SELF-ASSESSMENT TOOL (Based on the 2023 National Syllabus)

Purpose

This self-assessment is designed to help you evaluate your current level of knowledge and experience in relation to the technical requirements for a Canadian Professional Land Surveyor. It also helps you identify the evidence that supports your knowledge and any learning gaps that may require further development.

The self-assessment is organized as follows:

- **Competencies** represent the major technical areas of professional practice.
- Each **competency** is divided into one or more **subjects**.
- Each **subject** contains several **syllabus items** (bullet points) that describe specific areas of knowledge.

You will assess each syllabus item individually.

How to Complete the Self-Assessment

Step 1 – Review the Rating Scale

Before completing the assessment, review the Rating Scale provided on each competency form. Use the scale to rate your current level of knowledge for each syllabus item.

Rating	Description
0	No knowledge or experience.
2	Familiar with the topic but unable to explain it.
4	Can explain the topic with some assistance.
6	Can explain the topic with minimal assistance.
8	Can explain the topic confidently without assistance.
10	Can explain the topic confidently without assistance and have applied or implemented it extensively in practice.

Step 2 – Complete the Evidence(s) and Gap(s) Column

For each subject:

Evidence(s)

List the evidence that demonstrates your knowledge and experience. At this stage, simply identify the evidence you intend to provide—do **not** submit supporting documentation here, just list them.

Examples of evidence include:

- Relevant courses or academic programs
- Workshops or professional training
- Workplace experience
- Projects or assignments
- Certifications
- Self-directed learning
- Other relevant experience

Gap(s)

After listing your evidence, identify any syllabus items for which you believe you have limited or no knowledge or experience (generally corresponding to ratings of **0–2**). These are your learning gaps. Identifying learning gaps helps the interview panel understand your current level of knowledge and focus the discussion appropriately.

Step 3 – Rate Each Syllabus Item

For every syllabus item within a subject:

1. Assign a rating from **0 to 10** using the Rating Scale.
2. After rating all syllabus items within that subject, calculate the average of all ratings.
3. Record the average in the **"R"** column.

Include the ratings assigned to any identified learning gaps when calculating the average.

Additional Guidance

- A single piece of evidence may demonstrate your knowledge across multiple subjects or competencies.
- Likewise, demonstrating knowledge in a single subject may require several different pieces of evidence.
- Providing a variety of relevant evidence helps present a complete and accurate representation of your knowledge, experience, and professional development.

Technical Knowledge Requirements for a Canadian Professional Land Surveyor

In this section, you will assess your current level of knowledge for the technical requirements covered across the course syllabi for a Canadian Professional Land Surveyor.

S1 – Mathematics and Science

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Probability & Statistics	• Probability theory, samples, sample spaces, counting (Combinations, permutations) conditional probability, independence of events • Random variables and discrete and continuous distributions, binomial distribution, probability distribution functions and cumulative distribution functions • Expected values, covariance and correlation • Distribution of the sample mean, Distribution of a linear combination, covariance propagation	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
	• Error Sources & Hypothesis testing and Type I and II errors				
Numerical Methods	• Fundamentals of numerical methods; visualize, explore and then model • Numerical errors • Systems of linear equations • Interpolation and extrapolation • Numerical integration, Numerical aspects of solving systems of equations (least squares and the effects of geometry)	• Evidence(s) • • Gap(s) •		• Format Sample	
Calculus	• Functions, continuity & limits • Differentiation & applications • Integration, quadratures & applications • Plane curves, tangency & curvature • Sequences, series & Taylor expansions • Partial differentiation & differential operators • Multiple integrals & numerical approximations • Homogeneous ordinary differential equations	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Matrices & Linear Algebra	• Vector operations & analytical geometry (Real and complex vectors, Scalar and vector products of vectors, Analytical geometry equations and formulae) • Matrix algebra, linear equations & transformations (Matrices and simple matrix algebra, Matrix representation of linear algebraic equations and solutions, Matrix representation of linear transformations) • Complex variables, linear spaces & subspaces (Complex variables, Linear real and complex spaces and subspaces, Projections in real and complex spaces) • Quadratic forms, orthogonal & unitary matrices (Quadratic forms and applications, Orthogonal and unitary matrices and their applications) • Eigen vectors & values	• Evidence(s) • • Gap(s) •		• Format Sample	
Physics	• The Système International (SI) system of units of measure in quantity representations for; area, distance (length), frequency, volume, mass, time, electric current, force, energy, gravity and temperature • Physical terms such as mass, time, distance, force, acceleration, momentum, gravity, pressure; ampere, charge, potential difference, resistance; humidity, absolute humidity, relative humidity, saturation vapour pressure, equilibrium state, speed of sound and light	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
	• Basic physical laws such as Newton's Laws of motion, laws of reflection and refraction, Kepler's Laws of planetary motion (universal gravitation, gravitational field, orbital dynamics), and their applications • Spheroidal oscillations in elastic waves and seismic rays at earth's surface; • Physics of the atmosphere, their effect on electromagnetic waves and measurements, and their applications				
Computing	• Procedures involved in developing algorithms • Translating surveying problems into computer language • Functions, arrays and records in programming environment • Solving problems using computer programming with and without available libraries • Writing simple functions to read and write ASCII and binary data from and to files appropriately formatted files	• Evidence(s) • • Gap(s) •		• Format Sample	

