# ADVANCED TRAFFIC ACCIDENT

Expanded Outline

1.0) Introduction 1 Hour

a. Orientation
b. Overview of Course
c. Course Goals
d. Review of the Nine-Cell Matrix

2.0) The Law 4 Hours

a. Vehicle Code Updates
b. Penal Code Updates
c. Search and Seizure Review and Updates
    1. Discussion of current changes in search and seizure laws and court decisions.
    2. Review of evidence code and case law relevant to the collection of evidence.
d. Elements of Major Violations
    1. Homicide
        a) Murder
        b) Manslaughter (Gross/Ordinary Negligence)
    2. Felony Hit and Run
    3. Felony Driving-Under-the-Influence
    4. Other Major Violations

e. Civil Aspects
    1. Difference between criminal and civil procedure

f. Case Law
    1. Introduction to case law research procedures
    2. Discussion of applicable decisions

3.0) Photography 4 Hours

a. Review of Photographic Equipment
    1. Use of the standard 35mm camera
    2. Lenses and filters
    3. Flash equipment
    4. Film type and use
    5. Other accessories

b. Advanced Techniques
    1. Shutter/Aperture
    2. Flash
    3. Infrared Photography
    4. Aerial Photography

c. Introduction to Photogrammetry
    1. Perspective Grid Photography
    2. Terrestrial Photogrammetry

d. Case Law

4.0) ENVIRONMENTAL FACTORS 14 Hours

a. Definitions of engineering terms relevant to the roadway environment
b. Examination of the scene

    1. Roadway environment
        a. Roadway configuration
        b. Roadway delineation
        c. Controls
        d. Roadway surface compositions
        e. Weather and temperature

    2. Physical evidence
        a. Points of rest
        b. Tire marks
        c. Gouge marks
        d. Debris
        e. Fluid spatter, trails, pools and other collision scene evidence

c. Measuring the Roadway Environment

    1. Stationing
        a. Straight roadway
        b. Curved roadway

    2. Coordinate Method
        a. Linear
        b. Polar

    3. Spot-coordinate method
    4. Trilateration (Triangulation)
    5. Grid Method
    6. Use of photogrammetry techniques

d. Engineering Diagrams
    1. Use of engineering diagrams (As-built plans)
    2. Interpretation

e. Photography
    1. Photographing the roadway
    2. Photographing physical evidence

f. Case Law

g. Practical Exercises
    1. Examination and measurement of roadway site
    2. Engineering diagrams
    3. Environmental photography

5.0) DIAGRAMMING 8 Hours

a. Purpose of Scale Diagrams
    1. Medium for graphically recording collision site and physical evidence measurements.

    2. Provides the collision investigator with a perspective of the collision site, the evidence it contains, and their relationship that can be used to enhance the determination of collision cause factors.

    3. Utilized in all phases of collision reconstruction from the interpretation of physical evidence to the determination of area of impact, direction of travel, and velocities of collision-involved vehicles.

b. Equipment
    1. Traffic template
    2. Compass
    3. Protractor
    4. Engineer's scale ruler
    5. Flex curve
    6. Straight edges, triangles, etc.
    7. Pencils, paper, erasers, etc.
    8. Letering templates/devices
    9. Other implements

c. Information Required
    1. When to prepare scale diagrams
    2. How much and what type of information to include in diagrams

d. Diagramming Techniques
    1. Planning the diagram
    2. Straight roadway
        a. Center and lane lines
        b. Edge lines, pavement edges, curbs and shoulders
        c. Fixed objects
        d. Vision obscurements
        e. Tangent points
        f. Establishing right angles
        g. Traffic controls
        h. Physical evidence

    3. Curved roadways
        a. Center and lane lines
        b. Edge lines, pavement edges, curbs and shoulders
        c. Fixed objects
        d. Vision obscurements
        e. Tangent points
        f. Traffic controls
        g. Physical evidence

    4. Intersections
        a. Center and lane lines
        b. Edge lines, pavement edges, curbs and shoulders
        c. Fixed objects
        d. Vision obscurements
        e. Tangent points
        f. Angle of intersection
        g. Crosswalks, curbs, sidewalks and other features
        h. Intercept points
        i. Traffic controls
        j. Physical evidence

    5. Special Circumstances
        a. Off-road collisions
        b. Parking lots
        c. Cross-sectional diagrams
            (1) Vertical curves
            (2) Roadway collisions
                (a) Freefall collisions

e. Practical Exercises

    1. Draw scale diagrams from information provided

6.0) VEHICLE FACTORS 16 Hours

a. Major Components
    1. Tires and wheels
    2. Brakes
    3. Steering
    4. Suspension
    5. Glass
    6. Electrical
    7. Power trains
    8. Exhaust
    9. Restraints
    10. Lighting

b. Reasons for Inspection
    1. Record damage
    2. Determine force lines
    3. Possible mechanical defects
    4. Occupant contact

c. Inspection Process
    1. General walk around
        a. Establish what basic factors are involved
        b. Note unusual conditions

