course requirements.
• A contact person to assist instructors during the course.

NUMBER OF STUDENTS AND TUITION
The class size and tuition varies depending on the course.

LENGTH OF COURSES
The course length varies depending on the program. NUCPS can work with the host to determine the number of days and class hours.

HOTEL, MEALS & TRANSPORTATION
Hosts may provide options and recommendations to class participants but are not required to book hotels, schedule meals, or provide transportation.

PLANNING AHEAD
We recommend planning at least nine months to one year in advance. This lead time is critical for NUCPS and the host agency to effectively promote the course, allows potential participants to secure funding for tuition, and helps officers and staff make arrangements for the time needed to attend.

FINDING ATTENDEES
A valuable part of any course experience is the interaction participants have with officers from other agencies. To maximize that benefit, NUCPS recommends that no more than half of the students in a class be from the same agency.

To learn more…
Contact us at nucps@northwestern.edu or at (800) 323-4011.
EXPERIENCE THE NORTHWESTERN ADVANTAGE

1. THE GOLD STANDARD FOR PUBLIC SAFETY PROFESSIONAL EDUCATION

Tens of thousands of NUCPS course graduates are serving in agencies and organizations throughout the US and around the world — creating the future of law enforcement and addressing the most challenging issues in public safety.

2. COMPREHENSIVE CURRICULUM

NUCPS offers comprehensive education for public safety professionals. We serve organizations of all sizes and professionals at every stage of their careers. The depth of our programs enables you to find the right course at the right time and in a convenient location.

3. NATIONALLY RECOGNIZED INSTRUCTORS

Our instructors define excellence in law enforcement education — combining academic proficiency with on-the-job experience to provide education with a professional’s perspective.

4. DELIVERING IMPACT

NUCPS advances skills and techniques, builds analytical capacity, and improves agency performance. This enables agencies to reduce risk, avoid liability, drive efficiency, and advance strategic goals.

5. A PROFESSIONAL NETWORK & LEADERSHIP COMMUNITY

Northwestern students build relationships with instructors, fellow course participants, and leaders in the public safety community. These relationships translate into a lifetime of professional resources and opportunities.

Northwestern University
Center for Public Safety
405 Church Street
Evanston, Illinois 60201-3193

(800) 323-4011
Email: nucps@northwestern.edu
nucps.northwestern.edu