



2020 Candidate Handbook

for

Certification in Clinical Engineering

by the

Healthcare Technology Certification Commission

Program Sponsored by the

American College of Clinical Engineering

Examination Conducted by the

United States Board of Examiners for Certification in Clinical Engineering

or the

Canadian Board of Examiners for Certification in Clinical Engineering

Application Deadline:

July 24, 2020

Written Examination Dates:

November 7, 2020

thru

November 21, 2020



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Certification Program

The Healthcare Technology Certification Commission (Commission), the United States Board of Examiners for Certification in Clinical Engineering (US Board), and the Canadian Board of Examiners for Certification in Clinical Engineering (Canadian Board) endorse the concept of voluntary certification by examination for all clinical engineers and manage a program for certification in clinical engineering. Certification is one part of a process called credentialing. It focuses specifically on the individual and is an indication of current competence in a specialized area of engineering practice. Board certification in clinical engineering is highly valued and provides formal recognition of the knowledge base of clinical engineers.

Definition of Clinical Engineer

The Commission, US Board and Canadian Board (Boards) have adopted the definition of a clinical engineer as set forth by the American College of Clinical Engineering (ACCE):

A Clinical Engineer is a professional who supports and advances patient care by applying engineering and managerial skills to healthcare technology.

Clinical engineers generally have backgrounds in engineering applied to the healthcare industry. They have completed a period of defined education in engineering in addition to having defined experience as practicing clinical engineers leading to mastery of a defined core of knowledge.

Purposes of Certification in Clinical Engineering

The purpose of certification is to promote healthcare delivery improvement through the certification and continuing assessment of competency of professionals who support and advance patient care by applying engineering and management skills to healthcare technology.

The certification process includes:

- Establishing and measuring the level of knowledge required for certification as a clinical engineer.
- Providing a standard of knowledge requisite for certification; thereby assisting the employer, public, and members of the health professions in the assessment of the clinical engineer.
- Recognizing formally those individuals who meet the eligibility requirements of the Boards and pass the Examination Certification for Clinical Engineering.
- Requiring continued personal and professional growth in the practice of clinical engineering to maintain certification.

Certification Process

Clinical engineering certification is a three-step process administered by the Boards, which involves:

- 1) **Application:** The Board's determination of the applicant's eligibility to pursue certification in clinical engineering by assessing the information contained in the Application in comparison to defined eligibility requirements, which includes review and verification of college or university transcripts, and review of three references that attest to the applicant's clinical engineering experience and abilities.
- 2) **Written Examination:** If the Boards deem the applicant eligible to pursue certification in clinical engineering upon completion of the Application process, the candidate then must pass a written examination consisting of 150 multiple-choice questions based on the ACCE *Body of Knowledge* survey for clinical engineering practice.
- 3) **Oral Examination:** Candidates that pass the written examination must then pass an oral examination based on the same content areas of the ACCE *Body of Knowledge* survey for clinical engineering practice. Upon successful completion of the Oral Examination process, the Board shall recommend the candidate for Certification in Clinical Engineering by the Commission.

All communications regarding certification in clinical engineering as well as all examinations will be conducted in English.

Statement of Fairness, Impartiality, and Nondiscrimination

The Commission and the Boards adhere to principles of fairness and due process and endorses the principles of equal opportunity. In administering the certification program, those involved in the process shall not discriminate or deny opportunity to anyone on the grounds of gender, age, religion, national or ethnic origin, marital status, veteran status, sexual orientation, or disability. Additionally, the Commission and the Boards understand the importance of impartiality in carrying out its certification activities, manages conflict of interest and ensures the objectivity of its certification activities.

Certification Attainment, Registry, and Renewal

Candidates that meet all the requirements for certification and pass the examinations, shall be recommended by the Boards for Certification in Clinical Engineering by the Commission. Certification is valid for three years at which time it must be renewed. A registry of individuals certified in clinical engineering is maintained by the Commission and is posted on the ACCE website at: <http://accenet.org/CECertification/Pages/Default.aspx>. It is the responsibility of each individual to keep track of their renewal date and notify ACCE and the Commission of any change in contact information via email at: certification@accenet.org. Individuals wishing to maintain certification and continue to be listed as certified in clinical engineering must submit a renewal application every three years for evaluation against the eligibility criteria established by the CCE Renewal Handbook, which is posted on the ACCE website.