S2 – Modeling and Analysis

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Modeling & Prediction	• Fundamentals of spatial data analysis including visualise, explore and then model • Conditional, parametric, and general formulation of adjustment • Least squares adjustment models for different geomatics observables (including distance, azimuth, Horizontal and vertical directions/angles, GNSS, etc.) • Sequential adjustment model • Time series modeling, Kalman Filtering as a simple prediction model	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Estimation & Approximation	• Solution to underdetermined, unique, and overdetermined system of equations • Datum problems, including datum transformation • Principles and properties of least squares estimation and approximation • Calculus as applied to linearize non-linear systems of equations • Matrix manipulation involved in estimation and approximation	• Evidence(s) • • Gap(s) •		• Format Sample	
Filtering	• Spectral analysis (Fourier Transform) of time series • Relationship between sequential least squares adjustments and filtering • Relationship between spectral analysis of time series and filtering • Finite Impulse Response (FIR) filter design methods in image processing • Other filtering algorithms, such as used in positioning problems, e.g. Kalman filtering, moving average (MA), autoregressive (AR), and their combinations (ARMA)	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Statistical Data Analysis	• Gross error, systematic error, random error, precision and accuracy • Systematic and random error propagation • Simulation & pre-analysis of control networks (zero, first, and second order design) • Probability and statistics (statistical tests) to assess quality of geomatics field measurements • Probability and statistics (statistical tests) to assess quality of adjustment solutions	• Evidence(s) • • Gap(s) •		• Format Sample	

S3 – Geodesy

RATING (R) SCALE:

0 - Have no experience/knowledge

2 - Have heard or been familiarized to but cannot elaborate on

4 - Can elaborate on with some assistance

6 - Can elaborate on with minimum assistance

8 - Can elaborate on without assistance

10 - Can not only elaborate on without assistance but also have used/implemented it extensively

