Comparing Undergraduate Environmental Health Education in Canada and the United States

... training the next generation, eh!

Canada

NEHA/UL Sabbatical Exchange Award to Canada, 2013

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Disclaimer

This was a relatively short study trip to learn about the Canadian undergraduate EHS educational system, and not in depth research on the topic. Though I have attempted to accurately describe the system and what I learned, please excuse any inadvertent errors that I may have made in understanding, interpretation, or terminology in this report. Thanks!
Introduction

In 1993, I was fortunate to have won the NEHA/NSF Sabbatical Exchange Award to the UK. I was able to spend a month studying and working in England and Scotland looking at indoor air quality issues in university environmental health and safety (EHS) operations, District Councils, and in the private sector. This was my first international experience and what an impression it made! I learned that other countries often do things very differently than we do here in the US. As a mid-career professional, the experience helped me to think beyond the regulations; to think as a problem solver and to consider options that might at first glance seem different than I was used to. That mindset has served me well in my career. In 1999, I was able to host Andy Godman from the UK at my home and set up a week of his trip to the US in Ohio. Having had the UK experience, we were able to really compare the EHS systems in both countries and I was able to share with Andy our perspectives on common problems. We generally have similar problems and issues; but approaches, priorities, regulations, and systems differ. I would find that this was the case with the EHS educational system in Canada as well.

After the wonderful experiences that I had with our Sabbatical Exchange Program in developed countries, I was anxious to also experience developing countries as well. While finishing my doctoral degree late in my career in summer of 2007, I got the opportunity to work on a Chagas Disease project in Ecuador for a month. This was an eye-opener! Experiencing firsthand the poverty, substandard housing, lack of safe water and sewage facilities, the burden of vector-borne diseases, lack of refrigeration and food safety, and related issues, far beyond what we might experience in most parts of our country, was an educational experience unlike any I had ever had. Even with very little, the people I interacted with were warm, hospitable, friendly, and happy. I came home with a new perspective on public and environmental health and appreciation for our country that I could never have gained without participation in international experiences like these. It changes you.

A few years ago, as my career was hitting the 35 year point, I wanted to spend the rest of it educating young people in environmental health and safety, before I ‘hung up the thermometer’. I got the incredible opportunity to start a brand new environmental health science program in a brand new College of Public Health at Kent State University at Kent, Ohio, about 40 miles southeast of Cleveland. As I spent my first year developing the curriculum and 14 new courses for the program, I ran across the NEHA Sabbatical ad again in the Journal. I began to think, what better time for me to apply for the Canada trip and explore the EHS educational system in Canada? What could I learn that I might be able to bring back to the US,
to help shape our new program? Amazingly, I won and was given another wonderful opportunity! My hope now is to encourage and motivate other EHS professionals in NEHA to take advantage of this marvelous opportunity to broaden your horizons, open your eyes to the needs and possibilities in EHS, and advance your careers! You have nothing to lose, and everything to gain.

**Planning the Canada Trip**

A summary of Environmental Health Degree Programs in Canada has been published by the National Collaborating Centre for Environmental Health and can be found in Appendix A. There are only five undergraduate degree programs in Canada that lead to certification as a Public Health Inspector (PHI), that are certified by the Canadian Institute of Public Health Inspectors (CIPHI) (1). This would be equivalent to the registered sanitarian/registered environmental health specialist (RS/REHS) credential in the US. I was also very interested in the certification or registration process in Canada. We made sure our program at KSU would comply with the RS educational requirements in Ohio during development. I am a member of the Ohio Board of Sanitarian Registration (OBSR).

Initially, I had planned to visit all five programs in Canada; but due to scheduling conflicts, I was only able to get away for three weeks or so, so I settled on three universities in the western part of Canada:

- **British Columbia Institute of Technology (BCIT), Vancouver/Burnaby, BC** (2)
- **Concordia University (CU) College of Alberta, Edmonton, Alberta** (3)
- **First Nations University (FNU), Regina, Saskatchewan** (4)

BCIT is one of the oldest and most mature programs, having started in 1969. Concordia and First Nations were a bit newer. I was also very interested in learning about First Nations culture, EHS issues, and how treaty law affects environmental health regulation and practice; a topic I knew very little about. The province maps showing the three city locations can be seen in Appendix B. I traveled from Vancouver, through Kamloops and Jasper, over the Rocky Mountains to Edmonton, and then Regina. In addition, to the educational and professional benefits of the trip; the natural beauty of the country, as I traveled around, was spectacular!

I was able to get an introduction and contact information for the programs through Phi Phan, President of CIPHI. After a flurry of emails and phone calls, itinerary’s where set with my hosts:

- Lorraine Woolsey, BCIT, Burnaby, BC
Dr. Karen McDonald, Concordia University, Edmonton, AB

Carmen Buschow, First Nations University, Regina, SK

All were very gracious and helpful in setting up the itinerary’s found in Appendix C. The wonderful experience that I had on the trip and all that I learned was due in no small part to their efforts. I did collect many materials from the three university programs and Health Authorities, and took many pictures. I will include more pictures in my presentation at the NEHA Annual Educational Conference in Las Vegas on July 8, 2014.

British Columbia Institute of Technology, Burnaby, BC

The first week was spent at BCIT in Burnaby, a suburb of Vancouver, located on the Pacific Ocean in western Canada just north of Seattle. The city and area were very beautiful. Taking the sky train to work each day was a unique experience in itself for a guy from the Midwest. I was able to combine a look at the university environmental health science (EHS) program and a little of the occupational health and safety (OHS) program. These programs share lab space, equipment, and a lab manager. I was extremely envious of their facilities and equipment! I was also able to meet with regional environmental health professionals from the Vancouver Coastal Health Authority (VCHA) and go out for a few hours with a Public Health Inspector.
On the first day I met my host Lorraine Woolsey, who is Director of the Environmental Health Program. Lorraine spent time giving me my first orientation to the Canadian EHS educational system and involvement with the Canadian professional association, CIPHI. I quickly found out that although the curriculum and course work were very similar to ours, the ‘system’ and the type of student in the program were quite different in Canada. BCIT offers a Bachelors of Technology in Environmental Health degree.

Lorraine Woolsey, BSIT, EHS Program Director

The professional association, CIPHI, has direct control over the PHI certification process and accreditation of the EHS programs at the five universities. Certification with CIPHI is a national credential. Each province does not have a separate certification program as in the states in the US. CIPHI also certifies the academic EHS programs and has extensive practicum requirements and learning objectives that academic programs must adhere to (1). CIPHI also works directly with universities to place students in practicums (internships) with the many health authorities in Canada. This is very different than in the States where universities are not directed by the professional associations. Registration boards are generally separate entities in the states and the national academic accreditation board (EHAC) is also separate from professional associations, such as the National Environmental Health Association (NEHA) or Ohio Environmental Health Association (OEHA). As will be discussed later, this may be partially due to their narrower focus on educating public health officers for Health Authorities. Our
programs in the States and ours at Kent State University for sure, have a much broader EHS employment focus. We educate EHS students for not only for Public Health Agencies, but also for environmental protection agencies, universities, consulting companies, facility operations, research facilities, and industry. Unlike the US, in Canada you have to have an Environmental Health degree from one of the five certified programs to practices as a PHI or EHO.

Another interesting aspect of the BCIT program was that it is what is called an 'after degree' program. This means that their students generally come to the 2 year EHS program after they already have a four year degree, including a certain amount of science. This was important, I think, in understanding what I observed in the classroom discussions compared to those I have been at in the States.

During the week I was able to meet with a number of full and part-time faculty and attend a number of classes (*), since this was the last week of their semester. Faculty reported that they did not have major issues with basic science knowledge or writing skills as their student were older, most have college degrees already, and have some college and life experiences already. I was able to meet and/or attend a class with:

Martin Mcleod  (will become the new EHS Program Director, as Lorraine is semi-retiring)
  Food Safety*, Land Use Planning*, Pest Control, Air
  Joanne Edwards
  Water Programs*
  Keith Herle
  Solid and Hazardous Waste, Sewage, IAQ, Healthy Communities, Environmental Assessment, Occupational Health & Safety
  Vince Crozier
  Environmental Law*, Intro EHS, EH Applications, Water Programs
  Fred Shaw – EHS and OHS Lab Coordinator
  Toured all labs and looked at equipment used for teaching in all of the EHS and OHS labs

In the courses that I observed, one thing that was very striking was the level of engagement and discussion that took place among the students and with the faculty that occurred almost immediately when the classes began. This level of participation by students usually takes some
period of time in my experience, before they begin to open up more in class and engage in more meaningful discussion. I found this really interesting. As I learned more, I began to see the likely reasons for these differences, and the effects of the Canadian system on student learning and engagement. I think that the student and classroom differences can likely be attributed to some or all of the following factors:

1. PHI learning objectives are directly tied to getting a job, because of the close participation in the academic programs by CIPHI.
2. The students are a little older, more mature, and have college and a little more life experiences.
3. Most students already have college degrees, with previous science and college writing experience.
4. Students are highly motivated, because they have experienced some degree of problems getting a job with their degree, and have elected to take two more years of schooling for specific job skills and promise of a good job and career. A CIPHI certified EH degree is required to work in the field.
5. This is a ‘cohort program’. The students go through the program as a group and know each other fairly well and are comfortable with each other. All students are EH majors.
6. In their program a C grade or below fails.
7. All courses I observed used group tables. There were no long tables or individual classroom seats observed. Some had dedicated EH classrooms.
8. Specific focus on PHI training and specific job related projects and coursework.
9. Academic preparation for certification exams that includes not only a paper test, but a panel interview with impromptu questions and ‘thinking on your feet’, and submission of sample inspection reports.

I heard a guest speaker, Linda Pillsworth, who is an EHO with the new British Columbia First Nations Health Authority. This is a new approach in Canada, a private health authority of sorts for First Nations health affairs and all eyes are on them to see how this works out in British Columbia. She spoke about some of the unique challenges presented by the First Nations reserves.

