



**The Canadian Board of Examiners for Biomedical  
Engineering and Dialysis Technologists and  
Technicians**

**Le Jury Canadien D'Accréditation en Génie  
Biomédical et Dialyse Pour Les Technologues et  
Les Techniciens**



## **Appendix A**

# **INFORMATION AND APPLICATION FORM FOR BIOMEDICAL ENGINEERING AND DIALYSIS TECHNOLOGIST AND TECHNICIAN CERTIFICATION (CANADA)**

Thank you for your interest in the Canadian Biomedical Engineering and Dialysis Technology Certification Programme. In this document you will find programme information, eligibility requirements, examination format, application procedure, and the table of fees.

## Introduction

The International Certification Commission (ICC) has a membership, which provides broad representation of relevant members of the health care community. It includes representatives from engineering, medical, industrial, and government groups and agencies. It supervises the certification of biomedical engineering technologists and technicians, clinical engineers, and other related specialists through the organization of examining boards.

As guided by the International Certification Commission, The Canadian Board of Examiners for Biomedical Engineering and Dialysis Technologists and Technicians (The Board) considers that a biomedical engineering technologist or technician is a person knowledgeable in the theory of operation, the underlying physiologic principle, and the practical, safe, clinical application of biomedical equipment. His/her capabilities may include installation, calibration, inspection, preventative maintenance, repair, modification, design and development of general biomedical and related technical equipment, and in equipment control, safety and maintenance.

As guided by the ICC, The Board considers that a Dialysis technologist or technician is a person knowledgeable in the principles of dialysis and utilizes technical, scientific and clinical knowledge in operating and maintaining dialysis equipment so that the long-term outcomes of the patient are optimized and complications reduced. The dialysis technologist assumes primary responsibility for medical devices used in the delivery of renal replacement therapies, including but not limited to: dialysis machines, reprocessing equipment, water treatment equipment, artificial kidneys and blood lines, and the setup of dialysis equipment in and off unit, including home installations. Additionally, the dialysis technologist may assume responsibilities for medical devices not strictly related to the Nephrology Program in the hospital, encompassing special therapies such as: continuous arterio-venous haemofiltration (CAVH) and apheresis. The role of the dialysis technologist also includes the teaching of staff and individuals with renal failure, the development and maintenance of quality assurance programs with reference to the activities listed above, administrative and research activities appropriate to the specialty.

## Eligibility

The basic eligibility requirement for being examined for biomedical engineering or dialysis certification is the candidate's registration with their provincial association as a certified engineering technologist (CET), Applied Science Technologist (AScT), or technician (CTech) as recognized by The Canadian Council of Technicians and Technologists (CCTT), with a minimum number of years of related experience.

1. A certified member, in good standing, of a provincial association of engineering technologists and technicians, recognized by the Canadian Council of Technicians and Technologists.
2. The candidate shall have a minimum of 3 years practical experience as a biomedical engineering, or dialysis technologist or technician in a clinical/hospital environment.
3. Candidates, who are graduates of a recognized biomedical post-secondary program, accredited by the Canadian Technology Accreditation Board (CTAB), and/or recognized by The Board, will be allowed to count a maximum of 1-year internship period as part of the 3-year practical experience requirement noted in paragraph 2, above.
4. It is not necessary that the candidate be currently employed by a hospital, but it is required that the candidate have the above experience.

5. The applicant shall submit the names of at least 5 references for the biomedical engineering technologist/technician, 3 references for the dialysis technologist/technician. These references must be health care professionals who are familiar with the individual's competence in the following areas:
  - a. Technical ability
  - b. Clinical experience interfacing with physicians
  - c. Clinical experience interfacing with nursing staff
  - d. BMET only - two others who have knowledge of the candidate's work experience.

Note: If a physician reference (b) is not available, include an additional nursing reference (c).

The names of references are requested on the application form. Confidential questionnaires will be sent to the referees by the Secretariat. These forms are returned directly to the Secretariat.

## Certification Process

The process is as follows:

1. Upon receipt of completed application form and fee, the candidate will receive a receipt of payment, which will indicate that the candidate's file has been activated.
2. The Secretariat will send out reference requests to the references indicated on the candidate's application form.
3. Upon receipt of these completed references, the candidate's file is directed to the Board of Examiners for review. The Board will determine if the candidate meets the requirements for examination, or if additional information, or further study is required.
4. When the Secretariat has been advised of the candidate's acceptance for examination, a proctor will be appointed to oversee the written examination. The proctor will be a qualified examiner in the candidate's city/town, or as close as possible. The candidate shall have made arrangements with the proctor and written the exam within two (2) years of the acceptance date.
5. BMET examination candidates will be given eight (8) hours to complete the BMET examination. The use of hand-held scientific calculator (no calculators that allow text storage or formulation(s)) and one 7.6 cm by 12.7 cm card with formulas is allowed for the BMET examination. The card shall only contain formulas (no text) on both sides and shall have a font size of not less than 8 pitch. Calculators that are included as part of cellular phones, or other electronic communication devices will not be permitted. The formula card must be handed in together with the completed exam.