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Earth's Physics	• Definition and history of geodesy, field of specializations, applications, relations to other scientific disciplines, and related national and international organizations • Earth motions including diurnal, annual, precession, nutation, free nutation, variations in the angular velocity of the Earth, and their effects on geodesy • Physical shapes of the Earth, approximating them with different mathematical surfaces, and their applications in geodesy and surveying • Earth deformation in time including tide, isostasy theory, post glacial rebound, plate tectonics, man made deformations, and their effect on geodesy • Earth atmosphere, its physical properties and its effect on EM waves, its temporal variations, and gravitational field	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Coordinate & Reference Systems	• Definition and realizations of Terrestrial Reference Systems including geocentric (IT, AT, G), topocentric (LA, LG), ITRS, ITRF, and their transformations • Horizontal datums with an emphasis on NAD27, NAD83, NATRF2022, and CSRS, and corresponding transformations • Definition of Celestial Reference Systems including Ecliptic, Right Ascension, Hour Angle, and Horizon, Apparent Place, ICRF, ICRS and their transformations • Definition of Orbital Reference System, Kepler's laws, Keplerian orbital elements, and transformation of orbital to terrestrial coordinate systems • Time systems (Solar, sideral, atomic, GPS, Gregorian and Julian day/calendar), its variations (UT, UTC, UT0, UT1, and UT2, and transformations	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Geodetic Positioning	• Conventional geodetic observations and their corrections and reductions to the reference ellipsoid • 3D coordinate computations (LA/LG) using geodetic observations • Geodetic coordinate computations (2D) on the reference ellipsoid using short and long baseline formulas • Astronomic observations and their corresponding corrections and reductions • Astronomic azimuth, latitude, and longitude computations using celestial observations	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Map Projection Systems	• Definition of cartography, map projections problem and the parameters involved like scale, scale factor, false easting & northing, convergence of meridian • Theory of surfaces using first and second fundamental forms • Distortions in map projections including distortion in scale, bearing, angle, and area, definition and use of Tissot Indicatrix to evaluate map projection distortion • Map projection system classifications, and selecting a map projection system for a specific area/project • Specifications of M, TM, MTM, UTM, Lambert, and Stereographic Double map projections, coordinate computations on them, and transformation between them and ground	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Gravity Field & Height Systems	• History, importance, computations, and realizations of vertical datums (tide gauge, gravimetric, and combined ones) including CGVD28, CGVD2013, Great Lakes, and NAPGD2022, and the difference between MSL, geoid, and quasi geoid • Earth gravity field, terrestrial gravity measurement methods (absolute and relative mode), corrections to gravity measurements, normal gravity, gravity anomaly, gravity disturbance, gravity potential, potential disturbance, equipotential surfaces and their relation to gravity vector • Geoid computation using Stoke's method (spherical harmonics series expansion), brief comparison with Molodesnkij's method, application of satellite gravimetry / gradiometery missions (GOCE, GRACE, CHAMP, ...) in geoid determination • Physical and geometrical interpretation of lower degrees of spherical harmonics coefficients and their application in establishing ITRF coordinate systems • Different height systems including geopotential numbers, orthometric, dynamic, normal, and GNSS, and transformations between them • Astro-geodetic and astro-gravimetric methods of geoid determination	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Satellite Positioning Systems	• History, basic components, generations, concepts and configuration of satellite systems • GNSS signals, receivers, observations (pseudo-range, and phase), their characteristics, and their corresponding mathematical models • GNSS positioning modes (absolute/relative, static/kinematic, post processing/real-time), their characteristics and applications • Error sources, biases and achievable accuracy associated with each positioning mode, error mitigation strategies (including using data combinations, error models, differential techniques like DGNSS, RTK, LADGNSS, WADGNSS, Satellite Based Augmentation System (SBAS), correction domains (solution/observation/state-space), and data formats • Transformation of GNSS derived coordinates to the user coordinate system (local datum, ground/map projection system, and orthometric height)	• Evidence(s) • • Gap(s) •		• Format Sample	

S4 – Surveying

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Instrumentation Testing & Utilization	• Development and implications of historical survey instruments • Elements and operational principles of angle, distance, azimuth, and elevation measurement instruments • Elements and operational principles of GPS/GNSS receiver (for ground surveys), 3D scanner, and unmanned aerial vehicle (UAV) • Ancillary equipment (measuring tapes, plumb bobs, rods, external data collectors, etc.) • Calibration of instruments	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Observable Types & Quality Assessment	• Errors (systematic and random) and mistakes (gross errors) estimation & detection, estimation of accuracy and precision in measurements • Basic observables: slope distances, horizontal directions, vertical angles, vertical distances • Derived measurements: coordinates, elevation differences, horizontal and mark-to-mark distances, horizontal angles, azimuths derived from plane, astronomic, geodetic, gyro theodolite or gyro station measurements • Characteristics of raw data (contamination with errors and biases)	• Evidence(s) • • Gap(s) •		• Format Sample	
Data Collection Including Field Procedures	• Basic principles and procedures of angular and direction, distance, differential & trigonometric leveling measurements • COGO geometry • Procedures and calculation of location by intersection, resection, and traversing • Procedures and calculation of construction layout, and route survey (horizontal & vertical curves) • Principles of field notes, field records and significant numbers • Principles and procedures of field checks	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Common Survey Types (Cadastral, Topographic, Control, ...)	• Cadastral survey • Construction survey • Location survey • Site planning survey • Topographic survey • Control survey • Oil and gas survey • Mining survey • Offshore engineering survey • Hydrographic surveys	• Evidence(s) • • Gap(s) •		• Format Sample	
Survey Design, Simulation & Analysis	• Requirements' analysis • Principles and steps of survey design and analysis • Errors and consideration in design • Design and analysis of control surveys • Logistical, resource considerations, and role of occupational health and safety issues in survey design in meeting project needs	• Evidence(s) • • Gap(s) •		• Format Sample	
High Precision Surveying	• High-precision instruments • Industrial surveying (or metrology) • Deformation monitoring • Precision construction alignment • High precision leveling • Tunnelling survey • Control Survey • Blunder and outlier detection	• Evidence(s) • • Gap(s) •		• Format Sample	