Also of note, is that student recruiting was somewhat easier because of the participation of CIPHI and the fact that they largely recruit existing 4 yr. university programs, because it is an ‘after degree’ program. High school recruiting is much more time intensive. There are more of them to recruit and it is likely not as fruitful. High school students often don’t really know what they want to do yet with their life and are often not as career focused as these Canadian students in my experience.
I was able to tour their extensive lab facilities and equipment holdings with Fred Shaw. As a mature program that has been around for a long time, they have developed an impressive lab program. BCIT has at least five large labs for just the EHS and OHS programs. They have a vast array of equipment for course work and labs. They have multiple instruments for individual student use in lab. They have a full time lab coordinator to maintain the labs and equipment, set up/tear down the labs for faculty, and generally assists with hands on learning and demonstrations. They are also able to use labs in their Food Processing Technology program with the EHS students. The nature of an Institute of Technology is such that a larger laboratory and equipment presence might not be unexpected. As a new program, I was particularly envious of their facilities and equipment. I took lots of pictures to show my Dean, as we are just starting to build our program resources!

One thing that I was also interested in was how field work was incorporated as part of their program. They do some field work and trips. They are able to get more time for this because they can combine different sections or classes because they are a cohort program and all students have nearly the same schedules. I have made a special effort to included larger blocks of field time in my program courses because of the value I place on this. The logistics are much harder to deal with and more cumbersome in our course block system with students all having different schedules (non-cohort system).

The last afternoon of the week, I was able to visit the Vancouver Coastal Health Authority (VCHA). I met with Tara Hluchy and Ian Stewart. I had a chance to go out with Ian, who came to Canada from Ireland. British Columbia is broken up into five (5) Regional Health Authorities like VCHA, while Alberta is consolidated into one (1), and Saskatchewan has thirteen (13). This is in stark contrast to the 125 local health departments in Ohio! Much of their work is the same as ours, but they do much more private housing inspection and what they call ‘Personal Services’ establishments. This includes not only tattoo parlors and piercing, but can include body art, beauty shops, pedicure operations, float center sensory deprivation tanks, and the like. I was able to visit a few of these establishments that afternoon. Ian took me to a tattoo shop and float center where he had operators that were especially professional and willing to walk me through their operations health and safety programs. I had never heard of a float center. They are essentially a private room and a covered tank with a small amount of Epsom Salted water so that you float easily. You get inside and float in the dark, with minimal sensory input. This is done for relaxation and stress relief. The tanks have issues similar to swimming pools in terms of sanitation, disinfection, and the like. At the tattoo parlor I had a chance to not only review equipment sterilization, but also laser removal of tattoos that involves special training, eye protection, and safe laser operations. We also inspected a Food Service Operation, located near the bay that had been having some pest problems, to confirm
abatement success. I was finally starting to get the hang of using kilometers and degrees Celsius on the job as well!

**Concordia University College of Alberta, Edmonton, AB**

The drive through the Canadian Rockies from Vancouver, through Kamloops and Jasper, to Edmonton was quite spectacular! At Concordia, my host was Dr. Karen McDonald. The Concordia EHS program is a newer program, started in 1995. They have their own dedicated classroom, but did not have the level of dedicated labs and equipment that I saw at the BCIT program. But, there was also no companion occupational health & safety program there either. It was more like our current program at Kent State. They take quite a few field trips and do field work. It is also a 2 year ‘after degree’ program like BCIT. They offer a ‘Bachelors of Environmental Health’ (after degree).

![Concordia University, Edmonton, AB](image)

I attended several courses and meet with faculty at Concordia. I was able to work with Carla Eskow and Nelson Fok. Again, I found the curriculum to be very much like ours in the States, but the students and system different. I again found students much more engaged in their work, like at BSIT; but the same student attributes and factors previously outlined were likely in play at Concordia as well in their ‘after degree’ EH program. At Concordia, I was able to attend
related courses taught by adjunct faculty such as Allison Scott in Epidemiology and Dr. R.W Coppock in Toxicology as well.

![Carla Eskow, Nelson Fok, and Dr. Karen McDonald at Concordia U.](image)

I began to learn more about the relationships between the profession, CIPHI, and the universities. CIPHI dictates the learning objectives that the academic programs must address as part of their curriculum. This does not happen in the States. Again, our employment focus is so much broader in scope than just Public Health Inspectors. CIPHI prescribes some 488 instructional objectives in 16 categories that Universities must try to address throughout their curriculum. These can be found in Appendix D (1). I also found out that their programs have not only government funding, but support from private companies and CIPHI, because of their need for trained public health inspectors and environmental health officers. The five (5) EHS programs, geographically spread out programs across Canada, can generally prepare an adequate supply of environmental health professionals for the country.

I was able to meet with the university President and members of his senior staff and had a very enjoyable conversation about the environmental health program from their perspective, the university in general, and to discuss possible international collaborations between institutions.
I had an opportunity to meet with a group of former students who are now out working in Health Authorities. They echoed what we have been hearing from our own off-campus Professional Advisory Committee (PAC) here at Kent State. What was most important was what they learned about ‘people skills’; communications, writing that reflected real world situations they would be in, learning to work with a group, giving a talk, etc. They also stressed the value of real world experiences, field trips, and their practicums. They felt that their EHS program had served them well. I really enjoyed talking with this group of students (now EHS professionals). Their enthusiasm for the profession was evident.

Next, I spent some time with three officers from the Canadian Institute of Public Health Inspectors (CIPHI) - Alberta branch; Jason McDonald (president), Jon Elliott (VP), and Jessica Popadynetz (Secretary). They helped fill me in on the role of CIPHI in university EHS programs and about CIPHI in Alberta. One of the interesting things I learned was that in Canada most all EHO/PHI’s are unionized. They can also use their job benefits to put some of their benefits money aside to pay for continuing education. I thought that was a great opportunity for those that could do it. Money for continuing education is a continuing problem for many EHS professionals and their agencies in the States. We were able to get a picture of the group and I think our picture was ‘tweeted’ out to the organization soon after the meeting. I think that international cooperation between countries and professional associations will become increasingly important as we struggle to deal with EHS issues, many of which know no borders.
At each university, I tried to delve into the types of class projects they do, the writing they do, hands-on activities, and other ways to connect the science with real world practice. I was able to get some great ideas at all three universities and plan to try some new things in some of my courses as they develop. This was also a great ‘memory jogger’ as this also called to mind things from my own education and past experience that I had forgot about, that might be regenerated for use in classes. I have already incorporated a few for this Fall Semester. I had an opportunity to just talk and compare notes with other faculty involved in environmental health education. It was a great experience and opportunity that I very much appreciated.

Toward the end of the week, I was able to meet with environmental health practitioners from Health Canada (federal) and Health Alberta (provincial) as I learned more about the public and environmental health operations in Canada. Alberta was a little unique in that they were consolidated into only one Health Authority and did not have the province broken down into separate regional operational Health Authorities, like BC and Saskatchewan. They had work areas within the one Health Authority. One of the very interesting areas that I was able to learn about was the First Nations environmental health operations and the separation of the Health Authorities and their jurisdictions. Health issues are generally provincial operations, with the exception of First Nations programs which are federal. Otherwise the federal role is predominantly funding.

I met with Chris Kelly at the First Nations and Inuit Health Branch of Health Canada. The First Nations in Alberta, for example, are regulated by three treaties signed in the late 1800’s and are separate health operations. There are 44 First Nations people on 134 reserves covering 741, 427 hectares. Health Canada is responsible for environmental health affairs on First Nations reserves. Chris gave me a good explanation of the several treaties that regulate the First Nations people and how environmental health work and regulation is separated for First Nations and non-First Nations land. Operations on First Nations reserves are overseen by their own governing structures, so EHO’s must spend considerable time cultivating good relationships with the leadership and community. Good cooperation exists between environmental health officers on all sides in dealing with health concerns that exist across borders. All EHO’s working on First Nations lands must be Canadian Certified Public Health Inspectors. There is interest in training First Nations students in environmental health to become certified, especially at my last host institution First Nations University in Regina, Saskatchewan.

My last stop was to see Bill Hone, EH Director for Alberta Health Services. Bill helped me understand the provincial health operation in Alberta, their operational standards, and the province in general. Economically, oil production helps to fuel the economy in Alberta. I did
not really realize that. The Health Authority has produced a document, ‘A Common Reference System and Operational Standards for Albert Regional Health Authority Environmental Health Programs’ (The Blue Book) that guides their programs. Interestingly, the document references a University of Alberta study that sites ‘difficulties in recruiting qualified professionals’, as an issue. The three universities that I visited are helping to address this need.

**First Nations University, Regina, Saskatchewan**

My last week was at First Nations University (FNU) on the campus of the University of Regina in Regina, Saskatchewan. This is the First Nations university for Canada and attempts to preserve the First Nation cultures and provide regular and indigenous education for students. The university is open to all students. The design of their building itself was a tribute to First Nations culture and beliefs. The building is striking! It incorporates a teepee like atrium and was built with no exterior corners. The rounded design signifies that all aspects of life are continuously connected. My host was Carmen Buschow, the EHS program Director. First Nations offers a Bachelor of Science in Applied Science in Environmental Health & Science degree.

![Image of people in front of a banner](image)

*With Carmen Buschow, EHS Program Director at FNU*
When I arrived, I was met by my host and two tribal elders who took me into a glass teepee in the lobby of the atrium for a ‘smudging’ ceremony, during which smoke was used and prayers were offered for the success of my study trip and time at their university. Thus, the inter-cultural learning continued. I was then treated to a tour of the school by Cadmus Delorme, the student recruiter with Student Success Services. Cadmus is a First Nations person, and I was captivated by his pride and enthusiasm for the university. It was so interesting listening to him describe the design purpose for the building and various unique features in the building. He also told me about his efforts to recruit students on the First Nations Reserves to the school. Apparently, there are only a few First Nations EHO’s in Saskatchewan. He was a wonderful ambassador for the institution with an infectious smile and obvious love for the institution.

![First Nations University, Regina, SK](image)

FNU is co-located on the campus of the University of Regina. The FNU environmental health program is offered in collaboration with the University of Regina, Faculty of Engineering & Applied Science and students use both universities for their coursework. The Province of Saskatchewan Disease Control Laboratories are located on this campus as well. The Canadian Food Inspection Agency was located next to my hotel. It is a division of Health Canada (federal) that handles nation-wide food issues, recalls, etc.