Revocation of Certification

Certification will be revoked for any of the following reasons: falsification of information; misrepresentation of certification status; and/or, other activities deemed by the Commission or Boards to be contrary to the purposes of certification in clinical engineering.

Eligibility Requirements

To be eligible for certification in clinical engineering, individuals must have the required professional and educational credentials in addition to meeting a minimum number of years of engineering and clinical engineering experience. The minimum number of years of engineering and clinical engineering experience must be fully met prior to application submission. A single year (i.e., all 12 months completed) of clinical engineering practice can be counted as one year of clinical engineering experience and one year of engineering experience. The number of months of completed practice will not be rounded up to total years of experience.

For U.S. and International Applicants, individuals must meet one (or more) of the following eligibility criteria categories based on the type of credentials and its corresponding required number of years of experience:

Category	Professional Credentials Educational Credentials	Engineering Experience ^A Clinical Engineering Experience ^B
1	Licensure in the United States as a Professional Engineer (PE) ^C	3 or more years of clinical engineering practice ^{E,F}
2	BS or higher degree in engineering (ABET/EAC-accredited program) ^D	4 or more years of engineering practice, including 3 or more years of clinical engineering practice ^{E,F}
3	BSET degree in engineering technology (ABET/ETAC-accredited program) ^D	8 or more years of engineering practice, including 3 or more years of clinical engineering practice ^{E,F}

For Canadian Applicants, individuals must meet the following eligibility criteria:

Professional Credentials Educational Credentials	Engineering Experience ^A Clinical Engineering Experience ^B
Licensure as a Professional Engineer in the province in which the applicant practices	3 or more years of clinical engineering practice ^F

A. *Engineering Practice* is defined as “any service or creative work requiring engineering education, training, and experience in the application of engineering principles and the interpretation of engineering data to engineering activities that potentially impact the health, safety, and welfare of the public. The services may include, but not be limited to, providing planning, studies, designs, design coordination, drawings, specifications, and other technical submissions; teaching engineering design courses; performing surveying that is incidental to the practice of engineering; and reviewing construction or other design products for the purposes of monitoring compliance with drawings and specifications

related to engineered works” (NCEES Model Law, revised August 2016, National Council of Examiners for Engineers and Surveying).

The Boards may accept the following as representing up to two years of engineering practice each:

- Serving on the teaching staff of, and teaching advanced engineering subjects for, an academic institution providing engineering degrees at or above the BS level.
 - MS, or higher, degree in engineering.
- B. *Clinical Engineering Practice* is engineering practice within the clinical environment or in support of clinical activities and consistent with the ACCE definition: “A clinical engineer is a professional who supports and advances patient care by applying engineering and managerial skills to healthcare technology.” Technician-level activities, such as routine assembly, installation, testing, and maintenance of medical equipment, do not equate to clinical engineering practice. Experience is determined by the content and level of work described in the application and is not based merely on position titles.
- C. The US Board may accept equivalent professional engineering licensure from countries other than the United States. Obtaining equivalency evaluation from an approved third-party evaluation agency is the responsibility of the applicant and costs (if any) required to establish equivalency shall be borne by the applicant.
- D. The US Board only accepts degrees from programs in the United States that are ABET-accredited. To confirm a program’s accreditation, please use the ABET-Accredited Program Search at: www.abet.org.
- E. The US Board may accept equivalent degrees from countries other than the United States. Obtaining equivalency evaluation from an approved third-party evaluation agency is the responsibility of the applicant and costs (if any) required to establish equivalency shall be borne by the applicant.
- F. The Boards require applicants to provide clear evidence of engineering practice and clinical engineering practice.

Application Procedure

This handbook contains necessary information about clinical engineering certification. It is required reading for those applying and testing for certification in clinical engineering. All individuals applying for certification must comply with the policies, procedures, and deadlines in this handbook and attest to this by signing the attestation found on the online application. This handbook is subject to change. See the ACCE website for documentation updates at: <https://accenet.org/CECertification/Pages/Default.aspx>.

Applicants must read and follow all the directions on the Application and in this Handbook for Candidates.

Instructions for application submission are provided in the Application document published on the ACCE website. Applicants must have complete applications with all the required documentation submitted electronically to the Commission, including all forms, resume, transcripts, international degree equivalency evaluation (if applicable), reference statements, and fee payment received by the application deadline.