Dialysis examination candidates will be allowed three (3) hours to complete the dialysis examination. The use of a scientific calculator is permitted. Calculators that are included as part of cellular phones, or other electronic communication devices will not be permitted. No cue cards or other aids are permitted for dialysis examination candidates.
6. Upon successful completion of the written examination, the Board will advise the candidate of the results. The Board then makes its recommendation to the International Certification Commission, and a Certificate will be issued.
7. If the BMET candidate has not achieved a passing mark on the BMET exam, he/she will be given a time period to study in the area(s) of weakness, and then be given the opportunity to rewrite a supplementary examination that focuses on this area.

8. If the dialysis candidate is not successful on the exam, the entire examination can be rewritten.
9. The candidate's Certificate is sent to The Board Chairman for signature and the candidate will be consulted as to whether he/she wishes it to be sent to their supervisor for presentation, or directly to him/herself.

## Examination

The purpose of the examination process is to measure, in a standardized and unbiased manner, the ability of the candidate to apply the knowledge and skills in the role of a professional. Passing a certification examination establishes that the individual is minimally competent to work unsupervised in a given field or profession. The certification does not mean that an individual knows everything required to be considered an expert in a given field.

There is one exam in Canada for both biomedical engineering technologists and biomedical engineering technicians, (as determined by the candidate's provincial certification). Throughout this text the acronym "BMET" refers to both biomedical engineering technologists and technicians.

For dialysis certification, one examination is also used for both technologists and technicians (as determined by the candidate's provincial certification). Throughout this text the acronym "cdt" refers to both dialysis technologists and technicians.

### Examination Content

The content of the examination is based on the following premises:

#### BMET Examination

The BMET must be able to communicate intelligently with physicians and other hospital staff members in matters involving the operation and patient interface of medical devices. Also, in order to fulfill his/her responsibilities in the area (e.g. in the area of safety and device performance), s/he must have a reasonable knowledge of anatomy and physiology. The knowledge should include familiarity with terminology and body functions/systems.

The BMET should possess a broad knowledge of equipment and laboratory instrumentation used in a clinical setting. His/her knowledge should include, but not be limited to, the theory of operation, clinical application, safety requirements, regulations and standards relating to physiological monitors, analytical laboratory instruments, vacuum and gas pressure vessels and controls, anaesthesia equipment, information systems interfaces, ventilators, imaging devices (including MRI, CT, PET, X-Ray and ultrasound), physiological instruments, electrosurgical units, lasers (YAG, CO2, etc), renal dialysis, non-invasive surgical instruments.....etc.

The BMET should be able to perform theoretical troubleshooting, using schematics, for equipment ranging from the simple fibre optic light source to the microprocessor based electromyography. The BME Technologist should also possess basic management and supervisory skills.

## cdt Examination

The Dialysis technologist or technician is a person knowledgeable in the principles of dialysis and utilizes technical, scientific and clinical knowledge in operating and maintaining dialysis equipment so that the long-term outcomes of the patient are optimized and complications reduced. The dialysis technologist assumes primary responsibility for medical devices used in the delivery of renal replacement therapies, including but not limited to: dialysis machines, reprocessing equipment, water treatment equipment, artificial kidneys and blood lines, and the setup of dialysis equipment in and off unit, including home installations. Additionally, the dialysis technologist may assume responsibilities for medical devices not strictly related to the Nephrology Program in the hospital, encompassing special therapies such as: continuous arteriovenous haemofiltration (CAVH) and apheresis. The role of the dialysis technologist also includes the teaching of staff and individuals with renal failure, the development and maintenance of quality assurance programs with reference to the activities listed above, administrative and research activities appropriate to the specialty.

## Examination Format

**The BMET examination** is divided into two parts. The first part is in multiple-choice format and includes five (5) sections that cover the topics of:

- Anatomy and Physiology
- Electronics
- Medical Instrumentation
- Troubleshooting
- Canadian and other recognized standards.

The second part contains Essay questions pertaining to the practice and organizational management of Biomedical Engineering Programmes.

The content of **the dialysis examination** covers the Critical and Supporting Competencies.