Like the other two schools, I found the curriculum to be very much like ours. They are developing on-line coursework because of the distance to many of the First Nations
communities that they are trying to target for their program. Besides the First Nations orientation of the institution, another big difference from the other two institutions that I looked at was that FNU brings in four year students after high school like our university. It is not an ‘after degree’ program. The faculty voiced some of the same issues that we face: readiness for college, career uncertainty, writing skills and communication skills, lack of or fear of math and science education, and lack of life experiences, when compared to older ‘after degree’ program students. School was out, so I was not able to attend any classes at FNU, but I was able to meet with some faculty. I regret that I was not able to attend any classes at FNU and compare the level of student engagement under both ‘after degree’ and regular 4 year programs. Carmen filled me in on their program and indicated that they use a number of practicing EHS professionals as adjunct faculty and have a few full time faculty. It is a cohort program and all EHS courses are required in the program. They are also fortunate to have Dr. Carrie Bourassa at FNU; a well know researcher on the health issue faced by the First Nations people. I was sorry that I did not get to meet her during my trip. I also met Dr. Lynn Wells, the Vice President of Academics.

I was also able to do some document review, which I did not have as much time to do at the other institutions. In particular, I was able to review their CIPHI accreditation documents and learning objectives. This was very helpful, as I am just beginning the process of seeking EHAC accreditation in the US for our program. I reviewed the schedule for their CIPHI site visit to help me think about this for us going forward. One thing that I really liked was that they involved their external professional advisory committee in the site visit. The Canadian institutions must address the 488 learning objectives specified by CIPHI for the program. I really like how FNU presented their courses in a chart showing the alignment with the CIPHI objectives. This made it very easy to see the relationship between these two things. I was also able to review course syllabi and some of the on-line courses, in order to compare with our program and get ideas for consideration back at home. Afterwards, I had a chance to talk with one of the part-time adjunct faculty, Rob Shuba from Regina Qu’Appelle Health Region, about how the on-line water and wastewater courses are working out and ideas he has for the future.

I was able to spend an entire day with the Regina Qu’Appelle Regional Health Office. I caught them on office moving day, and they were still gracious enough to do it! My host, Rob Shuba, Manager of the EHS Department and instructor at FNU, organized the visit. Rob’s unit is one of 13 regional health districts in Saskatchewan and serves a population of about 200,000. Most of the population in all three provinces that I visited is in the south, closer to the US. The north is more rural and sparsely populated. We discussed the operation of Health Units and although generally like ours in Ohio, as I mentioned earlier in this report, I found that they too do much more in the area of ‘Personal Services” and housing inspection in private homes. Rob and I also discussed his course and some of the things he does. One thing that he did in his field
experiences and trips was to have them led by other EHS professionals. He was able to conserve his limited time while exposing students to other PHI’s and their experiences. I also learned that in general regional EHS professionals supported by the province and enforce provincial laws are called Public Health Inspectors (PHI’s) and those that have national responsibilities, like Health Canada or First Nations lands, are called Environmental Health Officers (EHO’s). EHO is a somewhat newer designated in some areas or countries as well. In Ohio, though our official credential is the Registered Sanitarian (RS), many professionals prefer the term Registered Environmental Health Specialist. I also spent some time with George Koutsoulis to talk about disease surveillance, disease investigations, prevalence of certain diseases in Saskatchewan, and some of the details about their work.

Rob Shuba (3rd from left) and some of his staff at Regina Qu’Appelle

During the afternoon I had the opportunity to go out in the field on some housing inspections with Paul Tykon and Rob Stadnyk. They have housing requirements and inspections are based on requests or complaints and often involve rental housing. In my experience, we generally do not get involved in housing inspection much in private homes, especially inside the homes, unless there are specific local regulations or programs. There may be regulations under health or other departments or perhaps rental housing codes in college towns, for example.
One house we went to, in particular, was a good example of why this is important in a community. Concerns from a renter about her house came in as she was moving her family out of the house. Upon inspection, a number of serious concerns were documents. The house had water damage apparently caused by roof gutters that were separated from the house by a few inches. There were large cracks in the basement walls, bowing walls in a few areas, and evidence of structural problems that needed to be looked at. In addition, in the basement there was badly damaged asbestos pipe lagging on the ceiling and a sheet metal wye with a louver in it had been installed in the vent from the boiler exhaust to the outside, which could allow carbon monoxide to enter the basement. The basement was used to do laundry and the kids played down there. The PHI’s took some pictures and made arrangements to take another look at the place to prepare some orders. This pointed out the importance of our Built Environment, Shelter Environment, and IAQ courses in preparing our students for real life situations.

My last visit in Regina was with Tim Macaulay, Director of Environmental Health at the Saskatchewan Ministry of Health. EH is in the Population Health Branch of the Ministry. In their Province they have 13 Regional Health Authorities, 101 Public Health Inspectors, and 15 Medical Offices. They are predominantly involved with funding the Regional Health Authorities, disease surveillance over the province, and consulting. Tim had several of his staff give me an overview of their programs and issues in the Province. This was very helpful in trying to understand the relationships between several levels of Health Authorities in Canada. Their three levels of government and health authorities, and a federal approach to First Nations issues seems similar to the US. I also learned that Saskatchewan is a major producer of uranium, in terms of resources and their economy. I heard from Lisa Pillar on the Food Program, Phil Curry on Vector Program, and Wayne Johnson on the Tobacco, Swimming Pool, Public Water, Plumbing, and other programs. I also heard from a summer employment student, Brianna Yee, about a biomonitoring program she was working on in the Province. There was discussion about making the transition to tablet computers for inspections, something they were going through right now.

Conclusion

Again, this international experience was an opportunity not to be missed. Both the educational experience and the chance to witness this beautiful country as I traveled around were spectacular! I learned a lot and benefited from the sharing of idea’s, common problems, and comparing the ability of our systems to address health and environmental problems in our communities. Although I found that our curriculum was very similar; I also found that some of the issues that we are all trying to address in our course work are similar as well. I have
included an example of a Canadian program map at BCIT in Appendix E and our program map at Kent State University in Appendix F. We are all looking to do a better job integrating such topics as risk assessment and communication techniques, land use planning and smart growth principles, healthy communities programs, writing and communications skills, applied science education, emerging diseases and emerging ways of contracting them (tattoos, body piercing, float tanks, etc.), moving toward more outcome based programming within the regulatory scheme, computerization and surveillance systems, and the like. In addition, my various international experiences have greatly enhanced my photo catalog that I use for developing coursework and teaching, with unique and interesting examples of EHS issues in other countries for comparison with our problems in the States.

To summarizing undergraduate EHS program differences between Canada and the US, I would include:

1. Student readiness differences were seen in ‘after degree’, cohort programs, listed in this report.
2. Their EHS courses are generally all required (as opposed to selecting from a number of electives).
3. A closer association of CIPHI with the professional and academic accreditation programs and universities, and how that makes our programs different in terms of curriculum, employment focus, associated educational knowledge, skills development, and field practice. We have more of a separation of the professional associations from state professional and academic credentialing or accreditation processes in the US.
4. The Canadian educational process is much more focused on training public health inspectors, where our programs focus on training a broader range of EHS professionals.
5. Environmental health agency structure is not unlike the US structure, but is part of a different total healthcare system. Some states have many, much smaller health departments than in Canadian Provinces. What does this mean for quality health services?

I would like to thank all my hosts in Canada for making this trip possible for me. I learned a lot and I hope the trip was beneficial for all of us. To close, I would like to sound a ‘call to action’ to EHS professionals and NEHA members, who have ever thought about applying for the Sabbatical Exchange Program and to those who haven’t yet considered it. Talk to your supervisor about it. Do it now! It costs so little, and you gain so much. International experiences can change your life and your career. They help give you perspective, appreciation
for our profession, instill renewed energy, offer new ideas, and you make so many new professional colleagues and friends. I believe that this makes one a better EHS professional. As a two time winner of the award, I can tell you that these experiences have made me a better EHS professional. I am grateful to NEHA, NSF, UL and those that have made this wonderful opportunity possible for NEHA members across the US for the last 23 years. It is much appreciated.

**Reference Sites**


2. British Columbia Institute of Technology, Environmental Health Sciences Program, [http://www.bcit.ca/study/programs/8500dbtech](http://www.bcit.ca/study/programs/8500dbtech).

3. Concordia University College of Alberta, Environmental Health Sciences Program, [http://publichealth.concordia.ab.ca/](http://publichealth.concordia.ab.ca/).