Applications will be considered incomplete if any of the forms are missing information or if any required documentation is not received by the application deadline, including OFFICIAL TRANSCRIPTS to be provided directly to the Commission by the college/university and CONFIDENTIAL REFERENCE STATEMENTS to be provided directly to the Commission by three professional references.

Only complete applications received by Commission by the application deadline will be forwarded to the Boards for review. Once the Board has reviewed and evaluated the applicant’s complete application, the Commission will notify the applicant of their certification eligibility status at least one month prior to the scheduled written examination dates. Applicants with incomplete applications by the application deadline or that do not meet the eligibility requirements for certification as determined by the Board review will be deemed ineligible for this application period. The Commission will only release individual application eligibility results directly to the applicant.

Fees

Fee Type	Amount	Details
Application Fee	US \$475	<ul style="list-style-type: none"> • Applies to all applicants and must be paid by the application deadline • Payable directly to ACCE • Refundable, less a US \$150 processing fee • Non-transferable • Includes initial testing center fees
Written Examination Rescheduling Fee	US \$50	<ul style="list-style-type: none"> • Applies to candidates who need to move their appointment within their current testing period at least 5 days prior to scheduled appointment • Payable directly to Prometric
Written Examination Retesting Fee	US \$175	<ul style="list-style-type: none"> • Applies to candidates who fail the written examination and are eligible to retest • Payable directly to ACCE • Non-refundable and Non-transferable
Oral Examination Retesting Fee	US \$150	<ul style="list-style-type: none"> • Applies to candidates who fail the oral examination and are eligible to retest • Payable directly to ACCE • Non-refundable and Non-transferable

Fee payments can be made by check or money order payable to ACCE, or securely online via PayPal® (Visa, MasterCard, Discover, and American Express accepted) at <http://accenet.org/CECertification/Pages/Default.aspx>.

Accommodations

The Commission, Boards, and Professional Testing Corporation (PTC) support the intent of and comply with the Americans with Disabilities Act (ADA). The Commission, Boards, and PTC will take steps reasonably necessary to make certification accessible to persons with disabilities covered under the ADA. According to the ADA, an individual with a disability is a person who has a physical or mental impairment that substantially limits a major life activity (such as seeing, hearing, learning, reading, concentrating, walking) or a major bodily function (such as neurological, endocrine, or digestive system). The information you provide and any documentation regarding your disability and special test accommodations will be held in strict confidence.

All approved testing accommodations must maintain the psychometric nature and security of the examination. Accommodations that fundamentally alter the nature or security of the exam will not be granted.

Special testing arrangements for the written examination may be made by completing and signing the Request for Special Needs Accommodations Form, available from www.ptcny.com/PDF/PTC_SpecialAccommodationRequestForm.pdf or by calling PTC at (212) 356-0660. This Form must be submitted with the online scheduling application no later than 8 weeks prior to the start of the written examination testing period.

Special testing arrangements for the oral examination may be made by contacting the Commission via email at: certification@accenet.org.

Only those requests made and received on the official Request for Special Needs Accommodations Form will be reviewed for the written examination. Letters from doctors and other healthcare professionals must be accompanied by the official Form and will not be accepted without the Form. All requests must be made at the time of scheduling. Accommodations cannot be added to an existing exam appointment.

Written Examination Administration and Scheduling

Candidates will be notified by the Commission if the Board deems the applicant eligible to take the written examination for certification in clinical engineering. The written examination consists of 150 multiple-choice questions, which must be completed within four hours. The written examination is administered during an established two-week testing period on a daily basis, Monday through Saturday, excluding holidays, at computer-based testing facilities managed by Prometric. Written examinations will not be conducted outside this scheduled testing period nor at non-Prometric testing centers. The written examination must be taken within two examination cycles after receiving eligibility notice; otherwise, the eligible application is forfeited, and the candidate is required to restart the certification process by submitting a new application.

Scheduling Written Examination Appointments

Prior to the testing period, you will be emailed a Scheduling Authorization from notices@ptcny.com. Please ensure you enter your correct email address on the application and add the 'ptcny.com' domain to your email

safe list. If you have been notified by the Commission that you are eligible for the written examination and you do not receive a Scheduling Authorization at least six weeks before the beginning of the testing period, contact PTC at (212) 356-0660 or online at www.ptcny.com/contact.