The **critical** competencies are:

1. Water Treatment
2. Dialysis Membrane Technology
3. Basic Principles of Dialysis
4. Haemodialysis Systems Components
5. Dialysis Electrical and Electronic Systems
6. Computer Systems
7. Haemodialysis On-line Technologies
8. Safety Standards and Directives

The **supporting** competencies are:

1. Renal anatomy/physiology & pathology
2. Treatment modalities
3. Dialyser Re-processing
4. Assessment of Dialysis Adequacy
5. Access Assessment Techniques and Technologies
6. Anticoagulation & Coagulometric Technologies
7. Complications of Haemodialysis Treatment
8. Applied Chemistry

9. Applied Microbiology

10. Professional Practice

### Examination Pass Mark

For the **BMET examination**, a minimum mark of 50% is required in each of the six (6) sections. 75% of the marks gained in the first five (5) sections, plus 25% of the mark gained in the essay section, will constitute the final mark attained. The final mark attained must equal or exceed 60%, with each of the six (6) sections receiving a mark of 50% or more, for a pass to be granted.

For the **cdt examination** a minimum mark of 70% is required for a pass to be granted.

### Examination Location

The Board will also make every effort to provide examinations in a location that the candidate might easily access. The examination site should provide appropriate testing conditions including good lighting, large desk, lack of noise, and a nearby rest room. The examination date will be a mutually agreeable date between the candidate and the examination proctor or supervisor. The examination may begin no earlier than 0800 hours and no later than 1300 hours (full examination only).

## Study Guide

Study Guides are available, which provide an insight into the BMET or cdt examinations by means of a mini sample examination and recommended readings. The Guide may be downloaded at no cost from the Web page (<http://bmetcertcanada.ncf.ca/>). A printed copy of the Study Guide is available from the Secretariat for a fee (see Fees).





## Application

A BMET Certification Application form must be completed. Curriculum Vitae are not acceptable in lieu of the completed form. This application form is directed to The Board Secretariat. The Secretariat will obtain the applicant's references and send the application together with the references to The Board for review.

### Application Review

The application will be reviewed by three (3) board members and they will decide whether or not the applicant is qualified to take the examination based upon the eligibility requirements. The applicant is then informed of his/her eligibility to take the examination.

If The Board does not recommend testing, the applicant is informed and s/he may choose to follow the appeal procedure.

### Application Appeal Procedure

The Secretariat submits the candidate's application for review by the Chairperson of The Board. The Chairperson will undertake a review of the application that is consistent with the intent of the original application review.

## Fees

### Application (Examination) Fee

The application fee is subject to annual review. This fee is non-refundable after the candidate has been accepted for examination. The fee is to cover the cost of processing the candidate's application and one examination session (if the candidate is determined eligible to test for certification). If, after the receipt of references and review by the Board, it is decided that the candidate is not eligible for examination, the candidate's fee will be refunded, less an administration fee to cover costs to that point. The Examination Fee will be reviewed on an annual basis and adjusted as required to cover the costs associated with maintaining The Board.

### Certification Renewal Fee

An annual renewal fee, for maintaining an active status as a Certified Biomedical Engineering Technologist/Technician or Dialysis Technologist/Technician is payable. Renewal Fees are due in the month of January immediately following successful completion of the examination and in January of each year thereafter. The renewal fee will be reviewed on an annual basis and adjusted as required to cover the costs associated with maintaining The Board. The Fee Schedule lists the amounts involved in the process.

### Fee Schedule

<b>EXAMINATION FEE</b>	<b>\$195.00</b>
<b>REFUND</b> (if not accepted for examination)	<b>\$145.00</b>
<b>SUPPLEMENTAL EXAM</b> (per section for BMET, re-write for cdt)	<b>\$90.00</b>
<b>ANNUAL RENEWAL FEE</b>	<b>\$60.00</b>
<b>ANNUAL RENEWAL FEE</b> (retired status)	<b>\$30.00</b>
<b>STUDY GUIDE (Hard Copy)</b> – web page download is free	<b>\$20.00</b>

## APPLICATION FORM FOR BMET/cdt CERTIFICATION

### INSTRUCTIONS

To avoid delays in processing your application, fill out the application form clearly, accurately and completely.

Your eligibility for certification will be judged on:

- The information you provide on this application form
- The opinions of your references
- The results of your written examination

Be sure to:

- Sign the statement at the bottom of this page
- Pay the examination fee (C\$195). Instructions will be given via e-mail.

E-mail the completed application form to:

**bmetcertcanada@ncf.ca**

### CANDIDATE'S STATEMENT

I, (PRINT NAME) \_\_\_\_\_, certify that all information that I have entered on this application form, and any accompanying documents, is correct. I understand that any misrepresentation may result in the rejection of this application, or the revocation of any certificate issued as a result of this application. I am also aware that any certification that I may receive from the Certification Commission will not constitute, and shall not be construed as, a license. I authorize, and release from all liability, the Certification Board of Examiners (Canadian) in doing so, to make any enquiries that are necessary in ascertaining my eligibility for certification.

Signature of Applicant \_\_\_\_\_ Date \_\_\_\_\_



**PERSONAL INFORMATION (PLEASE PRINT)**

NAME: \_\_\_\_\_  
(As you wish it to appear on your certificate)

Salutation: Miss Ms. Mrs. Dr. Mr. Check one only.