Appendix A
EHS-related Programs in Canada
# Environmental Health Degree Programs/Courses in Canada

<table>
<thead>
<tr>
<th>Province/Territory</th>
<th>Institution</th>
<th>Program Name</th>
<th>Environmental Health courses offered</th>
<th>Speculated courses offered</th>
<th>Other</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Concordia University College of Alberta, Edmonton</td>
<td>Bachelor of Environmental Health (After Degree)</td>
<td>Environmental health ethics</td>
<td></td>
<td>Yes</td>
<td>Leads to public health inspector certification. Three Graduate Certificates in Public Health also offered.</td>
</tr>
<tr>
<td>BC</td>
<td>BC Institute of Technology, Burnaby</td>
<td>Bachelor of Technology - Environmental Health (Public Health Inspection)</td>
<td>Environmental risk assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NB</td>
<td>Cape Breton University, Sydney</td>
<td>Bachelor of Health Sciences (Public Health)</td>
<td>Chemical hazard assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>Ryerson University, Toronto</td>
<td>BASc - Public Health and Safety</td>
<td>Communicable disease control</td>
<td></td>
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</tr>
<tr>
<td>SK</td>
<td>First Nations University, Regina</td>
<td>BASc - Environmental Health/Science</td>
<td>Environmental health policy/management</td>
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</tr>
<tr>
<td><strong>ADVANCED TRAINING IN ENVIRONMENTAL HEALTH</strong></td>
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</tr>
<tr>
<td>AB</td>
<td>University of Calgary</td>
<td>MSc &amp; PhD - specialization in population/public health - Dept of Community Health Sciences</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>Topics covered within a number of courses</td>
</tr>
<tr>
<td>AB</td>
<td>University of Alberta, Edmonton</td>
<td>MPH; MSc in Public Health; PhD in Science; MSc in Public Health</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>MPH program revised to meet CEHH accreditation standards</td>
</tr>
<tr>
<td>BC</td>
<td>Simon Fraser University, Burnaby</td>
<td>Master's in Public Health</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>Streams into mental health, global health, health disparities, and env/health</td>
</tr>
<tr>
<td>BC</td>
<td>University of British Columbia, Vancouver</td>
<td>MSc &amp; PhD programs in EH</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>The Bridge program is a funding mechanism for graduate students</td>
</tr>
<tr>
<td>BC</td>
<td>University of British Columbia, Vancouver</td>
<td>Master of Public Health</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>This 2-year practicum-based program will accept applications between Dec 1 and Feb 1 for entry in Sept</td>
</tr>
<tr>
<td>BC</td>
<td>University of Northern BC, Prince George</td>
<td>MSc in Community Health Science</td>
<td>Environmental health ethics</td>
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</tr>
<tr>
<td>WB</td>
<td>University of Manitoba, Winnipeg</td>
<td>Master of Public Health</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>Can be completed in 1 year; 2 streams available; some courses available online, others available synchronously through e-learning</td>
</tr>
<tr>
<td>NL</td>
<td>Memorial University of Newfoundland</td>
<td>MPH - Community Health &amp; Humanities</td>
<td>Environmental health ethics</td>
<td></td>
<td></td>
<td>Interested in including specialty environmental health training in public health. Practicum is not required.</td>
</tr>
<tr>
<td>NS</td>
<td>Dalhousie University, Halifax</td>
<td>MSc in Community Health and Epidemiology</td>
<td>Environmental health ethics</td>
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</tr>
<tr>
<td>Province/Territory</td>
<td>Institution</td>
<td>Program Name</td>
<td>Environmental health courses offered</td>
<td>Specialized courses offered</td>
<td>Other</td>
<td>Comments</td>
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<tr>
<td>ON</td>
<td>Lakehead University, Thunder Bay</td>
<td>Master of Public Health</td>
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<tr>
<td>ON</td>
<td>McMaster University, Hamilton</td>
<td>MSc and PhD in Health Research Methodology, specializing in Public and Population Health</td>
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<tr>
<td>ON</td>
<td>Queen's University, Kingston</td>
<td>Master of Public Health; MSc in Epidemiology</td>
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</tr>
<tr>
<td>ON</td>
<td>University of Guelph</td>
<td>MSc in Epidemiology</td>
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<td></td>
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</tr>
<tr>
<td>ON</td>
<td>University of Ottawa</td>
<td>MSc and PhD in Epidemiology</td>
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<tr>
<td>ON</td>
<td>University of Toronto</td>
<td>MPh in Occupational and Environmental Health (OEH)</td>
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<tr>
<td>ON</td>
<td>University of Toronto</td>
<td>MPh and Epidemiology</td>
<td></td>
<td></td>
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<tr>
<td>ON</td>
<td>University of Waterloo</td>
<td>Master of Public Health</td>
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</tr>
<tr>
<td>ON</td>
<td>University of Western Ontario, London</td>
<td>MSc and PhD in Population Epidemiology</td>
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</tr>
<tr>
<td>ON</td>
<td>University of Western Ontario, London</td>
<td>Master of Public Health</td>
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</tr>
</tbody>
</table>

**Distance Learning practicum-based program; 2 yr full-time or 4 yr flexible part-time program; also offers MPh Spec in Nursing/Nursing with HP electives**

**Offers specialization in Population and Public Health in both the MSc and PhD programs**

**OCGS approved**

**The MPh degree at University of Toronto has replaced the MPH program.**

**The MPh degree at University of Toronto has replaced the MSc program.**

**EH stream will be offered in the future**

**Applicant for accreditation by the Council on Education for Public Health (CEPH)**
<table>
<thead>
<tr>
<th>Province/Territory</th>
<th>Institution</th>
<th>Program Name</th>
<th>Environmental health courses offered</th>
<th>Specialized courses offered</th>
<th>Other</th>
<th>Continents</th>
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<tbody>
<tr>
<td>QC</td>
<td>Université de Montréal</td>
<td>Santé publique Attestation; Santé publique D.E.P.A.; Santé publique PhD</td>
<td>V V V</td>
<td>V</td>
<td></td>
<td>MSc program accredited by Council on Education for Public Health (CEPH)</td>
</tr>
<tr>
<td>QC</td>
<td>Université de Montréal</td>
<td>Maîtrise en santé environnementale et santé au travail</td>
<td>V V V V V</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>Université de Montréal</td>
<td>Diplôme d'études supérieures spécialisées (DESS) en Environnement, santé et gestion des catastrophes</td>
<td>V V V V V</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>Université de Montréal</td>
<td>DESS en Toxicologie et analyse du risque</td>
<td>V V V V V</td>
<td>V</td>
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</tr>
<tr>
<td>QC</td>
<td>Université de Montréal</td>
<td>Microprogramme en santé environnementale et santé au travail</td>
<td>V V V V V</td>
<td>V</td>
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</tr>
<tr>
<td>QC</td>
<td>Université de Montréal</td>
<td>Microprogrammes en santé publique vétérinaire</td>
<td>V V V V V</td>
<td>V</td>
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<td></td>
</tr>
<tr>
<td>QC</td>
<td>McGill University, Montreal</td>
<td>MSc in Epidemiology PhD in Epidemiology</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>Université Laval, Ville de Québec</td>
<td>Maîtrise en épidémiologie</td>
<td>V V V V V</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td>University of Saskatchewan, Saskatoon</td>
<td>Master of Public Health</td>
<td>V V</td>
<td></td>
<td></td>
<td>Program eligible for Council on Education for Public Health (CEPH) accreditation</td>
</tr>
<tr>
<td>SK</td>
<td>University of Saskatchewan, Saskatoon</td>
<td>STHHR: Public Health and the Agricultural Rural Ecosystem (PHARE)</td>
<td>V V V V V</td>
<td>V</td>
<td></td>
<td>Course offered (AGMD 800 – PHARE) has modules related to public health and agriculture ecosystem health</td>
</tr>
</tbody>
</table>

*content covered in a broader course

a=environmental and occupational health

N=not

R=required

Production of this document was made possible through a financial contribution from the Public Health Agency of Canada

December 2013

National Collaborating Centre for Environmental Health
Appendix B
Trip Maps
Travel Area: Vancouver/Burnaby, BC, via Kamloops and Jasper to Edmonton, Alberta, and then to Regina, Saskatchewan
Appendix C
Itineraries
Mon, May 12:
0900 – Chuck arrives on campus; meet briefly with LW; walk to SE6 206 with MM or LW
0930 – sit in on 2-hr class (ENVH 1300 in SE6 206); return to LW’s office with MM
1130 – lunch with LW (1 hr); walk to SE12 313
1230 – sit in on 2-hr class (ENVH 3280 in SE12 313); return to LW’s office with MM
1430 – coffee with LW

Tue, May 13:
0830 – sit in on 2-hr class (ENVH 2200 in SW1 2016); return to LW’s office
1030 – meet with KH (1 hr)
1130 - sit in on 2-hr class (ENVH 2200 in SW1 2009)
1330 – meet with JE (2 hrs)
1530 – check in with LW

Wed, May 14 (lab exams in process):
0900 – meet with MM (2 hrs); walk to SW3 2745
1130 - sit in on 2-hr class (ENVH 4100, SW3 2745)
1330 – meet with VC (2 hrs)
(LW & MM in a meeting 1430-1600; not available)

Thu, May 15 (LW off campus all day):
8:30-10:00 – meet with FS (SW1 3115)
10:00-11:15 – meet with KH (SW1 3130)
11:15 – 12:15 – travel to Vancouver Coastal Health (VCH) office, 12th Floor-601 West Broadway
12:30 -1:00 – meet with Mr. Richard Taki, Regional Director for Health Protection, VCH
1:00 – 4:30 pm – inspections with Ian Stewart, Environmental Health Officer (EHO), VCH
LW = Lorraine Woolsey, Program Head
MM = Martin Macleod, Instructor
JE = Joanne Edwards, Temp Instructor
VC = Vince Crozier, Instructor
KH = Keith Herle, Instructor
FS = Fred Shaw, Technical Staff & Lab Manager
<table>
<thead>
<tr>
<th>Time</th>
<th>Tuesday - May 20</th>
<th>Wednesday - May 21</th>
<th>Thursday - May 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 - 10:00</td>
<td>Mtg with Karen, Nelson, Carla. Karen's Office room HA 215</td>
<td>ENVH 557 - Toxicology Class HA237</td>
<td>ENVH 556 - Env Chem Class HA237</td>
</tr>
<tr>
<td>10:00 - 11:00</td>
<td>Tour of Campus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00 - 12:00</td>
<td>11:30 - 12:30 ENVH 533 Health Promotion HA 237</td>
<td>10:30 - 11:30 Mtg with Concordia Upper Management</td>
<td>Mtg with Health Canada - First Nation and Inuit Health Branch - Downtown Canada Place - Suite 835. Meeting with Simon Shota and/or Joan Yee</td>
</tr>
<tr>
<td>12:00 - 1:00</td>
<td>Lunch with old cohort students at Concordia</td>
<td>Lunch</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:00 - 2:00</td>
<td>Lunch</td>
<td>Mtg with Alberta Health Services Downtown HSBC Building - 10055 106 St, Room 7-120. Meeting with Darcy Garchinski and Bill Hone</td>
<td></td>
</tr>
<tr>
<td>2:00 - 3:00</td>
<td>Lunch</td>
<td>1:30 - 2:30 Mtg with CI PHI Representative at Concordia</td>
<td></td>
</tr>
<tr>
<td>3:00 - 4:00</td>
<td>ENVH 552 - Epidemiology Class HA237</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 - 5:00</td>
<td>Dinner with Ray Richards, Fire Chief, St. Albert, AL and former CSHEMA President</td>
<td>Dinner Downtown Chuck, Karen, Carla, Nelson and Spouses. Location to be decided.</td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Itinerary for Regina Visit

May 26th

8:30 am – Meet for breakfast
9:30 am - RQHR for introductions
10:00 am – Tour of FNUniv, orientation to the program
12:00 noon – Lunch with the Ministry of Health – Tim MaCulay
1:00 pm – Back at FNUniv for further program discussions – U of R Engineering (tentative)
4:00 pm – End of meetings

May 27th

9:00 am - RQHR - full day with manager and other PHI’s
4:00 pm – End of meetings

May 28th

9:00 am – Meet at FNUniv – accreditation discussions followed by U of R Engineering (tentative)
12:00 am – Lunch
1:00 – Go to the TC Douglas Building meet with various Ministry of Health program heads
4:00 – End of meetings

May 29th

9:00 am - Meet for breakfast meeting and last minute discussions
Free day!
Appendix D
CIPHI Learning Objectives for EHS Programs
Instructional Objectives and Guidelines for the Interpretation of Forms C & C1

A total of 488 instructional objectives have been developed which are grouped under sixteen major areas: air quality, waste management, water management, inspection, land management, environmental health assessment, administration, occupational health, communicable disease control, emergency preparedness, pest control, environmental health advocacy, miscellaneous, lifestyle programs, investigation, research and reporting and communications.

