Domain 1: Foundations of Road Safety

Task 1:

Define road safety (i.e., Highway Safety Manual, Road Safety Fundamentals).

Knowledge of:

- Definition of road safety
- Sources of road safety information (e.g., literature, government and professional organizations, peers)

Skill in:

- Critiquing road safety definitions

Task 2:

Describe evidence-based road safety, including the distinction of nominal versus substantive safety, by using road safety literature.

Knowledge of:

- Nominal versus substantive safety
- Sources of road safety information (e.g., literature, government and professional organizations, peers)

Skill in:

- Critiquing various sources of road safety literature
- Interpreting and applying source information when applicable

Task 3:

Describe the complexity of road safety (e.g., crash contributing factors and their interaction effects, crash frequency and severity).

Knowledge of:

- Sources of road safety information specific to crash contributing factors (e.g., crash reports, conflict data, road user behavior, field visits, geospatial data)
- Collision characteristics (e.g., speed, multimodal crashes)
- Relationship of severity to collision types
- Various disciplines involved in road safety

Skill in:

- Assessing various sources of road safety literature
- Assessing various sources of road safety information (e.g., safety data, CMF Clearinghouse, Countermeasures That Work, Safe System primary countermeasures)
- Considering diverse perspectives of various disciplines in determining the factors that contribute to crash frequency and severity

Task 4:

List road safety-relevant characteristics of different types of road users.

Knowledge of:

- Sources of road safety information (e.g., literature, government and professional organizations, peers)
- Road user behaviors
- Road user abilities
- Road user vulnerability and frailty
- Propensity for road user error
- Propensity for road user adaptation
- Road user expectation
- Operation of the sensory perception system (e.g., visual, auditory)
- Attention, distraction, and information processing capabilities
- Perception-reaction times

Skill in:

- Selecting the most relevant road safety information to understand the safety concerns
- Identifying how human characteristics (e.g., perception, information processing, physical condition) lead to road user error

Task 5:

Identify multidisciplinary partners across organizations to collaborate in decisions and actions to improve road safety.

Knowledge of:

- Sources of road safety information (e.g., literature, government and professional organizations, peers)
- Multidisciplinary approach to road safety management
- Principles of leadership
- Roles and responsibilities in road safety (e.g., federal agencies, state/provincial/municipal agencies, vehicle manufactures)
- Traffic safety culture
- Organizational traffic safety culture

Skill in:

- Supporting multidisciplinary teams
- Listing the components of a traffic safety culture (e.g., shared values, attitudes)
- Recognizing different roles, responsibilities, and perspectives on road safety

Task 6:

Describe different approaches to road safety management (e.g., traditional 4Es, Haddon's matrix, Safe System Approach, Vision Zero).

Knowledge of:

- History of the development of road safety management as well as emerging approaches (e.g., literature, government and professional organizations, peers)
- Principles and elements of the Safe System Approach
- Steps of the Road Safety Management Process
- Road safety audit
- Haddon's matrix
- Vision Zero

Skill in:

- Applying the principles and elements of the Safe System Approach
- Applying Haddon's matrix

Domain 2: Measuring Safety

Task 1:

Identify types, applications, and users of safety data, and discuss ways to mitigate the challenges and limitations of the data.

Knowledge of:

- Types of safety data
- Sources of safety data
- Typical users of safety data
- Difference between qualitative and quantitative data
- Limitations of different types of safety data
- Data quality management

Skill in:

- Distinguishing qualitative from quantitative safety data
- Collecting, managing, and using safety data
- Combining and analyzing multiple sources of safety data (e.g., police records, hospital records, municipal records)
- Interpreting data quality performance measures (i.e., timeliness, accuracy, completeness, uniformity, integration, accessibility)

Task 2:

Discuss how the quality of safety data can lead to more effective programs, projects, initiatives, and investments.

Knowledge of:

- Analytical needs of the users of safety data (e.g., tools for site analysis and crash contributing factors)
- Components of safety data quality management
- Methods to measure and improve data quality attributes for multiple data sources
- Role of safety data in guiding safety programs, projects, initiatives and investments

Skill in:

- Evaluating the quality of safety data
- Recognizing how data quality can influence outcomes
- Conducting data-related process reviews

Task 3:

Explain the primary components of quantitative safety analysis.

Knowledge of:

- Definition of SPFs
- Definition of CMFs
- Components of SPFs and how they are used
- Application of CMFs
- Differences between SPFs and CMFs
- Data needed to use SPFs and CMFs for evaluating safety performance
- Difference between predicted and observed crash frequency
- Pitfalls of nonreliable estimates of CMFs (i.e., countermeasure effectiveness)
- Over-representation in crashes and crash types for various road users

Skill in:

- Critiquing SPFs and CMFs
- Selecting suitable SPFs and CMFs
- Applying CMFs

Domain 3: Human Factors and Road Safety

Task 1:

Describe key characteristics, abilities, and limitations of human factors that influence how road users interact with the roadway environment.