S5 – Remote Sensing

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Introduction to Remote Sensing	• History of satellite remote sensing, the image formation process, the current satellite remote sensing missions, their specifications, and applications • Electromagnetic (EM) waves and their characteristics (atmospheric windows) • Atmosphere interaction with the EM (scattering, absorption, reflection) • Ground features (soil, water, vegetation) interaction with the EM (scattering, absorption, reflection) • General review of active & passive sensors (MSS, Pushbroom, Thermal) and how they work • Reviewing basic terms including pixel, band/channel, IFOV and FOV, difference between image and photo, multi and hyper-spectral image formation, data models and formats	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Remote Sensing Platforms	• Advantages, limitations, and applications of remotely sensed data • Ground based platforms (Handheld devices, Vehicles, tripods, and towers) including use of ground-based platform, setting up ground-based platforms, advantages and disadvantages of all platforms • Airborne platforms (RPAS, and Aeroplanes) including mission planning, calculating flight altitude, calculating number of flight lines, calculating number of images per flight line, calculating platform speed, calculating image scale • Space borne platforms (Satellites) including law of gravitation, circular motion and satellites, and Kepler's laws • Satellite orbit classification	• Evidence(s) • • Gap(s) •		• Format Sample	
Passive Remote Sensing: Sensors	• Cameras and Scanners (characteristics, geometry, benefits, and limitations of a digital image, and single and stereo image mode) • Image Resolutions (spatial, spectral, radiometric, and temporal)	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Passive Remote Sensing: Image Processing & Manipulations	• Image pre-processing (Atmospheric, Geometric (georeferencing/registration, transformation, resampling) & Radiometric corrections) • Image Enhancement (Contrast stretch, Histogram equalization, Digital filtering (low-pass, high-pass)) • Band Composite (PCA, NDVI, Pan-sharpening, and their applications) • Image Manipulation (Image rectification, DEM and orthoimage generation, Mathematical models for sensor and for sensor to object relationships) • Close range photogrammetry • Digital photogrammetry, epipolar and coplanarity geometry, image matching and 3D reconstruction	• Evidence(s) • • Gap(s) •		• Format Sample	
Passive Remote Sensing: Image Analysis & Interpretation	• Visual Interpretation (defining objectives, selecting data, Interpretation elements) • Digital Interpretation including unsupervised image classification (K-Means, ISODatA), supervised image classification Minimum Distance, parallelepiped, maximum likelihood, spectral angle mapper), and object-oriented image classification	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Passive Remote Sensing: Applications	• Vegetation analysis and mapping using NDVI (Normalized Difference Vegetation Index) and other vegetation indices • Land-use/Land-cover applications including built up area mapping, and surface water mapping • Forest fire detection and burn area mapping • Temporal analysis for change detection • Topographic mapping	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Active Remote Sensing Sensors & Applications: LiDAR	• Fundamentals of LIDAR technology (Components of LIDAR Systems, determination of 3D Coordinates from LIDAR Systems, Calibration, processing of point cloud data, 3D point cloud co-registration) • Ground based LIDAR Systems ((Terrestrial