Each of the following instructional objectives is targeted to the individual student who will demonstrate proficiency under standard verbal or written testing conditions. Unless specifically stated in the objective, it is assumed that the student will have access to no resource materials when examined. All the objectives are required to be addressed by all programs. Numbering is for referencing purposes only and does not indicate the level of importance or priority.

1.0 Air Quality

1.1 Ambient Air Quality

1.1.1 select what information should be accessed to describe hazard analysis determination and assessment related to toxic gases
1.1.2 select what information should be accessed to describe risk analysis determination and assessment related to toxic gases
1.1.3 categorize public health toxic gas hazards
1.1.4 compare and contrast the strengths and weaknesses of the current method of monitoring gas emissions of each of the following gases: sulphur dioxide, hydrogen sulphide, nitrogen dioxide, carbon monoxide, and ozone
1.1.5 compare and contrast the strengths and weaknesses of the current method of monitoring particulates
1.1.6 evaluate the adequacy of regulations in controlling gaseous emissions of sulphur dioxide, hydrogen sulphide, nitrogen dioxide, carbon monoxide, and ozone
1.1.7 evaluate the adequacy of regulations regarding particulate emissions
1.1.8 review the information required to describe gas behaviours
1.1.9 review the information required to describe gas dispersion modelling
1.1.10 describe the data needed for ambient air quality monitoring
1.1.11 propose environmental indicators of various toxic gases (e.g. sulphur dioxide, hydrogen sulphide, nitrogen dioxide, carbon monoxide, and ozone)
1.1.12 propose human health indicators of exposure to various toxic gases (e.g. sulphur dioxide, hydrogen sulphide, nitrogen dioxide, carbon monoxide, and ozone)
1.1.13 describe how to compile ambient air quality standards from literature reviews
1.1.14 assess the health risks and make recommendations on control measures at point of source based on field data provided
1.1.15 assess the health risks and make recommendations on control measures for local area air sheds and/or larger regional zones based on field data provided
1.1.16 design a risk communications plan to inform various publics (e.g. media, general public, politicians) on ambient air quality issues
1.1.17 describe the technologies used to reduce toxic gas emissions
1.1.18 develop protocols for ambient air quality investigations
1.1.19 identify the levels of indicator gases and make recommendations for monitoring levels of emission using actual field data
1.1.20 assess and predict the effects of various emission gases based on actual field data
1.1.21 describe, in both high and low pressure situations, the dispersion characteristics of various emission types of toxic gases
1.1.22 describe, giving both strengths and limitations, the types of air testing equipment currently used in the field
1.1.23 describe the oxides of nitrogen and oxides of sulphur atmospheric cycles and their relationship to acid rain
1.1.24 explain the carbon dioxide and methane atmospheric cycles and their relationship to the greenhouse effect
1.1.25 explain hydrocarbon sources and cycles
1.1.26 describe the variables associated with seasons on air quality
1.1.27 describe the sources and contributory amounts of atmospheric contaminants from industries, residential communities and transportation systems
1.1.28 describe air pollution monitoring stations and related sampling protocol
1.1.29 identify the current methods used to reduce or eliminate air pollutants
1.1.30 design a sampling program given a site and situation in regards to ambient air quality
1.1.31 design a sampling program given a site and situation in regards to indoor air quality

1.2 Indoor Air Quality

1.2.1 describe the types and sources of indoor air quality contaminants in private dwellings
1.2.2 describe the types and sources of indoor air quality contaminants in public places
1.2.3 describe the types and sources of indoor air quality contaminants in workplace settings
1.2.4 develop a protocol for indoor air quality investigations
1.2.5 design a survey to be used in indoor air quality investigations
1.2.6 describe, giving strengths and weaknesses, the various kinds of indoor air testing equipment in use today

Board of Certification Policy # 2
1.2.7 make recommendations for a core resource base related to indoor air quality in terms of textbooks, journals and equipment
1.2.8 identify and evaluate the kinds of evidence required for court proceedings related to indoor air quality concerns
1.2.9 calibrate, use and read indoor air quality testing equipment
1.2.10 identify the indicators used in indoor air quality monitoring for each of the following types of buildings: schools, day cares, care facilities, homes, workplaces, theatres, and private dwellings, ice arenas and pools
1.2.11 interpret continuous indoor air quality monitoring data
1.2.12 identify levels of exposure limits for various gases
1.2.13 evaluate various sources of indoor air quality guidelines
1.2.14 list common indoor contaminants including particulates, CO₂, CO, VOC's, bioaerosols, formaldehyde and asbestos
1.2.15 explain acceptable indoor air quality with respect to temperature and humidity
1.2.16 describe the effect of yeasts, molds and pollens on allergy sufferers
1.2.17 name aerosols associated with illness, eg. legionnaire's disease
1.2.18 name the components of a ventilation system, and the factors required for decision making to adjust air flows
1.2.19 describe air filtration systems and cleaning controls for gases, particulates and viable microorganisms
1.2.20 define various types of heating systems including forced air, radiant, hot water, steam, and electric
1.2.21 describe heat pumps and associated problems
1.2.22 explain thermal comfort
1.2.23 identify and explain the operation of common instrumentation and data loggers to measure particulates, CO, CO₂, VOC, bioaerosols, formaldehyde, radon, asbestos, temperature, relative humidity and thermal comfort
1.2.24 describe the nature and types of radiation
1.2.25 explain the radioactive decay process
1.2.26 identify the typical products of radioactive decay
1.2.27 list the exposure routes for radiation
1.2.28 compare and contrast man-made and natural radiation
1.2.29 calculate the ambient exposure to radiation of model individuals
1.2.30 calculate the indoor exposure to radiation of model individuals

2.0 Waste Management

2.1 Solid Waste Disposal

2.1.1 itemize the information required by a public health agency on both active and inactive waste management facilities
2.1.2 describe the various types of waste management facilities
2.1.3 list the public health requirements of siting and developing a new waste management facility
2.1.4 identify the various sources and components/categories of the waste stream
2.1.5 describe the storage, transportation and disposal requirements of the various components of the waste stream
2.1.6 describe the monitoring techniques used to detect migrating gases, leachates and particulates from waste disposal sites
2.1.7 define the reasons for setback requirements
2.1.8 propose an appropriate course of action where illegal land filling has occurred
2.1.9 describe the steps involved in inspecting the various types of waste management facilities (e.g. transfer stations, waste sorting stations, etc.)
2.1.10 describe the various techniques used in preventing off-site migration of micro-organisms, chemicals, leachates, particulates, gases and vermin
2.1.11 appraise the health risks of waste management facilities
2.1.12 appraise the environmental impact of waste management facilities
2.1.13 formulate remediation standards and methods in land use change for inactive waste management facilities
2.1.14 describe the impact of recycling and composting programs to the waste stream and to public health.

2.2 Liquid Waste Disposal [Municipal]

2.2.1 describe the volumes, characteristics and composition of liquid municipal waste
2.2.2 describe, sequentially, the processes involved in liquid waste treatment employed by various municipalities
2.2.3 list the mechanical processes involved in liquid waste treatment employed by various municipalities
2.2.4 describe the biological processes involved in liquid waste treatment employed by various municipalities
2.2.5 describe the chemical processes involved in liquid waste treatment employed by various municipalities
2.2.6 describe the various equipment used in a waste disposal and treatment plant
2.2.7 describe the various structures used in a waste disposal and treatment plant
2.2.8 describe the acceptable biological requirements for treated liquid waste effluents
2.2.9 discuss the acceptable chemical requirements for treated liquid waste effluents
2.2.10 assess the environmental and public health problems related to liquid waste collection and treatment systems
2.2.11 define expected levels of treatment for each of the levels of liquid waste (e.g. primary, secondary and tertiary)
2.2.12 describe the disposal methods and public health concerns of storm water and industrial waste water
2.2.13 describe some sampling techniques and standard analyses as used in "Standard Methods for the Examination of Water and Wastewater", latest edition.
2.3 Waste Water Treatment and Disposal [Private]

2.3.1 outline how sewage disposal systems should be constructed where municipal sewage treatment facilities are not available (e.g. private dwellings, small industry, and small developments)

2.3.2 describe the biological processes employed by sewage disposal systems in private dwellings, small industry, and small developments where municipal sewage treatment facilities are not available

2.3.3 define the specifications for construction (including such things as soil conditions, water tables, construction materials, sizes, slopes, soil depths etc.) of sewage disposal systems where municipal sewage treatment facilities are not available (e.g. private dwellings, small industry, and small developments)

2.3.4 outline the steps in installing and approving a sewage disposal system where municipal sewage treatment facilities are not available (e.g. private dwellings, small industry, and small developments)

2.3.5 Identify the major problems found with sewage disposal system where municipal sewage treatment facilities are not available (e.g. private dwellings, small industry, and small developments) and describe how these could be corrected

