



CAREERS IN PHARMACEUTICALS

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OVERVIEW

The pharmaceutical industry uses chemicals to develop, manufacture, and distribute therapeutic drugs and vitamins. There is a plethora of job opportunities in a variety of career areas in the industry. A graduate degree is valuable to obtain and progress in a pharmaceutical career but there are many opportunities for undergraduate degree holders as well. Networking and experience and key factors to obtain a job.

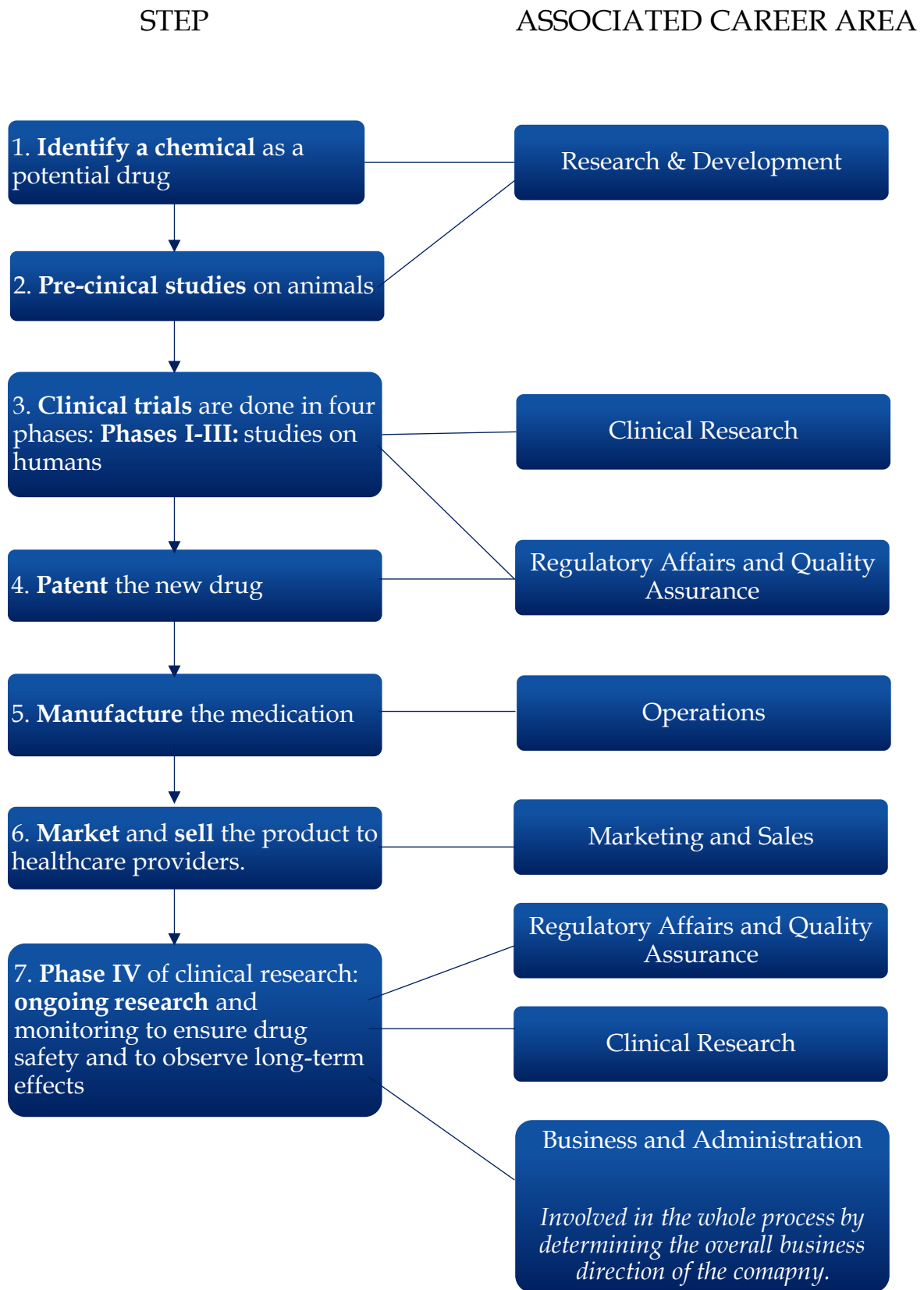
The mission of *Canada's Research-Based Pharmaceutical Companies*, a national organization, summarizes what pharmaceutical companies do: "to improve the quality of life of all Canadians and enhance our health care system by fostering discovery, development, and availability of new medicines and vaccines."

Pharmaceutical companies work with a number of other institutions. There are pharmaceutical related career opportunities at these establishments. Some of these institutions include:

- Biotechnology firms
- Drug distributors
- Clinical research centres
- Universities
- Hospitals/medical centres
- Medical device suppliers
- Financial consulting firms
- Software companies
- Government regulatory departments

CAREER POSSIBILITIES

Drug Development: "From the Lab to Your Medicine Cabinet"



Career Areas

The career areas associated with each step listed in the above table are outlined below.

