

ANNEX A

REQUIREMENTS AND QUALIFICATIONS

1. TITLE

CBRN Education Services

2. BACKGROUND

The events of September 11, 2001, led to the immediate Chemical, Biological, Radiological and Nuclear (CBRN) response capability of the Canadian Armed Forces (CAF) to be assigned to a new dedicated high readiness unit, the Joint Nuclear Biological and Chemical Defence (JNBCD) Company. Since February 1, 2006, this unit has been a part of the Canadian Special Operations Forces Command (CANSOFCOM). Its name was officially changed to the Canadian Joint Incident Response Unit (CJIRU) in September 2007. CJIRU has three key mandates:

- Respond to CBRN events in conjunction with other elements of the National Chemical Biological Radiological and Nuclear Explosive (CBRNE) response team;
- Provide an agile integral part of the CANSOFCOM Immediate Reaction Task Force (IRTF); and
- Provide specialized support to CAF domestic and expeditionary operations.

CJIRU is one of two Canadian Special Operations Forces Command (CANSOFCOM) National mission forces and provides a rapid CBRN response capability for Special Operation (SOF) missions throughout the world. Domestically, CJIRU, along with elements from the Public Health Agency of Canada (PHAC) and the Royal Canadian Mounted Police (RCMP) form the CBRNE Response Team. The National CBRNE Response team, led by the RCMP, is responsible for CBRN counter terrorism operations and is mandated to respond to CBRNE events in Canada.

Members of CJIRU sustain a high level of preparedness and readiness, maintained through a comprehensive training routine. The unit is spearheading the development of the new CBRN Operator occupation as a trade within the Canadian Armed Forces. As the unit grows it will become an integral part of the CAF, providing trained professionals that can respond to any threat.

3. OBJECTIVE

The objective of the requirement is to design, develop, prepare, coordinate and execute a part-time CBRN certificate program compliant with the Ministry of Training, College and University standards that will provide students with a CBRN Certificate with full college credits.

4. TASKS

Course Design and Development

Canada requires the assistance of an academic institution to design and develop a CBRN Certificate program commensurate with college level. The program is anticipated to be developed with a minimum of the courses described in Serials 1, 2 and 3.

Serial 1 – Designed to provide students with a fundamental understanding of Chemistry, Biology and Radiation Physics and should comprise:

- 1) Basic Math Skills Preparation Course
 - A basic-level mathematics course for technology programs begins with reviews of the fundamental math concepts, arithmetic operations, and units of measure;
 - Covers basic algebra, trigonometric and other functions, and quadratic equations; and
 - Offered online or via distance learning in advance of Introduction to Biology, Chemistry and Radiation Science.
- 2) Introduction to Biology
 - Cell and molecular biology;
 - Properties of primary biomolecules (proteins, lipids, carbohydrates and nucleic acids)
 - Basic prokaryotic and eukaryotic cellular biology; and
 - Cellular metabolic process.
- 3) Introduction to Chemistry
 - Classification and physical properties of matter;
 - Measurements, errors and dimensional analysis;
 - Chemical nomenclature, formulae and valences;
 - Chemical reactions, equations and stoichiometry;
 - Properties of gases, liquids and solutions;
 - Atomic theory of matter, electronic structures and chemical bonding; and
 - A laboratory (practicum) component.
- 4) Introduction to Radiation Science
 - The difference between ionizing and non-ionizing radiation;
 - The key types of properties of ionizing radiation;
 - The units used for dose, dose rate and accumulated dose. The focus will be on Canadian standard units, but with mention of units of measure that may be encountered outside of Canada;
 - Radioactive decay and resulting particles; and
 - Radiation mathematics to include calculation of energy levels, dose and dose rate.

Serial 2 – Builds upon the basic scientific knowledge and laboratory practicum of Serial 1. All students proceeding onto Serial 2 must have completed the courses in Serial 1. Serial 2 should comprise:

- 1) Advanced Chemistry

- Essential aspects of physical, inorganic, organic and biological chemistry; and
 - Redox chemistry, kinetics and thermodynamics.
- 2) Organic Chemistry
- An introduction to organic chemistry with emphasis on molecular structure of the major classes of organic molecules, physical and chemical properties, and International Union of Pure and Applied Chemistry (IUPAC) nomenclature; and
 - Recognition of the unique properties of organic compounds including practical applications of organic chemistry to everyday life and biological systems
- 3) Microbiology
- An introduction to microbiological theory;
 - Fundamentals of microbiology, bacterial morphology, growth, nutrition and control; and
 - The principles of anatomy and physiology of plants and animals within the context of problems that organisms must solve, including sensory perception and response to the environment, acquisition of oxygen and nutrients, excretion of wastes, movement, and reproduction.