Laser Scanners–TLS) technology, mission planning and data acquisition using TLS, applications of TLS (Scanning of buildings and structures)) • Airborne LIDAR Systems (Airborne LIDAR Technology (GNSS, IMU, Laser Scanner), mission planning and flying operation, Geolocation Process, sources of Data Errors, applications of Airborne LIDAR systems (DEM, DSM, volume calculation, view shed and watershed area determination)) • Spaceborne LIDAR System (ICESAT-2 and GEDI) • LIDAR Applications (Land Surveying, generation of Digital Terrain Models (DTMs), open Pit Volume Calculations, transportation Expansion)	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Active Remote Sensing Sensors & Applications: RADAR	• RADAR Technology (RADAR wavelengths (Bands), polarization, interference advantages and limitations) • Side looking RADAR (SLAR) (Viewing geometry, spatial resolution (Slant range, cross track, and along track resolution), image characteristics (Shadow, foreshortening, layover effect, and speckle noise)) • Synthetic Aperture RADAR (SAR) (technology, applications, and SAR Interferometry (InSAR)) • Ground Penetrating Radar (GPR) (Physical principles, components of GPR, wavelengths/frequencies, penetration, and resolutions, sources of error, airwaves, line scans, grid scans, data understanding and interpretation, dielectric constant of materials, construction of 3D images/tomographic images, object detection and locations, GPR data interpretation & applications) • Interpretation of RADAR Imagery & applications agriculture, forestry, mining	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Active Remote Sensing Sensors: SONAR Technology & Hydrography	• Principles and Processes of Hydrographic Surveying and SONAR Technology (sound waves and their characteristics, refraction of sound waves, propagation of sound waves in water, tidal fundamentals, measurements, streams, and currents, non-tidal water variations, and vertical Datum, elevation, and soundings, MLW, MLLW, MHW) • SONAR Systems (Single Beam Echo Sounders (SBES), Narrow Beam and Wide Beam Sounders, Multibeam Echo Sounders (MBES), Side Scan Sonars (SSS), and sonar data processing) • Elements of Hydrographic Surveys (SONAR survey requirements, mission planning, surveys in support of river crossings and engineering, surveys in support of port management and coastal engineering, ellipsoidally referenced hydrographic surveys, nautical charting and marine navigation, SONAR data applications, data quality, errors, uncertainty, and mapping)	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Information from optical & range data: Photogrammetric Computer Vision	• Camera calibration, measurement, and correction of image coordinates (Coordinate transformations, mathematical models for sensor and for sensor to object relationships collinearity, epipolar geometry, coplanarity, and space resection and intersection) • Sensor poses estimation, • Photogrammetric bundle block adjustments • Structure from motion • Visual odometry	• Evidence(s) • • Gap(s) •		• Format Sample	
Mobile Mapping Systems Applications	• Mobile mapping, Direct georeferencing, Simultaneous Localization and Mapping (SLAM) (3D reconstruction from optical and range, Image rectification, and DEM and orthoimage generation) • Close range photogrammetry, Vanishing geometry • Mobile mapping systems • Navigation and mapping sensors • Reference coordinate systems and transformations of navigation and mapping sensors used for mobile mapping systems • Sensor co-registration including bore sighting and lever arm calibration	• Evidence(s) • • Gap(s) •		• Format Sample	