2.3.6 describe how to conduct a site evaluation

2.3.7 describe how to conduct a percolation test

2.3.8 assess the effectiveness of private sewage disposal legislation

2.3.9 propose appropriate action where a private sewage treatment system fails

2.3.10 identify and describe the function of plumbing fixtures and fittings

2.4 Industrial/Hazardous Waste Disposal

2.4.1 compare and contrast industrial and hazardous waste

2.4.2 identify the types of non-hazardous industrial waste and their probable sources

2.4.3 identify the types of hazardous wastes and their probable sources

2.4.4 list the public health requirements for various storage, collection, transportation and disposal of industrial waste

2.4.5 list the public health requirements for various storage, collection, transportation and disposal of hazardous waste

2.4.6 describe the reclamation methods for inactive non-hazardous industrial waste sites

2.4.7 describe the reclamation methods for inactive hazardous industrial waste sites

2.4.8 define the acceptable standards for inactive industrial non-hazardous waste sites

2.4.9 define the acceptable standards for inactive industrial hazardous waste sites

2.4.10 propose appropriate action where illegal, non-hazardous waste disposal has occurred

2.4.11 propose appropriate action where illegal, hazardous waste disposal has occurred

2.4.12 list the steps of inspection for industrial non-hazardous waste disposal facilities

2.4.13 list the steps of inspection for industrial hazardous waste disposal facilities

2.4.14 describe the health risks of industrial non-hazardous wastes

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2.4.15 describe the health risks of industrial hazardous wastes
2.4.16 describe the environmental impact of industrial non-hazardous wastes
2.4.17 describe the environmental impact of industrial hazardous wastes
2.4.18 describe the equipment used in the storage, handling, transportation, and disposal of non-hazardous industrial waste
2.4.19 describe the equipment used in the storage, handling, transportation, and disposal of hazardous industrial waste
2.4.20 define manifests
2.4.21 explain the purpose of manifests
2.4.22 compare and contrast the roles of environmental departments and health departments in non-hazardous industrial waste management
2.4.23 compare and contrast the roles of environmental departments and health departments in hazardous industrial waste management
2.4.24 explain WHMIS

2.5 Biological/Biomedical Waste Management

2.5.1 list a typical schedule of wastes in the biological/biomedical waste stream
2.5.2 describe the level of health risk for the various biomedical wastes and identify the target groups for infection
2.5.3 identify the diseases which are transmissible as a result of infection from biomedical waste
2.5.4 describe the methods used for the safe storage and disposal of biomedical waste
2.5.5 describe the equipment used for the safe distribution and transportation of biomedical waste
2.5.6 explain the reasons for manifesting and color-coding biomedical wastes
2.5.7 describe the methods used for rendering biomedical wastes non-pathogenic

3.0 Water Management

3.1 Potable Water Quality

3.1.1 identify the major water-borne diseases in Canada
3.1.2 describe the methods used to ensure that water provided for human consumption is adequately treated and is potable
3.1.3 list the equipment used in water treatment
3.1.4 explain cross connections and identify probable causes
3.1.5 describe water sampling techniques
3.1.6 demonstrate water sampling techniques given appropriate equipment
3.1.7 interpret the results for bacterial and chemical parameters given laboratory analysis reports and the Guidelines for Canadian Drinking Water Quality
3.1.8 list the tolerable limits for chemical parameters in drinking water according to the Guidelines for Canadian Drinking Water Quality
3.1.9 identify the sources of drinking water
3.1.10 list in sequence the procedures to be followed in the case of a water main break
3.1.11 describe the processes used in water treatment
3.1.12 describe water sampling procedures
3.1.13 define the indicators used in water analysis
3.1.14 list the potential causes of various water odours
3.1.15 list the potential causes of various discolorations in water
3.1.16 describe the effectiveness and the limitations of the various point-of-use water treatment equipment
3.1.17 explain the municipal distribution system for potable water and the breakdowns which may occur
3.1.18 design a sampling program given a site and situation in regards to potable water
3.1.19 describe some sampling techniques and standard analyses as used in "Standard Methods for the Examination of Water and Wastewater", latest edition.

3.2 Recreational Water Quality

3.2.1 define the acceptable bacterial parameters for recreational water
3.2.2 describe the acceptable upper limits of chemical parameters for recreational water as defined in the Guidelines for Canadian Recreational Water Quality
3.2.3 describe how to alter bacterial parameters in recreational water
3.2.4 describe how to alter chemical parameters in recreational water
3.2.5 describe the functions of the equipment used in the treatment of recreational water
3.2.6 describe the processes used in water treatment
3.2.7 describe laboratory procedures for water analysis
3.2.8 describe water sampling procedures
3.2.9 demonstrate water sampling techniques given the appropriate equipment
3.2.10 describe the problems associated with air in indoor pools
3.2.11 describe pool safety requirements and identify appropriate checkpoints
3.2.12 describe electrical hazards associated with pools
3.2.13 describe disinfection procedures for play equipment in pools
3.2.14 describe the operation of, and problems associated with, wave pools and water slides
3.2.15 describe how to overcome problems associated with wave pools and water slides
3.2.16 list the various types of natural outdoor swimming areas
3.2.17 identify the problems associated with the various types of natural outdoor swimming areas and how to control them
3.2.18 design a sampling program given a site and situation in regards to recreational water

3.3 Surface and Ground Water Quality

3.3.1 identify potential sources for the pollution of surface and ground water
3.3.2 describe factors influencing the leachability of various chemical and biological surface and ground water contaminants
3.3.3 develop plans for a community program to protect surface and ground water from contamination
3.3.4 describe algae control measures
3.3.5 list the potential sources of nutrients to surface and ground water
3.3.6 describe the effects of nutrients on surface and ground waters
3.3.7 describe the effects and hazards of using drinking water treatment measures to control elevated levels of nutrients in surface and ground waters
3.3.8 list acceptable bacteriological parameters in surface and ground waters intended for human consumption
3.3.9 list acceptable chemical parameters in surface and ground waters intended for human consumption
3.3.10 describe a typical water system including hydrogeology, mechanical equipment, sanitary seals, screens and distribution lines
3.3.11 describe the operation of water softening and its advantages and disadvantages
3.3.12 name and explain the various types of point-of-use water systems. Explain their effectiveness.
3.3.13 design a sampling program given a site and situation in regards to surface water

### 4.0 Inspection

#### 4.1 Food Establishments

4.1.1 explain the principles underlying food regulations
4.1.2 explain the principles underlying hazard analysis
4.1.3 define critical control points and delineate the principles underlying this concept
4.1.4 list the requirements in food preparation to prevent food-borne illness
4.1.5 list the requirements in food service to prevent food-borne illness
4.1.6 list the requirements in food storage to prevent food-borne illness
4.1.7 list the symptoms and incubation periods of the various food-borne illnesses
4.1.8 identify the types of food contamination, including adulterations
4.1.9 describe food equipment requirements
4.1.10 describe and demonstrate food sampling techniques
4.1.11 describe laboratory food analysis
4.1.12 explain the procedures involved in food-borne illness investigations
4.1.13 review the protocol and procedures involved in sampling body wastes of food-borne illness victims
4.1.14 identify and evaluate the records which should be kept in food-borne illness investigations
4.1.15 define Aw and describe its significance
4.1.16 define pH and describe its significance
4.1.17 name the primary sources of microorganisms found in foods
4.1.18 name the secondary sources of microorganisms found in foods
4.1.19 describe what is meant by the temperature "danger zone" in food storage
4.1.20 name and compare the effectiveness of common preservation methods for high risk foods
4.1.21 outline the methods used in an inspection of a food premises
4.1.22 discuss the difference between standards and guidelines used for the operation of food premises
4.1.23 define what is meant by a food recall. Describe the process used in food recalls and name the origins of recalls.
4.1.24 list the public health concerns to be noted when inspecting food processors such as abattoirs, dairies, fish plants, canneries, cereals, food warehouses and food transportation systems
4.1.25 name the common food additives and explain their public health significance
4.1.26 name the food types most often associated with food allergies
4.1.27 describe the health significance of allergic reactions
4.1.28 describe control measures to prevent allergic reactions
4.1.29 design a sampling program given a site and situation in a food operation

4.2 Recreational Facilities
4.2.1 describe the appropriate terrain for a recreational park or camp
4.2.2 explain the natural environmental hazards to which patrons of a recreational park or camp may be exposed

4.3 Housing
4.3.1 evaluate the legislation used to control housing problems
4.3.2 identify housing problems which have an impact on health
4.3.3 identify the government departments/agencies who may be involved in housing complaints and describe the role of each
4.3.4 state the health standards that may be used in housing inspections and interventions

4.4 Nuisance and General Sanitation
4.4.1 define the term health nuisance
4.4.2 describe the various kinds of health nuisances which may be reported to an Environmental Health Officer
4.4.3 explain how one determines if a health nuisance exists
4.4.4 propose a protocol for nuisance abatement choosing any health nuisance as an example
4.4.5 identify the legislation in your jurisdiction which regulates health nuisances
4.5 Social Care Facilities (Child Care)

4.5.1 define the term \textit{child care facility}
4.5.2 list the various kinds of complaints which may be reported to an Environmental Health Officer regarding child care facilities
4.5.3 list the health concerns associated with child care facilities
4.5.4 explain the steps involved in preventing the spread of a communicable disease in a child care facility
4.5.5 identify typical injury control measures used in child care facilities
4.5.6 name the types of disinfectants used in various parts of child care facilities and describe the effectiveness of each
4.5.7 identify the legislation in your jurisdiction which regulates child care facilities

4.6 Social Care Facilities (Adult Care)

4.6.1 define the term \textit{adult care facility}
4.6.2 identify the types of adult care facilities which exist
4.6.3 describe the various kinds of complaints which may be reported to an Environmental Health Officer regarding adult care facilities
4.6.4 list the health concerns associated with adult care facilities
4.6.5 explain the steps involved in preventing the spread of a communicable disease in an adult care facility
4.6.6 identify typical injury control measures used in adult care facilities
4.6.7 name the types of disinfectants used in various parts of adult care facilities and describe the effectiveness of each

4.7 Personal Service Facilities

4.7.1 define the term \textit{personal service facilities}
4.7.2 list the health concerns associated with personal service facilities
4.7.3 identify the types of industries which may be included under the designation of personal service facilities
4.7.4 describe disinfection and sterilization procedures required in personal service facilities

4.8 Animal Facilities

4.8.1 list the various types of animal facilities
4.8.2 describe the public health concerns associated with the various kinds of animal facility operations
4.8.3 develop a housekeeping plan for a given animal facility
4.8.4 develop a waste control program, which includes the disposal of dead animals, for a given animal facility
4.8.5 describe the setback requirements for some kinds of animal facilities and explain the rationale behind these setbacks.
5.0 Land Management

5.1 Land Use Review

5.1.1 define land use review and the variety of uses anticipated
5.1.2 explain the public health rationale behind land use review
5.1.3 identify the essential components of a land use review
5.1.4 identify the government departments/agencies who may be involved in land use review and describe the role of each
5.1.5 identify the factors of public health significance in land use planning
5.1.6 describe the setbacks which should be considered in land use planning
5.1.7 identify some incompatible developments and/or sites which must be considered in land use planning
5.1.8 describe the types of public health and environmental impacts which must be considered in land use planning (e.g. sewer loading, noise, industrial/residential setbacks, storm water drainage, etc.)