Serial 3 – Builds upon the courses of Serials 1 and 2 with the addition of a CBRN specific component. All students proceeding onto Serial 3 must have completed courses in Serials 1 and 2. Serial 3 should comprise:

- 1) CBRN Physiology
- Radiation including physiological effects of long term exposure to ionising radiation and physiological effects of short term acute exposure to ionising radiation
 - Chemistry including physiological effects of nerve agents, vesicants, choking agents, blood agents and incapacitating agents on the body; and
 - Biology including physiological effects of viral infections and bacterial infections.
- 2) CBRN Policy and Law
- Domestic law and policy with respect to CBRN;
 - International law with respect to Chemical Warfare Agents;
 - International law with respect to Biological Warfare Agents;
 - International law with respect to nuclear radioactive materials; and
 - International law with respect to proliferations.
- 3) Any remaining courses the academic institution deems relevant and appropriate to the certificate programs to make up the required number of course hours to achieve provincial recognition under the Ontario Qualification Network. Possible electives could include Instrumentation and Scientific Writing.
- a. Instrumentation
- Theory of common laboratory instruments supported by hands on experience with equipment.

- Skills: Prepare experiments, standards for sample preparation, interpret analytical data, quality control analysis and calculations, complete mass and concentration calculation, utilize laboratory computer applications.
 - Knowledge: understanding of the theory behind Colourimetry, Spectrophotometry (ultraviolet, visible, infrared, atomic emission) Fluorimetry, Turbidity/nephelometry and understanding of evolution of instrumentation and reasons for next generation, smaller, faster versions of the technology.
- b. Scientific Writing
- An introductory course focused on technical communications skill including written and oral communications strategies. Students should both draft and edit products. Topic areas should include:
 - Elements of Communication: Target audience analysis, technical style and structure of technical information.
 - Principles of Writing: readable scientific documents, integrating text and graphics effectively, integrating source information, forming persuasive and effective arguments, efficient writing processes and grammar errors in scientific writing; and
 - Format and content for a variety of technical documents to include: classes of scientific documentation, data summaries, standard operating procedures, informal reports, field reports, cost recovery documents and project or funding proposal.

DND recognizes that Introduction to Radiation Science (Serial 1), CBRN Physiology and CBRN Policy and Law (Serial 3) are specialized courses. DND expects Subject Matter Experts from DND/CANSOFCOM to be available and provide input/advice during the development of these courses. Once developed, these courses and their course content will remain the property of the contractor (College).

The design and delivery of the courses must be compliant with the Ontario Ministry of Training, College and University standards, as is applicable to all credited college courses. Once fully developed, the CBRN Certificate Program must meet the criteria to achieve provincial recognition under the Ontario Qualification Network. Should additional courses to those identified above be required to meet the standards and/or required number of credit hours for a certificate program; the course selection, design and delivery will be at the discretion of the Contractor, with input from DND Subject Matter Experts.

Course Delivery

Serial 1 – 2 components

- 1) Distance learning – online math prep course prior to condensed 6 week semester
- 2) Condensed 6 week semester
Specific to DND with a minimum of 20 students per year

Time period is January and February
2 weeks per course based on required hours

Serial 2 – Condensed 6 week semester
Specific to DND with a minimum of 15 students per year
Time period is July and August
2 weeks per course based on required hours.

Serial 3
Run at college's discretion
Course delivery is at the college's preference (part-time, distance or night school), with a lab portion if required.
Note: Course delivery for Serial 3 is not part of this requirement.

For the purposes of providing a CBRN Certificate Program to the general population, the courses comprising serial 1 and 2 can also be incorporated into the college's course calendar by the college at any time; however DND specifically requests they be delivered solely to DND personnel in a condensed format, 2 weeks per course.

5. CONSTRAINTS

5.1 Location and Facilities

The current requirement is for the courses to be delivered within 50km of 8 Wing Trenton.

5.2 Language:

All courses must be designed and delivered in English.

5.3 Timeline

Serial 1 is to be delivered in the January and February months of each calendar year starting in 2016. Serial 2 is to be delivered once per year, preferably during the summer months, July and August, starting in 2016. The courses comprising Serial 3 can be delivered at any time during the calendar year. All courses that form the CBRN certificate program, must be developed and a part of the academic course calendar by the end of this contract. Additionally, the CBRN certificate program must be recognized by the provincial the Ontario Qualification Network as a certificate program by the end of the third year of this contract.

5.5 Prior Learning Assessment Recognition

Given the number of CBRN Operators who have previously taken courses similar to those in Serial 1 from another academic institution; DND requires a one-time bulk Prior Learning Assessment Recognition (PLAR) be conducted. This will ensure CBRN Operators will receive credit for courses taken at the Royal Military College of Canada

(RMCC) from 2010-2013, which can be applied to the CBRN certificate. The bulk PLAR would be for the following courses:

- CCE106 Basic Chemistry;
- CCE 151 Introduction to Nuclear Science; and
- CCE240 Molecular and Cellular Biology.