The Scheduling Authorization will indicate how to schedule your examination appointment with Prometric as well as the dates during which testing is available. Appointment times are first-come, first-serve, so schedule your appointment as soon as you receive your Scheduling Authorization in order to maximize your chance of testing at your preferred location and on your preferred date. Candidates who wait until the last minute run the risk of missing out on their preferred date, time, and testing center. Candidates unable to schedule an appointment will forfeit their test center fees.

After you make your test appointment, Prometric will send you a confirmation email with the date, time, and location of your exam. Please check this confirmation carefully for the correct date, time, and location. Contact Prometric at (800) 741-0934 if you do not receive this email confirmation or if there is a mistake with your appointment.

Note: International candidates may also schedule, reschedule, or cancel an appointment online at prometric.com.

IMPORTANT! You MUST present your current driver’s license, passport or U.S. military ID at the test center. Expired, temporary, or paper driver’s licenses will NOT be accepted. The name on your Scheduling Authorization MUST exactly match the name on your photo ID. *Fees will not be refunded for exams missed because of invalid ID.*

Rescheduling Written Examination Appointments

Candidates are able to reschedule their examination appointments within the same testing period as long as the request is submitted within the timeframe described below. Reschedule within the permitted time frame by calling or going to the Prometric website: www.prometric.com.

Time Frame	Reschedule Permitted?	Stipulations
Requests submitted 30 days or more before the original appointment	Yes	None
Requests submitted 29 to 5 days before the original appointment	Yes	Candidate must pay Prometric a rescheduling fee of \$50.
Requests submitted less than 5 days before the original appointment	<u>No</u>	Candidates who do not arrive to test for their appointment will be considered a no-show and all their examinations fees will be forfeited. Candidates will need to reapply and pay fees for a future testing period.

Preparing for the Written Examination

- Check your government issued photo ID (driver’s license, passport or U.S. Military ID) when you make your examination appointment. Is it expired? Does the name on your ID match the name on your Scheduling Authorization email? Proctors at the Prometric testing center will refuse admission to candidates with expired IDs, IDs with names that do not match their records, and temporary paper IDs. Candidates will be marked as no-shows and will forfeit their exam fees.
- Check your Prometric Scheduling Authorization email and Appointment Confirmation email from Prometric to make sure everything is accurate (i.e. your name, exam name, appointment date, time and location).
- Make yourself familiar with the location of your chosen testing site and any requirements they may have for parking and check the weather and traffic conditions before you leave for the testing center. Make sure you give yourself plenty of time to arrive as late arrival may prevent you from testing.
- In the event of inclement weather, check the Prometric website for site closures: <https://www.prometric.com/closures>.
- Prometric’s website provides information on what you can expect on your test day, including a walkthrough of check in and security procedures: www.prometric.com.
- This Handbook provides the Content Outline for the Examination (see Appendix). Use these to help you start studying for the examination.
- Review the Rules for the Written Examination before your appointment.

What to Expect at the Written Examination Testing Centers

PTC has partnered with Prometric Testing Centers to deliver examinations to candidates. Here is what you can expect when you arrive at your Prometric Testing Center.

- Candidate Check-In
 - Candidates will be asked to present their IDs
 - Candidates will be asked to empty and turn out their pockets
 - Candidates will be “wanded” or asked to walk through a metal detector
 - Inspection of eyeglasses, jewelry, and other accessories will be conducted. Jewelry other than wedding and engagement rings is prohibited.
 - Religious headwear may be worn into the testing room; however, it may be subject to inspection by a testing center administrator before entry into the testing room is permitted.
 - Prometric provides lockers for candidates to store their purses, mobile phones, jackets, food, drinks and medical supplies.

- During the Exam
 - No breaks are scheduled during the exam. Candidates who must leave the testing room to take a break will not be given extra time on the exam
 - Accessing mobile phones or study materials during the examination is prohibited
 - Smoking is prohibited at the testing center
 - All examinations are monitored and may be recorded in both audio and video format

Please keep in mind: other exams will be administered at the same time as your examination. Therefore, examinees may hear ambient noises such as typing, coughing, or people entering and exiting the testing room that cannot be avoided. Prometric is unable to provide a completely noise-free environment. However, headphones may be requested to minimize impact.

Please see [Prometric's website](#) for more information about what to expect on testing day.

Rules for Written Examination

Please read the information below carefully. You are responsible for adhering to the examination rules while at the testing center.