5.2 Area Development Plan Review

5.2.1 identify the impacts to public health associated with development planning
5.2.2 describe the kinds of environmental impacts which must be considered in development planning
5.2.3 identify the development incompatibilities which should be considered when planning developments
5.2.4 identify setbacks which should be considered in developmental planning
5.2.5 explain ambient air levels as related to development planning
5.2.6 describe noise level factors as related to development planning
5.2.7 explain the reason for public health intervention in development planning
5.2.8 identify the factors which should be considered in planning sewer services in a proposed development
5.2.9 identify the factors which should be considered in planning water services in a proposed development

5.3 Subdivision Review

5.3.1 identify the impacts to public health associated with subdivision planning
5.3.2 describe the kinds of environmental impacts which must be considered in subdivision planning
5.3.3 identify the development incompatibles which should be considered when planning a subdivision
5.3.4 identify setbacks which should be considered in subdivision planning
5.3.5 describe ambient air levels as related to subdivision planning
5.3.6 describe noise level factors as related to subdivision planning
5.3.7 explain the reason for public health intervention in subdivision planning
5.3.8 identify the factors which should be considered in planning sewer services in a proposed subdivision
5.3.9 identify the factors which should be considered in planning water services in a proposed subdivision

5.4 Land Reclamation Review

5.4.1 describe what is meant by land reclamation
5.4.2 describe the technological options available for land reclamation
5.4.3 develop a protocol for public health intervention with respect to a land reclamation proposal for an old industrial site
5.4.4 define the term site specificity
5.4.5 identify the sources of land reclamation standards and indicate which are superior or inferior
5.4.6 describe options for land use as related to land reclamation
5.4.7 identify the types of laboratory analysis procedures which should be considered when contaminated sites are involved
5.4.8 identify and demonstrate the field testing techniques commonly used when examining contaminated sites
5.4.9 list the health impacts which contaminated sites pose
5.4.10 describe the environmental impacts which contaminated sites pose
5.4.11 outline a plan for storage and disposal of contaminated soils
5.4.12 explain land farming of contaminated soils
5.4.13 design a sampling program given a site and situation in soil
5.4.14 demonstrate the operation of land survey equipment

5.5 Plan Review

5.5.1 describe the purpose, process and the elements involved in community planning
5.5.2 identify the types of community planning
5.5.3 identify the inputs used in community planning
5.5.4 describe the public health role in community planning
5.5.5 prepare a presentation supporting/opposing a proposed development plan (to be provided)

6.0 Environmental Health Assessment

6.1 Risk Assessment

6.1.1 explain the concept of risk assessment
6.1.2 explain the purpose of conducting a risk assessment
6.1.3 explain how health risk assessment relates to regulations
6.1.4 identify the components of a health risk assessment
6.1.5 explain the concept of relative risk
6.1.6 explain the concept of quantitative risk assessment
6.1.7 explain the concept of qualitative risk assessment
6.1.8 demonstrate how a health risk assessment is used in the environmental health field
6.1.9 define environmental monitoring
6.1.10 explain the methods and techniques used in environmental monitoring
6.1.11 state what is meant by toxicity testing
6.1.12 explain the exposure pathways from sources to recipient
6.1.13 identify the target organs in humans from given toxic substances
6.1.14 identify likely sources of toxic substances in the environment

6.2 Risk Management

6.2.1 explain the concept of risk management
6.2.2 identify, giving the advantages and disadvantages, the risk management options in the environmental health field
6.2.3 apply all risk management options, giving the advantages and disadvantages of each option, to a given health risk situation [to be provided]
6.2.4 describe the economic considerations of choosing risk management options

6.3 Risk Perception and Risk Communication

6.3.1 define risk perception
6.3.2 list the principles of risk communication
6.3.3 define the term focus group
6.3.4 describe the value of focus groups in assessing risk perception
6.3.5 explain the concept of statistical significance used with data from community surveys
6.3.6 define the term stakeholder, identifying key stakeholders to be considered in risk communications.
6.3.7 apply the concept of the right to know to risk communications

7.0 Administration

7.1 Computer Technology

7.1.1 develop a proposal for a personal computer system giving specifications for a hard drive, floppy drives, CD-ROM, keyboards, monitors, printers, modem, CPU, memory, speed, and core software
7.1.2 give examples of the basic uses of computers in the field of environmental health
7.1.3 define and describe a local area network (LAN) and a wide area network (WAN)
7.1.4 define the terms: directory, file, hardware, software, file transfer and file deletion
7.1.5 describe procedures that are be used to protect computer data from viruses
7.1.6 list and describe basic software applications
7.1.7 demonstrate the use of a basic computer operation
7.1.8 define and describe the functions of e-mail
7.1.9 define and describe the functions of the internet
7.1.10 define and describe the application of GIS / GPS to Public Health

7.2 Policy Development

7.2.1 define policy
7.2.2 describe the basic components of a policy
7.2.3 evaluate sample environmental health policies in terms of their impact on health protection
7.2.4 design a policy statement which covers adequately an environmental health issue
7.2.5 give a rationale for policy development, indicating the purposes for which policies are developed and the potential range of application
7.2.6 describe the current health determinants in Canadian Society
7.2.7 describe the concerns of population growth, community organization and community development patterns
7.2.8 evaluate a neighbourhood development plan
7.2.9 distinguish between policy, guidelines and requirements
7.2.10 distinguish between health policy and healthy public policy

7.3 Legislation Review

7.3.1 describe the process by which legislation is written, reviewed and passed
7.3.2 identify the key elements of legislation
7.3.3 illustrate the uses of legislation
7.3.4 describe the types and authority of legislation
7.3.5 describe the process from education to enforcement of legislation
7.3.6 describe the process for the laying of charges
7.3.7 delineate the essential elements in a case brief
7.3.8 describe the criteria used in selecting and using expert testimony
7.3.9 describe the role of an expert witness
7.3.10 explain the categories of law such as criminal law, torts, contracts, statutory law and duty
7.3.11 interpret intent and scope of statutory law
7.3.12 describe the types of appeal procedures to orders issued by public health inspectors
7.3.13 describe the significance on the enforcement of health laws of human rights and constitutional powers.
7.3.14 list the grounds on which statutory law can be challenged
7.4 Public Administration

7.4.1 explain how government is organized
7.4.2 define the role of politicians, deputy ministers, department heads and program directors
7.4.3 outline the roles of health boards, chief executive officers of public health organizations, a medical officer of health and the various components of the public health sector
7.4.4 explain the funding process to support public health programs and specifically, environmental health programs
7.4.5 compare the mandate of environmental health programs at the federal and provincial, municipal and First Nations levels of government
7.4.6 describe the accountability and role of an environmental health program director/manager
7.4.7 describe the fundamental role of the EHO in the Public Health Act

8.0 Occupational Health

8.1 Occupational Workplace Inspection

8.1.1 identify the primary health risks to workers in selected industries
8.1.2 design a work site information system regarding hazardous material
8.1.3 describe the effects on worker's health of various industrial exposures
8.1.4 identify the major kinds of industrial exposure
8.1.5 describe the testing equipment, indicating the mode of operation, used to measure major kinds of industrial exposure
8.1.6 use environmental sampling equipment to collect and measure gases and vapours, noise, radiation including light, heat and radon
8.1.7 explain control, mitigation, and amelioration methods as applied to industrial exposures
8.1.8 list the regulatory authorities for industrial concerns and identify the legal instruments used by each
8.1.9 recognize the role of occupational hygiene in environmental assessment
8.1.10 describe the principles, applications and limitations of various laboratory instrumental methods for analysis of environmental samples or interpretation of data
8.1.11 demonstrate competence in the use of all standard field instrumentation including recording devices and dataloggers for the collection and/or measurement of chemical and physical factors
8.1.12 identify the best available technology control strategies for chemical and physical factors
8.1.13 recognize the importance of evaluating the impact of noise on the individual and on the community
8.1.14 explain the concept of risk assessment in dealing with environmental factors
8.1.15 discuss the risks to individuals due to exposure to harmful gases, particulates, noise, vibration, lighting, radiation and bioaerosols
8.1.16 discuss the jurisdiction of various government agencies and regulations in Occupation Health
8.1.17 describe the use of protective equipment including gloves, eye protection, face masks or respirators
8.1.18 comprehend common occupational terminology used to describe exposure including TLV, STEL, ppm, TWA, mg/m³
8.1.19 describe the basic principles of toxicology