S6 – Geospatial Information Systems

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Fundamentals	• History, evolution, and components of GIS • Difference between GIS and other information systems • Common terminology related to GIS and nature of geospatial data • Spatial data models including vector, raster, and TIN • Standards and interoperability in GIS	• Evidence(s) • • Gap(s) •		• Format Sample	
Data Visualization & Map Making	• Essentials of map design • Essentials of graphic communication • Cartographic principles & elements • Visual variables & symbology • Map types, Map scale and generalization	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Spatial Databases & Models	• Concepts of spatial databases and models • Concepts of database modeling • Concepts of Extract, Transform and Load (ETL) Processes • Data query and SQL • Concepts of data structures, spatial and aspatial Indexes • Applications of spatial databases in data warehousing	• Evidence(s) • • Gap(s) •		• Format Sample	
Data Acquisition & Manipulation	• Data acquisition • Uncertainty in GIS • Data editing / conversion tools and techniques • Linear reference systems and dynamic segmentation • Topological relationships and handling • Metadata and data standards	• Evidence(s) • • Gap(s) •		• Format Sample	
Geospatial Data Analysis & Analytical Modeling	• Spatial queries (Vector, Raster, Network analysis) • Geoprocessing tools and techniques • Basic spatial statistical measures and analysis techniques • Types of spatial models • Analytical modeling • Big data analytics, non-structured data and NoSQL • Geospatial data mining methods • Dynamic geospatial data modeling • AI and deep learning	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Digital Elevation Modeling (DEM)	• Concepts, modeling, methods and techniques, and data sources and acquisition • Implementation and applications of digital terrain modeling (DTM) in geomatics • Mathematical approaches and techniques for terrain surface reconstruction, terrain analysis, structure, storage, processing and applications of DTM • Generation of elevation Grid from a set of elevation points, generation of triangular irregular networks (TIN), Delauney triangulation and Voronoi diagrams, generation of contour lines from TIN and elevation Grids • Global and local deterministic interpolation methods from point data; Kriging geo-statistical interpolation • Accuracy and quality control, terrain parameters, visualization and generalization, applications	• Evidence(s) • • Gap(s) •		• Format Sample	
Building Information Medeling	• Definition of BIM, its components, and applications • Advantages and limitations of BIM for surveying projects and geospatial applications • BIM implementation procedures and tools • The process of BIM and GIS integration • BIM standards	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Web/Cloud GIS & Mapping	• Different types of web/cloud GIS and mapping • Different types of web mapping services • Technical, organizational, social issues and policies and standards related to web and mobile GIS • Mobile data collection tools • Applications of web/cloud GIS and mapping services for better geospatial information dissemination, decision support and applications	• Evidence(s) • • Gap(s) •		• Format Sample	
Geospatial Programming	• Geospatial programming • Use of code libraries and APIs • Geospatial programming languages and IDEs • Customization of geospatial tools or applications • Design, development and implementation of geospatial applications	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
GIS Project Design & Implementation	• GIS project design and implementation • Understanding user requirements • Principles and methods of software engineering (like agile, waterfall, RUP) applied to GIS development • Strategies, plans and procedures for implementing an effective GIS system • Challenges with implementing GIS with special reference to: data, people, technology and application, including benefits and limitations	• Evidence(s) • • Gap(s) •		• Format Sample	

S7 – Law, Tenure, Boundaries, Cadastres, and Planning

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Law, Tenure, Boundaries & Cadastral Systems	• Origins and philosophies of law, Canadian legal system, real property law, land registration system, title insurance, mineral rights and tenure, and aboriginal land tenure and law • Different types of cadastral systems, boundaries, Canada lands, and international & offshore boundaries, law of Sea, UNCLOS, and Ocean Act • Cadastral surveys & land survey practice in Canadian jurisdictions, structure of surveying profession in Canada and internationally • Land tenure databases and data modeling • Ethics & professionalism	• Evidence(s) • • Gap(s) •		• Format Sample	

Land Use Planning	• Settlement patterns and planning strategies in Canada • Development of planning principles, and structures, processes, and tensions between different planning philosophies in Canada and internationally • Legal and policy environments for international, national, regional, municipal, and site- specific planning • Legislation, policy and guidelines including regional, metropolitan & municipal, development plans, transportation plans, municipal by-laws, zoning, local development plans, structure plans, subdivision applications and appeals, provincial and regional legislations plan, and City design standards • Planning process theory including Planning Design Strategies, Rational comprehensive model, Communicative model, Critical pragmatic approach, Goal ranking, and Cross Impact matrices • Purpose of regional plans, official community plans and zoning legislation and the role of the public and other stakeholders in planning processes • Participatory planning (Ladder of participation, and Participation structures and process in Canadian jurisdictions) • Infrastructure planning (Green infrastructure, Water bodies, Stormwater and sewerage, Transportation (Public Transport & Emergency	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
	Services; national, provincial and municipal levels of transport), Utilities, Roads, Engineering services, and Social Infrastructure) • Aboriginal community planning • Subdivision Design (Topographic surveys, topographic maps, cartographic communication for subdivision layouts, Layout design, Financial Considerations, cash flow options releasing different parts of a project at different times, financial risk, net present value and return on investment, Infrastructure and utility planning considerations, Legal analysis (encumbrances, caveats charges, existing zoning), Social and environmental analysis considerations, Connectivity (driving, public transport, cycling, walkability analysis to schools, city centre, recreation, shopping), and Road design, complete streets, public space, green space creation) • Evaluating a proposed development based on environmental, social, economic reasoning or risks of a particular planning design • Location and flow factors in development projects				