- You must present your current driver's license, passport, or US Military ID at the testing center. Candidates without valid ID will NOT be permitted to test. Temporary or paper copies of your ID will not be accepted.
- No Electronic devices that can be used to record, transmit, receive, or play back audio, photographic, text, or video content, including but not limited to, cell phones, laptop computers, tablets, Bluetooth devices; wearable technology (such as smart watches), MP3 players (such as iPods), pagers, cameras, and voice recorders are permitted to be used and cannot be taken in the examination room. Prometric provides lockers for your personal items.
- No papers, books, or reference materials may be taken into or removed from the testing room.
- No questions concerning content of the examination may be asked during the examination session. The candidate should read carefully the directions that are provided on screen at the beginning of the examination session.
- Candidates are prohibited from leaving the testing room while their examination is in session, with the sole exception of going to the restroom.
- Bulky clothing, such as sweatshirts (hoodies), jackets, coats, and hats (except hats worn for religious reasons), and most types of jewelry may not be worn while taking the examination. Proctors will ask you to remove such items and place them in your locker. Please see [Prometric's statement on Test Center Security](#) for more information.
- All watches and "Fitbit" type devices cannot be worn during the examination.

- No food/beverages are permitted inside the testing room. Leave these items in your assigned locker.

Contact PTC at (212) 356-0660 or www.ptcny.com/contact with any questions about the Written Examination Rules.

VIOLATION OF ANY OF THE RULES LISTED ABOVE MAY LEAD TO FORFEITURE OF FEES, DISMISSAL FROM THE TESTING ROOM, AND CANCELLATION OF YOUR TEST SCORES.

Reporting of Written Examination Results

Candidates will be notified within eight weeks whether they have passed or failed the written examination. Scores on the major areas of the written examination and on the total examination will be reported. The Commission will only release individual results directly to the candidate. Candidates that pass the written examination will be permitted to take the oral examination leading to certification.

Written Reexamination

If the candidate does not pass the written examination, they are allowed one retest after a minimum six-month waiting period at the next written examination offering. The fee for retesting is \$175 USD. Candidates that do not pass the retest or fail to take the retest at the next written examination offering will forfeit all fees paid and must restart the certification process by submitting a new application.

Oral Examination Administration and Scheduling

The oral examination can be scheduled once the candidate passes the written examination. The objective of this examination is to assess candidate's oral presentation of clinical engineering ideas in an organized and professional manner as well as their application of practical knowledge to solve problems. The oral examination consists of three scenarios with corresponding questions to be delivered and answered in 1 ¾ hours. The oral examination must be taken within two oral examination offerings from when the candidate is notified of successful completion of the written examination; otherwise, the eligible application is forfeited, and the candidate is required to restart the certification process by submitting a new application.

Scheduling Oral Examination Appointments

Candidates will be contacted by the Commission to schedule the oral examination following successful completion of the written examination. The oral examinations are offered annually in conjunction with professional meetings. Oral examination times will be scheduled with each individual candidate. Candidates are responsible for any necessary travel arrangements and associated costs for attending oral examination appointments. If candidates need to cancel an oral examination appointment or reschedule to a different date

due to extenuating circumstances, they must contact the Commission no less than 30 days prior to the scheduled appointment at certification@accenet.org.

Admission to Oral Examination Appointments

Candidates must be at their assigned examination room at the start of their scheduled examination time. Late comers may be admitted to the examination room at the discretion of the examiners, but examination times will not be extended such that later oral examination schedules are affected. Additionally, positive photo identification must be presented to the examiners at the start of the oral examination.

Rules for Oral Examination

Please read the information below carefully. You are responsible for adhering to the examination rules while in the oral examination room.

- You must present your current driver's license, passport, or US Military ID to the examiners in the oral examination room. Candidates without valid ID will NOT be permitted to test. Temporary or paper copies of your ID will not be accepted.
- No Electronic devices that can be used to record, transmit, receive, or play back audio, photographic, text, or video content, including but not limited to, cell phones, laptop computers, tablets, Bluetooth devices; wearable technology (such as smart watches), MP3 players (such as iPods), pagers, cameras, and voice recorders are permitted to be used and cannot be taken in the oral examination room.
- No papers, books, or reference materials may be taken into or removed from the oral examination room.
- No questions concerning content of the oral examination may be asked during the examination session. The candidate should listen carefully to the directions that are provided at the beginning of the examination session.
- Candidates are prohibited from leaving the examination room while their oral examination is in progress.

Contact the Commission at certification@accenet.org with any questions about the Oral Examination Rules.