HOME ADDRESS: \_\_\_\_\_  
Street City Province Postal Code

HOME TELEPHONE: \_\_\_\_\_ HOME E-MAIL: \_\_\_\_\_  
Area Code Number

PRESENT EMPLOYER: \_\_\_\_\_

WORK ADDRESS: \_\_\_\_\_  
Street City Province Postal Code

DEPARTMENT: \_\_\_\_\_ CURRENT POSITION: \_\_\_\_\_

WORK TELEPHONE: \_\_\_\_\_ WORK E-MAIL: \_\_\_\_\_  
Area Code Number

NAME AND TITLE OF IMMEDIATE SUPERVISOR: \_\_\_\_\_

SEND PERSONAL LETTER MAIL TO: HOME WORK

SEND PERSONAL ELECTRONIC MAIL (E-MAIL) TO: HOME WORK

NAME OF PROVINCIAL ASSOCIATION OF TECHNICIANS/TECHNOLOGISTS WITH WHICH YOU ARE CERTIFIED: \_\_\_\_\_

DATE OF JOINING THIS ASSOCIATION: \_\_\_\_\_ MEMBERSHIP NUMBER: \_\_\_\_\_

TITLE: \_\_\_\_\_ CLASSIFICATION: \_\_\_\_\_  
TECHNICIAN OR TECHNOLOGIST? C.E.T., A.Sc.T., ETC.

	NAME OF SCHOOL	LOCATION	PROGRAMME	FROM	TO	DEGREE
High School						
Technical Institute						
College						
Other						

### BIOMEDICAL ENGINEERING/DIALYSIS EXPOSURE

During any part of your formal education, were you exposed to working in a biomedical engineering/Dialysis environment (internship), which was included in the curriculum?

Yes No

If "Yes", please list dates, institution and a brief description of the work you performed:

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Have you attended any major biomedical/dialysis conferences, seminars, or meetings sponsored by an accredited organization?

Yes No

If "yes", please list:

Date

Event

Sponsor

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List your major disciplinary interests in the field of biomedical technology (e.g. Haematology, Respiration, Cardiology, etc..)

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Upon successful completion of the Certification Examination process you may opt for your name to be listed on the ICC Web site as a Canadian Certified Biomedical Engineering/Dialysis Technologist/Technician.

I wish my name to be listed on the ICC Web site                      Yes                      No

**Note that the default of "Yes" will be applied if you fail to complete this section.**

**EMPLOYMENT HISTORY**

Dates			Start with your most recent employment and account for each year since High School. Include the name and location of your employers, titles of your positions and descriptions of your duties. If more space is required add a separate sheet.
From Mo.      Yr.	To Mo.      Yr.	Total Time Yrs. Mos.	
			

## OUTSTANDING ACHIEVEMENTS

Attach a separate sheet to describe any outstanding achievements on your part that you feel the Board of Examiners should evaluate when considering your application. This could include publications, special projects, incident investigations, research projects, safety programmes, etc..

## REFERENCES

For BMET and Dialysis applicants, list the names and contact information (PLEASE PRINT) of three (3) health care/engineering professionals who may be consulted for the purpose of providing references in the following areas:

- a. technical ability
- b. clinical experience interfacing with physicians
- c. clinical experience interfacing with nursing staff
- d. for BMET applicants only, add two (2) others, in the shaded area below, who have knowledge of your work experience

**Note: If a physician reference (b) is not available, replace (b) with a second nursing reference (c)**

**Obtain permission to use the references that you provide and inform them that they will be requested to complete a questionnaire, which will be sent to them via e-mail (preferred) or surface mail.**

**REF. a** NAME & TITLE: \_\_\_\_\_ POSITION \_\_\_\_\_  
ORGANIZATION: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_

Street City Province Postal Code

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_  
AREA CODE NUMBER

**REF. b** NAME & TITLE: \_\_\_\_\_ POSITION \_\_\_\_\_  
ORGANIZATION: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_

Street City Province Postal Code

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_  
AREA CODE NUMBER

**REF. c** NAME & TITLE: \_\_\_\_\_ POSITION \_\_\_\_\_  
ORGANIZATION: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_

Street City Province Postal Code

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_  
AREA CODE NUMBER

**REF. d1** NAME & TITLE: \_\_\_\_\_ POSITION \_\_\_\_\_  
ORGANIZATION: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
Street City Province Postal Code

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_  
AREA CODE NUMBER

**REF. d2** NAME & TITLE: \_\_\_\_\_ POSITION \_\_\_\_\_  
ORGANIZATION: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
Street City Province Postal Code

TELEPHONE: \_\_\_\_\_ E-MAIL: \_\_\_\_\_  
AREA CODE NUMBER