    2. Vehicle Damage Description

        a. Exterior
            1. Contact damage
                (a) Definition
                (b) Examples
                (c) How to record

                    1) Vehicle outline sketches
                    2) Vehicle profile
                    3) Vehicle damage records

            2. Induced damage
                (a) Definition
                (b) Examples
                (c) How to record

            3. Reason for distinguishing between contact and induced
            4. Imprints and transfers

b. Interior
    1. Contact damage
    2. Induced damage
    3. Reason for distinguishing between contact and induced
    4. Imprints and transfers

3. What to Measure
    a. All damage, whether new or old
    b. Emphasis on major component displacement
    c. Importance of not overlooking minor component damage
    d. Horizontal, vertical and crush dimensions
    e. Establishment of pre-crush dimensions
    f. Occupant contact damage

4. How to Measure
    a. Station line method through longitudinal axis of vehicle
    b. Body line extension
    c. Base line along the side or front of the vehicle
    d. Rectangular stationing
    e. Stand and cord

5. Motorcycle damage measurements
    a. Measurement of wheelbase displacement
    b. Examination of fork damage to determine extent of braking at impact
    c. Usefulness in speed analysis

d. Force Line Determination
    1. Methodology
    2. Explanation of changes in force magnitudes during impact
    3. Resultant force or direction of principle force
    4. Flow of the damage
    5. Occupant kinematics
    6. Accuracy of determination
    7. Force line estimates and their use in the accident reconstruction process

e. Collision Deformation Classification (CDC)

f. Photography
    1. How to photograph vehicular evidence
        a. Exterior
        b. Interior
        c. Mechanical defects

g. Vehicle Damage Diagram

1. Selection of appropriate scale
2. Plotting measurements from reference lines
3. Vehicle damage profile
4. Use in the accident reconstruction process

h. Use of Mechanical and Automotive Engineers as Experts
1. Mechanical inspections of vehicles
2. Analysis of component parts and systems failures
3. Expert witness testimony

i. Lamp Analysis to Determine On of Off at Impact

j. Legal Aspects of Vehicle Inspections

k. Practical Exercises
1. Measure, diagram, and photograph a damaged vehicle
2. Determine lines of force
3. Lamp analysis

7.0) HUMAN FACTORS 8 Hours

a. Introduction to Human Factors/Overview

b. Psychological Factors
1. Cultural
2. Emotional
3. Suicidal
4. Homicidal

c. Physiological Factors
1. Nervous system
2. Senses
3. Reaction time
(a) Perception
(b) Decision
(c) Reaction
(1) Reflex reaction
(2) Simple reaction
(3) Complex reaction
(4) Discriminative

d. Altered Physiological Factors
1. Physical handicap
2. Medical condition
3. Alcohol and drugs

4. Fatigue
5. Environment

e. Witnesses
    1. Ability to perceive
    2. Field of view
    3. Education and experience
    4. Emotional condition
    5. Bias/Prejudices

f. Mechanisms of Injury
    1. At-scene investigation
    2. Hospital follow-up
        a. Description
        b. Photographs
        c. Medical records

    3. Morgue follow-up
        a. Description
        b. Photographs
        c. Medical records
        d. Autopsy evidence

    4. Collision trauma

    5. Intentional verses accidental

g. Case Law

8.0) MATHEMATICS AND BASIC PHYSICS 7 Hours

a. Mathematics
    1. Algebra review
    2. Right-angle trigonometry
    3. Quadratic equations
    4. Cartesian coordinate system

b. Basic Physics
    1. Laws of motion
    2. Inertial reference systems
    3. Velocity and acceleration
        a. Constant, Average, and Instantaneous
    4. Objects in freefall
    5. Resultant drag factor

9.0) TIME-POSITION ANALYSIS (KINEMATICS) 7 Hours

a. Equation of motion with constant acceleration
    1. Refer to Advanced Traffic Accident variable list and equation sheet

b. Outline and demonstration of solution process
c. Time-position analysis problems

10.0) FREEFALL ANALYSIS 7 Hours

a. Freefall equation and derivation
b. Evidence associated with freefall accident
    1. Evidence of launch
    2. Evidence of trajectory
    3. Evidence of landing
    Freefall analysis problems
c. Means to ensure the calculated speed is consistent with all parameters of the collision

11.0) FINAL EXAMINATION 4 Hours

a. A combination of no more than one hour cognitive evaluation and no less than three hours of case evaluations

    1. Number of cases will be based on case complexity