VIOLATION OF ANY OF THE RULES LISTED ABOVE MAY LEAD TO FORFEITURE OF FEES, DISMISSAL FROM THE EXAMINATION ROOM, AND CANCELLATION OF YOUR TEST SCORES.

Reporting of Oral Examination Results

Candidates will be notified by the Commission within eight weeks whether they have passed or failed the oral examination. The Commission will only release individual results directly to the candidate. Candidates that pass the oral examination will be recommended for certification in clinical engineering by the Commission.

Oral Reexamination

If the candidate does not pass the oral examination, they are allowed one retest after a minimum six-month waiting period at the next oral examination offering. The retesting fee for the oral examination is \$150 USD. Candidates that do not pass the retest or fail to take the retest at the next oral examination offering will forfeit all fees paid and must restart the certification process by submitting a new application.

Failing to Report for an Examination

If the candidate fails to report for an examination, they will forfeit all fees paid to take the examination. A completed application form and examination fee may be required to reapply for examination.

Appeals

Applicants may appeal the eligibility decision of the Board by submitting a formal appeal in writing to the Commission. Candidates may appeal the written examination results or examination administration by submitting a formal appeal in writing to the Commission. Oral examination results are not appealable. All appeals must be made by the applicant or candidate directly; appeals made on the behalf of the applicant or candidate will not be considered. Repeat appeals will also not be considered.

Eligibility Appeal

If an applicant fails to meet the eligibility requirements for certification in clinical engineering, the applicant has 30 days to appeal the decision. The applicant must submit their appeal in writing to the Commission at certification@accenet.org and must provide a detailed explanation as to how the applicant believes they meet the eligibility requirements. The appeal will then be sent to the Board for review. Once a decision by the Board has been rendered, additional appeals will not be considered for the same application.

Appeal of the Written Examination Results

If technical issues are experienced during written examination, candidates may request a verification of their score which may involve hand scoring and/or a review by the Board. Any scoring alteration found as a consequence of an appeal of written examination results will be applied to all candidates whose pass-fail status was affected; not just the candidate requesting the appeal. All requests must be made in writing within 30 days of receiving written examination results to the Commission at certification@accenet.org.

Appeals of the Examination Administration

Testing conditions should be such that each candidate has an equal opportunity to be successful. Test sites should be comfortable, accessible, well-lit and free of distracting noise. Proctors and examiners should provide clear and uniform instructions and monitor testing conditions throughout the entire session. If conditions of the examination administration do not meet these standards, the candidate shall immediately notify the Commission in writing at certification@accenet.org. Any special considerations made for testing conditions that are deemed unacceptable as a consequence of an appeal will be applied to all candidates whose pass-fail status was affected; not just the candidate requesting the appeal.

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APPENDIX: Examination Content

Written Examination

1. The Examination for Certification in Clinical Engineering is a written examination composed of a maximum of 150 multiple-choice, objective questions with a total testing time of four (4) hours.
2. The content for both examinations is based on a “Body of Knowledge” (BOK) survey that is periodically performed by ACCE to determine the current knowledge and skill sets needed for competent clinical engineering practice. The most recent version of the BOK is found on the ACCE website at: https://accenet.org/publications/Downloads/Reference Materials/ACCE 2018 BOK Survey Report_web.pdf.
3. The Board, with the advice and assistance of the Professional Testing Corporation (PTC), prepares the written examination using questions developed and reviewed by the Board for construction, accuracy and appropriateness.
4. The questions for the written examination are also obtained from practicing clinical engineers and are reviewed for construction, accuracy, and appropriateness by the Board.
5. Some sections of the written examination may include questions on basic underlying knowledge including ones from anatomy, physiology, and the management and engineering sciences.
6. The distribution of questions in the written examination for Certification in Clinical Engineering will be weighted in approximately the following manner:

I. Technology Management.....	35%
II. Service Delivery Management.....	20%
III. Product Development, Testing, Evaluation, & Modification	5%
IV. IT / Telecom	10%
V. Education of Others	5%
VI. Facilities Management.....	5%
VII. Risk Management / Safety	10%
VIII. General Management.....	10%

Oral Examination

1. Following notification of successful completion of the written examination, applicants will be contacted by the Commission to schedule the oral examination.
2. The objective of the examination is to assess candidate’s oral presentation of clinical engineering ideas in an organized and professional manner as well as their application of practical knowledge to solve problems.

