BIOMEDICAL ENGINEER

JOB SUMMARY
A biomedical engineer applies engineering principles and design to solve problems related to human health. Three important components in making a competent biomedical engineer are: (1) a firm foundation in engineering (Bachelor of Applied Science), (2) working knowledge in human biology and (3) an understanding of clinical practice.

QUICK FACTS
The Wage
- $50k-$100k annual

TRAINING / EXPERIENCE NEEDED
- A Masters degree in Engineering, or combination of education and experience, with eligibility for registration with the Association of Professional Engineers of B.C.
- Demonstrated proficiency in the operation of a broad range of electronic test equipment and medical instruments.
- Familiarity with computer programming and operation.
- Four years related experience including exposure to Biomedical Engineering in a Hospital environment required.

SKILLS AND ABILITIES NEEDED
- Ability to establish and maintain effective work relationships with all levels of staff within the VIHA, vendors and suppliers. Demonstrated organizational, communication and project management skills. Ability to analyze unexpected problems with medical equipment and to resolve them with minimum disruption to the department.
- Ability to communicate with and direct a wide variety of people including clinical staff, managers, and internal resource people (e.g., purchasing).
- Ability to establish and maintain effective work relationships and communication with all levels of VIHA staff and external agencies, vendors, and resources.

WHAT ARE THE PREREQUISITES FOR A BIOMEDICAL ENGINEER?
- High academic achievement will be required to obtain entrance to an undergraduate program in Biomedical Engineering.
- The Masters level program will be open to those with undergraduate degrees in engineering or science in relevant scientific disciplines such as physics, computer science, biotechnology, or medical science.

TRAINING LOCATIONS
- For information on schools offering biomedical engineering visit the following website: http://www.cmbes.ca/

PROGRAM LENGTH
- 4 years for a bachelor (Undergraduate Degree)
- 2 years masters’ degree

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WHAT WILL I BE LEARNING ABOUT?

Undergraduate Degree:
• The mandatory courses required to complete an engineering degree are required, such as Calculus, Electronics, Static/Dynamic mechanics, Computer Programming, and Design.
• Additional courses will include Human biology and physiology, organizational behaviour and clinical practice.

Master's Degree:
• The three-credit course APSC 556: Clinical and Industrial Practice of Biomedical Engineering
• A maximum of six credits in clinical and industrial practice of medical science or biomedical engineering. This includes APSC 556: Clinical and Industrial Practice of Biomedical Engineering.
• A minimum of six credits in life science subjects. Three credits must be in physiology and anatomy unless candidates have the equivalent credits prior to admission
• A minimum of six credits from a list of core biomedical engineering courses currently offered by the Faculty of Applied Science.
• At least nine credits must be taken in the Faculty of Applied Science courses at the 500-level.
• Technical electives are selected in consultation with the research supervisor.
• Completion of a graduate research seminar, APSC 552.
• According to the Faculty's academic regulations, a maximum of six credits at the undergraduate level in courses numbered 300 to 499 may be counted toward the requirements of a master's degree.

JOB OPPORTUNITIES

Medical instrument industry
• Biomedical engineers may be involved in the design of diagnostic and research devices, manufacturing of medical equipment, construction of medical facilities, development of diagnostic standards, or test and implement new products.

Pharmaceutical/biochemical industry
• Biomedical engineers may design and evaluate biochemical processes for making medical compounds or components, control and optimize bioreactors for pharmaceutical productions, or participate in project management or marketing of biomedical products.

Hospitals
• Biomedical engineers may test and implement new devices, maintain medical equipment, act as consultant to the selection of hospital equipment, design and develop informatics, develop diagnostic protocols, liaise with hospitals and other high-tech sectors.

Medical research facilities & educational Institutions
• Biomedical engineers teach and perform research to advance the field. Since Biomedical Engineering is a multidisciplinary research area, collaborative research often involves engineers and other researchers from a wide variety of background such as Medicine, Science, Rehabilitation Science, Dentistry, Nursing, and Pharmaceutical Science etc.

Regulatory bodies, governments and industry associations
• Biomedical engineers may develop inspection protocols, codes and standards for safety, or practice guidelines. They may review and assess new products, participate in academic activities, and liaise with different bodies including the general public on issues related to this discipline.

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JOB TASKS – A SAMPLE

- Mediates crisis situations regarding medical equipment as they arise including any difficulties clinical staff may encounter in the use of medical devices, obtaining replacement equipment or other short term solutions and contacting vendors to negotiate terms of equipment repair or loan.

- Ensures long term solutions to medical device problems by reviewing and revising procedures and policies, identifying key sequences or part set ups that would affect the performance of a device, communicating procedural changes to staff, implementing procedure revisions and follow-up for re-occurrence of problem.

- Develops, leads and manages substantial multi-disciplinary projects that are intended to improve the existing care delivery system. (e.g. laser equipment, ICU charting equipment). This includes assessing the needs of specific departments and the VIHA as a whole, developing a project plan, working with vendor and implementing changes and arranging training. This also includes conducting feasibility studies based on cost analysis.

- Conducts incident investigations in cases of injury to a patient or staff member or a disruption in service that endangers patient care by securing all evidence, interviewing personnel involved in the incident, and preparing a report including conclusions and recommendations for changes. Works with manufacturer if failure of a specific device is a contributing factor, ensures corrective action is taken and follows-up with users and manufacturers to ensure product changes are implemented.

- Assists users with Capital Equipment planning by providing information about the condition and serviceability of existing equipment, VIHA acquisitions strategies, and market trends. Translates user needs into technical specifications in order to identify and locate suitable contenders and analyze how a new acquisition will impact operating costs.

- Maintains an ongoing awareness of developments and trends in a number of technologies and markets relating to health care equipment. Surveys the equipment market, reviews medical equipment trade magazines, searches the internet and maintains contact with suppliers/vendors.

- Coordinates evaluation of contract proposals to ensure objective selection. Contacts user references and vendors to discuss service models including training, service contract options, availability of parts, quality of service, and response times. Chairs multidisciplinary teams to ensure that equipment meets everyone’s needs. Provides a final recommendation to Purchasing as the technology expert. Responsible for the installation, integration, and implementation of the new technology.

- Trains, consults and provides advice to users in the operation, safe use and care of medical equipment, on the instruments necessary for maintaining their safety and effectiveness and for protecting the organization’s investment.

- Develops department policies and operating procedures to improve the operating efficiency of the department.

- Designs and maintains the VIHA’s medical device information system and provides asset management information to clinical users and administration

- Mitigates medical device hazards by maintaining systems to monitor medical device hazard notices and implement recommended changes. Leads and participates as the technology expert for safety committees associated with potentially hazardous technology within the VIHA (e.g., laser safety, reuse committee, cardiac arrest committee, technology assessment committee)

- Responsible for monitoring expenditures and variance analysis and reporting for contract/supply budget for delegated responsibility area.