9.0 Communicable Disease Control

9.1 Food-borne/Enteric Diseases

9.1.1 classify the common types of food-borne/enteric disease
9.1.2 describe the notable/distinguishing symptoms of each of the common food-borne/enteric diseases
9.1.3 explain the role of public health agencies in food-borne/enteric disease control
9.1.4 list the principles of food-borne/enteric disease control
9.1.5 explain the process for taking samples and identify the types of samples to be taken, when investigating food-borne/enteric disease outbreaks
9.1.6 describe the purpose and nature of isolation procedures as related to food-borne/enteric diseases
9.1.7 describe the purpose and nature of reporting procedures as related to food-borne/enteric diseases
9.1.8 name the microorganisms associated with food poisoning and food intoxication
9.1.9 describe how these microorganisms are controlled or destroyed.
9.1.10 describe the social and economic costs associated with foodborne illness
9.1.11 interpret a given laboratory analysis of a food sample

9.2 Waterborne Diseases

9.2.1 classify the common types of waterborne disease
9.2.2 describe the notable/distinguishing symptoms of waterborne diseases
9.2.3 explain the role of public health agencies in waterborne disease control
9.2.4 list the principles of waterborne disease control
9.2.5 explain the process for taking samples, and identify the types of samples to be taken, when investigating waterborne disease outbreaks
9.2.6 describe the purpose and nature of isolation procedures as related to waterborne diseases
9.2.7 describe the purpose and nature of reporting procedures as related to waterborne diseases

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9.3 Zoonotic Diseases

9.3.1 classify the common types of zoonotic disease
9.3.2 describe the notable/distinguishing symptoms of zoonotic diseases
9.3.3 explain the role of public health agencies in zoonotic disease control
9.3.4 list the principles of zoonotic disease control
9.3.5 explain the process for taking samples, and identify the types of samples to be taken, when investigating zoonotic disease outbreaks
9.3.6 describe the purpose and nature of isolation procedures as related to zoonotic diseases
9.3.7 describe the purpose and nature of reporting procedures as related to zoonotic diseases

9.4 Sexually Transmitted Diseases (STD)

9.4.1 classify the common STDs
9.4.2 describe the notable/distinguishing symptoms of each of the common STDs
9.4.3 explain the role of public health agencies in STD control
9.4.4 explain the process for taking samples, and identify the types of samples to be taken, when investigating STD outbreaks
9.4.5 describe the purpose and nature of isolation procedures as related to STDs
9.4.6 describe the purpose and nature of reporting procedures as related to STDs

9.5 Infection Control in Institutions

9.5.1 describe the components of an institutional infection control program
9.5.2 explain the role of a public health inspector in an infection control program
9.5.3 identify institutional personnel responsible for infection control
9.5.4 discuss infection control practices which may be utilized in an institution

9.6 Outbreak Control in Institutions

9.6.1 define an outbreak
9.6.2 identify potential sources
9.6.3 identify members of an outbreak team
9.6.4 explain the steps involved in the investigation of an institutional outbreak
9.6.5 describe measures which may be implemented to control an outbreak

9.7 Diseases of Public Health Significance

9.7.1 name current communicable diseases of major public health significance in Canada
9.7.2 for each communicable disease, name the causative agent, mode of transmission, incubation period, symptoms and control measures used in public health
9.7.3 describe the legal provisions for communicable disease control
9.7.4 what are the accountability roles for the control and management of communicable diseases (eg. MOH, PHN, PHI)

10.0 Emergency Preparedness

10.1 describe the kinds of emergency situations involving public health agencies
10.2 explain the roles and functions of public health agencies in emergency situations
10.3 design an environmental health emergency plan, which includes the identification of needed equipment and supplies, to ensure preparedness in the case of an emergency
10.4 evaluate environmental health actions taken in a real or mock emergency scenario (to be provided)

11.0 Pest Control

11.1 list and classify invertebrates and vertebrates likely to be encountered by citizens engaging in common activities
11.2 describe the life cycles of common insect pests
11.3 describe the life cycles of common rodent pests
11.4 describe the harbourage of common insect pests
11.5 describe the harbourage of common rodent pests
11.6 describe the methods used to control insects pests
11.7 describe the methods used to control rodents pests
11.8 describe the methods used to control vertebrate pests other than rodents
11.9 list some diseases transmissible to humans from invertebrates common to North America
11.10 list diseases transmissible to humans from vertebrates common to North America
11.11 use taxonomic keys to identify insects
11.12 describe the significance of integrated pest management

12.0 Environmental Health Advisory

12.1 Environmental Health Education

12.1.1 explain the purpose of environmental health education
12.1.2 describe the range of environmental health education
12.1.3 explain the principles of adult education
12.1.4 list the steps involved in designing an educational program
12.1.5 evaluate a print resource designed for the general public on an environmental health topic
12.1.6 design an evaluation process for an educational program
12.1.7 list various instructional techniques which may be used to present information, giving the advantages and disadvantages of each
12.1.8 conduct a group training session
12.1.9 write goals and objectives and a lesson plan for an educational program
12.1.10 present the educational program
12.1.11 evaluate the program
12.1.12 discuss the strategies used in preparing and presenting a media release or interview
12.1.13 design a radio spot announcement on health education
12.1.14 design a poster on health education

12.2 Community Development

12.2.1 define community development
12.2.2 define community mobilization
12.2.3 describe the mechanics of a public participation process
12.2.4 describe how communication theory is used to involve others in planning and decision making
12.2.5 describe the role of a group facilitator in motivating group involvement in community action
12.2.6 describe the roles of the health professional in community development
12.2.7 describe the dynamics of work group processes involved with community development initiatives
12.2.8 discuss the methods used to resolve conflict
12.2.9 define social planning
12.2.10 define social action
12.2.11 outline key differences between community development, social action and social planning.
12.2.12 define sustainable development and how it applies to Public Health
12.2.13 define environmental economics and how it applies to Public Health

12.3 Advocacy

12.3.1 define what advocacy means
12.3.2 describe the role of advocacy in addressing public health issues and challenges
12.3.3 describe when advocacy should be used over other strategies

13.0 Miscellaneous

13.1 calibrate, use and read various testing equipment commonly used by public health inspectors
13.2 read and interpret blueprints
13.3 identify and describe the function of operational equipment used in the industries inspected (i.e. food, water, air)
13.4 demonstrate the application of mathematical formula in a public health situation (i.e. disinfection of a well)
13.5 describe the basic tenets of TEK (traditional environmental knowledge)

14.0 Lifestyle Programs
14.1 describe the public health concerns surrounding life style issues such as substance abuse (alcohol, tobacco, drugs) injury prevention, healthy eating and exercise
14.2 identify the role of strategies such as education, engineering of the environment and enforcement of legislation in promoting healthy lifestyles
14.3 describe how the outcomes of these strategies could be measured
14.4 explain the role of community mobilization in public health programs
14.5 list potential partners in health promotion initiatives

15.0 Investigation, Research and Reporting
15.1 describe how the epidemiologic process is used in the environmental health field
15.2 describe how one conducts a critical literature review
15.3 describe the purpose of writing an annotated bibliography
15.4 interpret common biostatistical terms such as incidence, prevalence, risk, relative risk, risk ratio
15.5 list the key components of an epidemiological study and define their statistical significance
15.6 describe the elements to be considered in writing a research proposal
15.7 describe the appropriate methods used to conduct an epidemiological research study
15.8 list the types of writing a public health inspector may be required to do in an environmental health program
15.9 name the characteristics and components of well written materials in the organizational setting (reports, memorandums, letters)
15.10 submit a sample of a well-written document (their own)

16.0 Communications
16.1 effective interpersonal communications
16.2 public speaking: one-to-one
16.3 public speaking: group situation (town hall forum, classroom etc)
16.4 media relations: print
16.5 media relations: TV, radio
16.6 briefing notes, communiques
16.7 cross-cultural awareness
Appendix E

Canadian EHS Program Map (BC Institute of Technology)
# 2-Year Bachelor of Technology in Environmental Health Program Map

<table>
<thead>
<tr>
<th>COURSE AREAS</th>
<th>Year 1 Equivalencies</th>
<th>Year 2 Equivalencies</th>
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<th>Year 4</th>
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Revised: May 25/11

1. To be completed prior to graduation if not satisfied on admission
2. 15-week long course
3. To be completed Spring or Summer
Appendix F
Kent State University
EHS Program Map
This roadmap is a recommended semester-by-semester plan of study for this major. However, courses and milestones designed as critical (1) must be completed in the semester listed to ensure a timely graduation.

<table>
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<tr>
<th>Critical</th>
<th>Course Subject and Title</th>
<th>Credit Hours</th>
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Graduation Requirements Summary

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1. US 10097 is not required of transfer students with 25 credits or students age 21+ at time of admission.
2. Students in the nursing [BSN-NURS] major may substitute NURS 40020 for PH 30007, NURS 40045 for PH 30033 and NURS 40872 for PH 30004.
3. A minimum C (2.00) grade must be earned to fulfill the writing-intensive requirement.
Special Major Note:
This major requires 123 credits for graduation. Credit hours. Students can stay on track for graduation by:
- Declaring their major as freshmen and completing all courses in sequence (be aware that switching majors may cause a delay in graduation);
- Prioritizing required courses above electives;
- Meeting regularly with their academic advisors to stay on track;
- Passing each required course the first time attempted and maintaining the minimal GPA for the major;
- Successfully completing more than 15 credit hours of relevant coursework (field-based work, internship) during academic semesters; and/or
- Completing relevant coursework (field-based work, internship) during summer sessions.

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<td><strong>KGU</strong> Kent Core III. Humanities</td>
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<td><strong>DD</strong> Domestic Diversity Course Requirement</td>
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<td><strong>DG</strong> Global Diversity Course Requirement</td>
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<td><strong>WIC</strong> Writing-Intensive Course Requirement</td>
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Kent State University, College of Public Health

Course Electives Available (not required) - BSPH in Environmental Health Sciences, 2014-15

- PH30110 Hazardous Materials Management
- PH40100 Vector-borne & Zoonotic Disease
- PH40101 Occupational Health & Safety
- PH40109 Laboratory Safety & Hygiene
- PH40112 Institutional & Recreational EHS
- PH40020 Emergency Preparedness
- PH40200 Built Environments
- PH44003 EH in Low & Middle Income Countries
- CMGT22200 Construction Documents
- GEOG41082 Geography of Soils
- GEOG49070 GIS
- MIS24503 Computer Applications