



SURVEY/GEOMATICS – TECHNOLOGIST (SGTY 2021)

Preamble

The Canadian Technology Standards (CTS) are a collection of learning outcomes for Canada's engineering technology and applied science profession at the technician and technologist level.

Stakeholders

The CTS may be utilized by accreditation bodies, provincial professional associations, educational institutions, government agencies, industry and others for the purposes accreditation, certification and other applications.

Educational Programs

The Survey/Geomatics CTS is relevant to programs including, but not limited to, cartography; geodesy; photogrammetry; hydrography; and remote sensing at the at the technologist level.

Learning Outcomes

This CTS list Discipline Learning Outcomes (DLO) which describe the significant and essential learning that students have achieved and can reliably demonstrate at the time of graduation. Each DLO has a number of Learning Outcome Indicators (LOI), which are examples illustrating, defining and clarifying the level of performance expected. The list of LOI is not comprehensive and there may be other indicators which can be used to assess achievement of learning outcomes.

Graduate Capability

Students graduating from an accredited program have demonstrated achievement of all general learning outcomes, including a prescribed level of math, and discipline learning outcomes selected by the program.

Having completed a program that is based on applied mathematics and scientific and engineering theory, principles and practices and having acquired the knowledge, skills and attitudes to function in the work place, graduates are;

- able to evaluate assignments, establish objectives, set parameters and determine appropriate procedures and actions.
- able to exercise due diligence in the workplace and adhere to related practices, applicable laws and health and safety practices.

- able to work in accordance with labor-management principles and practices.
- able to work independently or interdependently as part of a discipline or multi-disciplinary team.
- prepared to assume responsibility for their work.

Graduate Career Opportunities

Graduates of Survey/Geomatics Technology – Technologist programs have career opportunities in such areas as: business, industry, construction, government, and public organizations. They may find employment in careers such as: boundary and or land surveying; cartography; land management systems; construction/engineering/mining or control surveying; site improvement surveying; interpretation or preparation of specifications, technical drawings, or instructions; construction contract inspection and administration; field and customer service; quantity surveying and estimating; management and project management; technical sales; and supervision of projects and training activities.

Discipline Learning Outcomes (DLOs)

SGTY01 Data Reporting

- Assemble, analyze, and appropriately use survey/geomatics data from existing graphics, reports, and other documents.

Learning Outcome Indicators include:

- 1.1 Apply systematic approaches to problem solving and decision-making.
- 1.2 Assess criteria for project and identify appropriate information sources.
- 1.3 Select and evaluate data from a variety of sources including graphics, reports, and other documents.
- 1.4 Justify selection, interpretation, and use of data.
- 1.5 Prepare cost estimates.

SGTY02 Data Management

- Manage collecting, processing, and interpreting of survey/geomatics data.

Learning Outcome Indicators include:

- 2.1 Create strategies for collection of survey/geomatics data.
- 2.2 Manipulate appropriate survey/geomatics equipment to conduct, measure, and calculate quantities.
- 2.3 Validate survey/geomatics data collected is within expected parameters of accuracy.
- 2.4 Collaborate as active member of survey/geomatics team to measure, calculate, record, and disseminate data according to industry standards.
- 2.5 Evaluate hard copy and digital field notes in accordance with hierarchy of evidence.
- 2.6 Interpret basics of Global Navigation Satellite System (GNSS).

SGTY03 Horizontal and Vertical Networks

- Collaborate in design, establish horizontal survey networks, and conduct error analysis and adjustments.

Learning Outcome Indicators include:

- 3.1 Survey network design for project parameters.
- 3.2 Conduct fieldwork for networks using conventional, GPS, or other means.
- 3.3 Verify network data.
- 3.4 Reconstruct data to other co-ordinate systems.

SGTY04 Data Creation

- Analyse, translate, and present survey/geomatics data from field processing of captured data.

Learning Outcome Indicators include:

- 4.1 Plan, organize, prepare, and modify graphics according to industry standards employing standard drafting conventions.
- 4.2 Access and present survey/geomatics data to project stakeholders.
- 4.3 Collect, install, and edit data into Geographic Information System (GIS).

- 4.4 Produce, translate, write and transfer data in technical applications utilizing computers and appropriate software
- 4.5 Prepare and present project-related documents including field notes, reports, and graphics in oral and written formats.
- 4.6 Organize capture of three-dimensional terrain data through field survey, photogrammetric or remote sensing methods.
- 4.6.1 *Analyze a variety of GIS-related activities.*

SGTY05 Project Planning and Monitoring

- Collaborate in planning and monitoring of various phases of survey/geomatics work.