Knowledge of:

- Human factors of road safety
- Operation of the perceptual system (e.g., visual, auditory)
- Attention, distraction, and information processing capabilities
- Perception-reaction times
- Basic elements of the driving task
- Influence of road user workload
- Influence of road user mental and physical condition on safety
- User expectation
- User adaptation

Skill in:

- Identifying how human abilities and limitations (e.g., perception, information processing, condition) influence safety, infrastructure design and operations, and behavioral program design and delivery

Task 2:

Describe multidisciplinary safety strategies to modify human behavior.

Knowledge of:

- Multidisciplinary approaches to addressing road user behavior (e.g., education, enforcement, engineering, Safe System Approach, cultural norming)
- Common strategies that address human behavior within each discipline
- Human-centered components of road safety plans (e.g., vulnerable road users, behavioral contributing factors)
- Key partners within each discipline

Skill in:

- Interpreting safety information to identify underlying behavioral issues
- Linking identified behavioral safety issues to appropriate multidisciplinary strategies
- Coordinating among multiple partners to implement strategies

Task 3:

Discuss the benefits and limitations of enforcement and educational/outreach strategies for modifying human behavior.

Knowledge of:

- Effective educational/outreach and enforcement strategies
- Population demographics and target audience characteristics
- Social norms and traffic safety culture
- Outreach methods (e.g., public service announcements, social media, events)
- Statutory/policy influences and limitations (e.g., enforcement, novice driver training, motorcyclist training)

Skill in:

- Evaluating behavioral safety program effectiveness
- Identifying resource needs for behavioral safety programs (e.g., enforcement, media buys, evaluation)
- Communicating with a non-technical audience

Task 4:

Describe how roadway infrastructure features and elements (e.g., traffic control devices, road alignment, cross-section) affect human behavior.

Knowledge of:

- Safety literature
- Human factors for road systems
- Road user adaptation and road elements (e.g., sight distance, alignment elements, illumination)
- Road user adaptation to countermeasures (e.g., resurfacing, illumination)
- Road user expectation based on roadway elements
- Predominant crash types for roadway types (e.g., rural versus urban, freeway versus local road) and why they occur (e.g., infrastructure contributing factors)
- Interaction of road design and driver workload

Skill in:

- Understanding the output of safety analyses that identify the interaction between roadway environment and road users
- Communicating with a non-technical audience

Task 5:

Describe how human factors influence planning, design, and operations to increase the safety of all road users.

Knowledge of:

- Human mental, physical, perceptual, and cognitive limitations
- Types of human errors and their contributions to road safety
- Adaptation of drivers to road design
- Road planning, design, and operations processes
- Vulnerable road user needs and challenges

Skill in:

- Interpreting human error
- Evaluating the interaction of roadway features and human factors

Task 6:

Describe how applying positive guidance principles reduces road user cognitive workload.

Knowledge of:

- Principles of positive guidance for road systems
- Applications of positive guidance
- Driving task model
- Driver capabilities and limitations in performing the driving tasks (e.g., workload, information processing)
- Capabilities and limitations of all road users
- Vehicle, infrastructure, and road user interaction

Skill in:

- Applying the driving task model to the process of identifying contributing factors to road user error (e.g., work zones)
- Identifying and analyzing workload elements (e.g., driver attention and information processing ability, vision capability, perception-response time, speed choice)

Domain 4: Solving Road Safety Problems

Task 1:

Describe the road safety management process and the use of data-driven procedures and methods.

Knowledge of:

- Safety management process (i.e., network screening, diagnosis, countermeasure selection, economic appraisal, project selection and prioritization, safety effectiveness evaluation)
- Different methods and tools to support the different components of the road safety management process

Skill in:

- Identifying safety problems (i.e., network screening and diagnosis)
- Developing potential safety solutions (i.e., countermeasure selection and economic appraisal)

Task 2:

Describe network screening approaches and methods.

Knowledge of:

- Different network screening performance measures (e.g., expected crash frequencies, predicted crash frequencies)
- Site-specific network screening approaches
- Systemic network screening approaches

Skill in:

- Identifying the data needs, resources, advantages, and limitations of different network screening performance measures
- Estimating the performance measures
- Selecting systemic versus site-specific approaches

Task 3:

Select the appropriate methods, approaches, and tools to diagnose safety problems by using safety data to identify contributing factors and patterns of crashes.