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Economics	• Micro and Macro-economics and their application to immovable property (Supply and demand, Capital, Marginal contribution, Law of diminishing returns, Opportunity cost, Elastic and inelastic supply and demand, Economic rent, Property markets, Property investment) • Time value of money • Financial and property valuation (Cost of capital, Rate of Return, Market value, Income value, Replacement value, Depreciation) • Return on investment • Categories of land use such as commercial, industrial, residential, agricultural, green space and valuation thereofDescribe how an investor might arrive at a rate of return/cost of capital when evaluating whether a particular project is worth financing	• Evidence(s) • • Gap(s) •		• Format Sample	

S8 – Professional Practice

RATING (R) SCALE:

0 - No knowledge or experience.

2 - Have heard of or been introduced to the item but cannot explain it.

4 - Can explain the item with some assistance.

6 - Can explain the item with minimal assistance.

8 - Can explain the item confidently without assistance.

10 - Can explain the item confidently without assistance and have applied or implemented it extensively in practice.

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Business Law & Practices	• Types of business entities and arrangements– pros and cons of each • Duties, responsibilities, and liabilities (Directors of a corporation, Shareholders of a corporation) • Types of insurance required by a surveying business (Professional liability (E&O), General liability, Commercial, theft, fire, vehicle, equipment) • Contract Law (Elements of a contract, Differences between oral and written, Discharge of contract, Conflict of interest, Copyright, Confidentiality, non-compete agreements, non-disclosure agreements) • Litigation and liability (Employer statutory obligations in Canada, Elements of a negligence action, Liability in torts, Due diligence) • Expert Witness • Surveyor's Opinion	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Management & Business Skills	• Business plans (Marketing, Strategic Planning, Succession Planning, Financial Planning, Organizational Structure) • Business Financing and Financials (Capitalization, Loans and Mortgages, Financial Statements, Balance sheet and income statement, Accounts Receivable and Accounts Payable, Assignment of book debts, Salary Markups and Multipliers, Capital Costs and Operating Costs, Project Cost Estimates, Owning vs. Leasing, Assets and Liabilities, Depreciation, Retainers, Goodwill) • Business Valuation for an Acquisition or Sale • Bonding and its uses • Basic management skills (HR, Social Responsibility, Negotiation) • Business codes of conduct	• Evidence(s) • • Gap(s) •		• Format Sample	
Health, Safety, and Environment	• Health and Safety (OH&S) legislation–general & injury reporting • Workplace inspections • Policy statement • OH&S program–general elements • Hazard Control • Emergency planning • Site specific Safety • Violence & harassment in the workplace	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Professionalism & Ethics	• Regulatory, advocacy and other associations • Licensure versus certification • Self-governed Professional associations (Reason for existence, Structure, Main attributes, Roles, Responsibilities) • Standards of professional practice (Government standards, Professional association standards) • Professional ethics and interaction (Utilitarian versus rights-based approaches to ethics, Major components, Types of code of ethics, Client Confidentiality vs Public Protection, Conflict of Interest) • Professional Misconduct • Incompetence • Complaint process • Discipline process • Continuing education • Labour mobility agreements • Examine and report on the work of another surveyor	• Evidence(s) • • Gap(s) •		• Format Sample	

Subject	Syllabus Items	Applicant's Evaluation		Assessor's Evaluation	
		Evidence(s) & Gap(s)	R	Comment(s)	R
Project Management	• Ten knowledge areas of PMBOK Project Management (scope, time, cost, risk, human resources, procurement, quality, stakeholder, communication, and integration management) • Responsibilities related to the protection of the public and the environment • Impact of a land surveyor's work on the environment (considering the environment through their professional opinion) • Effective report writing skills, record keeping and documentation throughout the project • Rationalizing the potential profit versus the peril of cost overruns	• Evidence(s) • • Gap(s) •		• Format Sample	