3. The oral examination for US candidates will consist of questions related to three clinical engineering scenarios. The oral examination for Canadian candidates will include a fourth scenario that relates to Canadian codes and standards.
4. For the US examination, 75% of the score will be based on information from the candidate's responses, and 25% will be based on verbal presentation of clinical engineering ideas in an organized and professional manner.
5. The scenarios will be presented in writing. Candidates will be given a period of time to collect their thoughts about each scenario before being questioned by the examiners. This period is 30 minutes for the US exam and 40 minutes for the Canadian exam. The review time may be used to make notes regarding all scenarios.
6. A series of 5-7 questions for each scenario will then be asked orally by the examiners. The candidate will have 20 minutes per scenario to answer the questions pertaining to that scenario.
7. Candidates may request for questions to be repeated while answering that question. Questions will not be rephrased or expanded upon.
8. Examiners can only repeat the question; they cannot expand on or request the candidate to clarify their answers.
9. If the candidate completes a scenario's examination session before the 20-minute allotted time, the remaining additional time will not be extended to any of the remaining examination times. Candidates are encouraged to manage their time wisely and take all the time available for each scenario to present comprehensive answers to the questions.
10. Examiners will take notes during the candidate's responses and may take up to 5 minutes to compile their comments. After that the process will repeat for the remaining scenarios.

Content Outline

- I. **TECHNOLOGY MANAGEMENT:** Technology assessment, Usability / Compatibility assessment, Product / vendor selection , Device integration planning, Life cycle analysis, Device / system upgrade planning, Return on investment (ROI) analysis, Healthcare technology strategic planning, Clinical trials management (non-investigational), Capital planning, Project management, Electromagnetic Interference (EMI) / Radio Frequency Interference (RFI) management , Clinical devices use and/or application, Pre-Clinical procedure set-up / testing, Participation in clinical procedures (e.g. surgery), Water quality management, Coordinating device interoperability / interfacing, Clinical systems networking, Interpretation of codes and standards, Other technology management responsibilities.
- II. **SERVICE DELIVERY MANAGEMENT:** Technician / service supervision, Service contract management, Equipment repair and maintenance, Equipment acceptance, Equipment performance testing, Develop test / calibration / maintenance procedures, Maintenance software (CMMS) Administration, Parts/ supplies purchase and/or inventory management, Technical library / service manuals management, Other service delivery responsibilities.

- III. **PRODUCE DEVELOPMENT, TESTING, EVALUATION, AND MODIFICATION:** Medical device concept development / invention, Human factors engineering, Medical device design, New product testing and evaluation, Device modifications, Product research and development, Product sales / sales support, Product / systems quality management, Regulatory compliance activities, Documentation development / management, Other product development responsibilities.
- IV. **INFORMATION TECHNOLOGY (IT) / TELECOMMUNICATIONS:** Help Desk / dispatching / call tracking, Information Technology (IT) management, Telecommunications management, Integration of medical device data, Installation management, Configuration and change management, ISO/IEC 80001 (risk management of medical devices on a network), Continuity and capacity management, ISO/IEC 20000 (information technology service management ITSM), Release management, ITIL (information technology infrastructure library), Other IT / Telecommunications responsibilities.
- V. **EDUCATION OF OTHERS:** Technician education, Engineering education, Device user / nurse training, Develop / manage staff training plan, International healthcare technology management, Other education responsibilities.
- VI. **FACILITIES MANAGEMENT:** Building design, Building plan review, Medical gas system testing, Supervise / manage / direct facilities management, Facility / utility remediation planning, Emergency electrical power, Facility emergency preparedness activities, Other facility management responsibilities.
- VII. **RISK MANAGEMENT /SAFETY:** Patient safety, Expert witness, Risk Management, Investigational Research (Human Use), Forensic investigations, Medical device incident reporting (SMDA) , Radiation safety, Root cause analysis, Failure mode and effects analysis, Fire protection/safety (Life Safety Code) , Product safety / hazard alerts / recalls, Infection control, Industrial hygiene, Work place safety practices (OSHA), Hazardous materials, Engineering assessment of medical device failures, Incident / untoward event investigation, Other risk management / safety responsibilities.
- VIII. **GENERAL MANAGEMENT:** Staffing, Staff skills / competency assessment, Budget development / execution, Personnel management / supervision, Performance improvement / CQI, Policy / procedure management / development, Committee management, Business / operation plan development / management, Revenue producing activities, Other general management activities.