Learning Outcome Indicators include:

- 5.1 Identify phases of survey/geomatics projects and their component activities.
- 5.2 Determine criteria needed to complete each phase of project.
- 5.3 Verify processes used to complete each phase of project.
- 5.4 Design and implement projects utilizing reports, minutes, field data, and field notes.
- 5.5 Determine project schedules.
- 5.6 Identify and resolve problems related to equipment, processes, materials, scheduling, resources, and budget concerns.

SGTY06 Equipment and Methods

- Evaluate and apply survey/geomatics equipment and methods to implement and complete survey/geomatics projects.

Learning Outcome Indicators include:

- 6.1 Discuss performance properties, limitations, potential, and safety aspects of survey/geomatics equipment.
- 6.2 Employ safe, accurate, and effective methods to carry out survey/geomatics work.
- 6.3 Justify selection of methods and equipment used.
- 6.4 Test, calibrate, and, if necessary, facilitate repairs to survey/geomatics equipment to ensure its accuracy and operational safety.
- 6.5 Conduct inspections for quality-assurance sampling and testing.
- 6.6 Prepare cost-benefit analysis when implementing new technology.

SGTY07 Remote Sensing

- Identify and analyze physical features utilizing remote sensing data.

Learning Outcome Indicators include:

- 7.1 Identify remote sensing energy sources, atmospheric effects, aerial/space scanning, and recording platforms.
- 7.2 Apply principles of database and spatial data structure design.
- 7.3 Perform analogue and digital image analyses.

SGTY08 Engineering Surveys

Perform engineering surveys for design, construction, and layouts.

Learning Outcome Indicators include:

- 8.1 Select appropriate levels of measurement precision and accuracy for project in consultation with the engineering team.
- 8.2 Employ appropriate data acquisition methods to meet project requirements.
- 8.3 Develop appropriate measurement analysis to maintain project accuracy and precision.
- 8.4 Create project specific reports.

SGTY09 Digital Data Management

- Interpret and analyze data to produce digital plans and reports.

Learning Outcome Indicators include:

- 9.1 Apply standard map design techniques.
- 9.2 Create and incorporate CAD standards.
- 9.3 Collaborate with other stakeholders to share digital plans.
- 9.4 Integrate field data collection with digital plan creation.
- 9.5 Validate project requirements with appropriate digital plan presentation.
- 9.6 Analyze plan data accuracy and precision.

SGTY10 Geodetic Applications

- Apply principles of celestial co-ordinate systems, time systems, and earth properties in performance of geodetic computations and surveys.

Learning Outcome Indicators include:

- 10.1 Integrate data from various disciplines associated with survey/geomatics to assist in planning and implementation of projects.
- 10.2 Collaborate and consult with members of appropriate discipline(s) for assistance and clarification.
- 10.3 Plan, implement, and complete survey/geomatics projects as member of multi-disciplinary team.
- 10.4 Create project plan to collect, analyze, and monitor data collection.
- 10.5 Create cost-benefit analysis comparing a variety of data collection/analysis methods.

SGTY11 Photogrammetric Applications

- Employ aerial photos and photogrammetry to produce topographical maps and wide range of photogrammetric products.

Learning Outcome Indicators include:

- 11.1 Plan and estimate photogrammetric project.
- 11.2 Determine spatial position of each photograph through aerial triangulation.
- 11.3 Collect data necessary to produce topographic maps for a variety of scales and applications.
- 11.4 Collect surface models using photogrammetry.

- 11.5 Assess and process surface models using LiDAR and Radar.
- 11.6 Produce orthophotography.
- 11.7 Produce topographic and non-topographic products utilizing terrestrial photogrammetry.
- 11.8 Process photogrammetry collected data to build topology, create contours, transform to other map projections, translate to other formats, and produce hardcopy deliverables with balanced map sheet surrounds.

SGTY12 Records and Inventories

- Manage project records and inventories.

Learning Outcome Indicators include:

- 12.1 Apply principles of information management, cost control, and materials management to survey/geomatics projects.
- 12.2 Manage project-related information by using paper-based approach and/or computers and appropriate software.
- 12.3 Create and maintain current, clear, and accurate project-related records including quality assurance documents.
- 12.4 Prepare reports and make decisions utilizing project-related records and inventories.
- 12.5 Write clear and accurate reports, minutes of business meetings, and other project-related documents.

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