Knowledge of:

- Applications and limitations of diagnostic methods, approaches, and tools
- Safety data types (e.g., crash data, speed data, near miss data)
- Crash data elements (e.g., crash type, crash severity, time of day)
- Crash report elements (e.g., crash narrative, at-fault drivers, vehicle type)
- Surrogate safety measures

Skill in:

- Interpreting safety data
- Conducting safety analysis
- Identifying patterns (e.g., collision diagramming)
- Interpreting safety analysis results and findings

Task 4:

Recognize appropriate sources for multidisciplinary countermeasures and select potential countermeasures.

Knowledge of:

- Appropriate sources for multidisciplinary countermeasures (e.g., CMF clearinghouse, Countermeasures that Work, Safe System primary countermeasures, proven safety countermeasures)
- CMFs
- How multidisciplinary approaches can be used to select the most effective solutions
- User-focused interventions for specific target groups (e.g., vulnerable road users)

Skill in:

- Recognizing the trade-offs in selecting countermeasures (e.g., fully protected left-turn phase and pedestrian safety)
- Selecting the most appropriate CMFs and applying them
- Applying the appropriate treatments to the identified safety problem

Task 5:

Perform benefit-cost analysis to select effective road safety programs and countermeasures for implementation.

Knowledge of:

- Techniques to perform economic appraisal analysis
- Understanding non-tangible impacts (e.g., environmental, societal) of countermeasure implementation
- Direct (e.g., medical bills, repairs) and Indirect costs of crashes (e.g., lost productivity, economic loss)
- Program and project requirements (e.g., projects identified by systemic road safety management)

Skill in:

- Conducting benefit-cost analysis
- Prioritizing projects based on benefit-cost analysis
- Documenting non-tangible benefits and costs

Task 6:

Create an evaluation plan using data to determine the impact of proposed countermeasures.

Knowledge of:

- Evaluation methods (e.g., before-after studies, cross-sectional studies)
- How to measure safety impacts
- Data sources

Skill in:

- Identifying sources of data

Domain 5: Implementing Road Safety Plans and Programs

Task 1:

Describe how road safety plans are prepared and used.

Knowledge of:

- Road safety plans (e.g., Strategic Highway Safety Plan, local road safety plan, behavioral safety programs)
- Safety plan development process
- Implementing safety plans and programs
- Importance of multidisciplinary partners when developing a road safety plan or behavioral program

Skill in:

- Describing the essential components of a road safety plan or program (e.g., identifying goal and objectives based on data)
- Gathering and analyzing data for emphasis areas or program areas
- Listing the key partners who should be involved in creating a road safety plan or behavioral safety program
- Describing how road safety plans and programs influence the use of road safety funding and resources
- Evaluating the results of strategies and programs, including implementation and monitoring

Task 2:

List important elements of road safety policies and programs.

Knowledge of:

- Elements of successful and unsuccessful road safety policies and programs
- Common attributes of effective road safety policies and programs (e.g., data-driven, multidisciplinary, training, strategic planning, research)
- Research to shape road safety policies/programs (e.g., TRB, NHTSA, FHWA, CCMTA, state research programs, IIHS, TIRF, AAA/CAA)
- Multidisciplinary partners appropriate for road safety policies/programs (e.g., behavioral specialists, engineers, planners, educators, law enforcement, medical personnel)

Skill in:

- Assessing the “cause and effect” linkage between the problem and policies/programs
- Determining the practicality of implementation

Task 3:

Explain the roles, elements, and value of multidisciplinary teams for implementing and monitoring road safety policies, programs, and outreach strategies.

Knowledge of:

- Elements of effective communication programs
- How to build consensus among decision-makers and lead to increased public acceptance/awareness about road safety initiatives
- Roles of leaders, champions, and coalitions
- Basic outreach strategies (e.g., advertising, public meetings, PSAs, events)
- Roles and benefits of multidisciplinary teams (e.g., engineering, planning, education, enforcement, public health, emergency services)

Skill in:

- Identifying a target audience
- Choosing strategies appropriate for the audience
- Developing compelling road safety messages
- Using guides and tools to implement road safety plans

Task 4:

Describe approaches to evaluate road safety programs and explain how evaluation findings influence changes in future program delivery.

Knowledge of:

- Key components for the program evaluation
- When and how to conduct a program evaluation
- Different evaluation methods (e.g., process, outcome)
- How evaluation influences program and road safety plan updates

Skill in:

- Conducting a process or program evaluation
- Interpreting program evaluation results to inform changes

Legend:

4E: enforcement, education, emergency response, and engineering

SPF: safety performance functions

CMF: crash modification factors

TRB: Transportation Research Board

NHTSA: National Highway Traffic Safety Administration

FHWA: Federal Highway Administration

CCMTA: Canadian Council of Motor Transport Administrators

IIHS: Insurance Institute for Highway Safety

TIRF: Traffic Injury Research Foundation

AAA: American Automobile Association

CAA: Canadian Automobile Association

PSA: public service announcements