Research & Development (R&D)

R&D professionals seek to identify chemicals as potential drugs and perform pre-clinical trials on animals. Research is done in or outside the lab. A science background and research experience are required. A graduate degree is advantageous and required for some positions, though there are some entry-level positions which do not require a Master's degree. A graduate degree is needed to obtain jobs above entry level positions in this area. A Master's Degree is needed for bioinformatics and a PhD is required to be a pharmacologist.

Biotechnology companies are involved in this stage of drug development. They form partnerships with larger pharmaceutical companies and perform research on organic-based drugs. This field is known as biopharmaceuticals. There are opportunities for biochemistry and biology graduates at biotechnology companies.

Computer technology is a growing area in this field. There are software companies which specialize in developing software used in pharmaceuticals. Opportunities exist for people with a computer science background at these specialized software companies.

Bioinformatics: the use of a computer to store, retrieve and analyze biological data such as DNA and protein information.

Skills	Sample Positions
<ul style="list-style-type: none">- Research skills- Science knowledge- Creative- Open-minded- Teamwork	<ul style="list-style-type: none">- Pharmacologist- Analytical researcher- Technician- Industrial pharmacist- Research assistant- Junior level chemist- Librarian (research outside the lab) <p>Computer Technology positions:</p> <ul style="list-style-type: none">- Computational chemist- Bioinformatics scientist- Software engineer- Software developer

Clinical Research

Clinical research involves performing clinical trials on humans to evaluate the effectiveness and safety of the drug. A science background is an asset, though there are some opportunities for people with a non-science degree. Graduates with a background in statistics are hired for

statistician/biostatistician positions. A graduate degree is an advantage for executive/managerial positions. Bachelor's degree holders are hired for entry-level positions and may achieve higher level positions with experience. There are specific college post-graduate programs in clinical research.

Clinical trials occur in 5 phases:

Phase I: Early human trials to make sure the potential drug is safe.

Phase II: Determine that the drug is effective on humans.

Phase III: Large-scale trials to assess the effectiveness of the drug more thoroughly.

Phase IV: Safety surveillance once the drug is made and sold.

Although pharmaceutical companies may hold some clinical trials, many of these tests take place at medical centres, hospitals and large-scale clinical research centres. Career opportunities exist at these institutions.

Skills	Sample Positions
<ul style="list-style-type: none"> - Research skills - Knowledge of Product - Organized - Interpersonal and Communication Skills 	<ul style="list-style-type: none"> - Clinical Research Coordinator - Clinical Supplies Associate - Statistician/Biostatistician - Clinical Research Scientist - Senior Clinical Executive - Clinical Project Manager

Regulatory Affairs and Quality Assurance

This step entails performing checks, tests, and conducting sampling procedures on raw materials and finished products and to make sure everything is made correctly, safely and reliably. Results are recorded to make sure quality standards are met and documents are made. Documents are reviewed to make sure they follow government regulations and protocols. Highest quality products are ensured. A science background and a graduate degree are advantageous and required for some positions.

Pharmaceutical companies work with law firms to patent their drug in order to have exclusive rights to manufacture and sell their product. A law degree is required to practice as an intellectual property (patent) lawyer. Many lawyers who work with pharmaceutical companies have a science background.

Skills	Sample Positions
<ul style="list-style-type: none"> - Written and Oral Communication Skills - Teamwork Skills - Attention to Detail - Science Background - Logical 	<ul style="list-style-type: none"> - Regulatory Affairs Specialist/Assistant - Quality Assurance Associate - Quality Assurance Investigator - Research Ethics Coordinator - Intellectual Property Lawyer - Intellectual Property Manager

Operations

The field of operations involves manufacturing the product on a large-scale, as well as promoting and maintaining health and safety on site. High efficiency of production is maintained. A science background is useful in this area.

Ergonomics: How companies design tasks and work areas to maximize the efficiency and quality of employees' work.

Skills	Sample Positions
<ul style="list-style-type: none">- Analytical- Efficient- Multitask- Teamwork- Organized	<ul style="list-style-type: none">- Occupational or Industrial Hygienists- Production Technician- Scientific Policy and Program Officer- Analytical Chemist- Ergonomist- Chemical Engineer

Marketing & Sales

Marketing and sales professionals identify target customer groups (health-care professionals), meet with customers, set prices, and determine promotion strategies. Graduates with a background in marketing, CCIT, business and related study may pursue this area. A science degree is not needed for many of these positions, though it may be an advantage. A graduate degree and/or experience are required for managerial positions. Drug distributing firms work with pharmaceutical companies at this stage.

Skills	Sample Positions
<ul style="list-style-type: none">- Sales Related Experience- Creative- Teamwork- Communication and Interpersonal Skills- Persuasive- Presentation Skills- Knowledge of Product	<ul style="list-style-type: none">- Market Researcher- Marketing Associate- Advertiser- Pharmaceutical/Technical Sales- Representative- Sales Manager- Associate Market Manager- Customer Marketing Manager- Sales Training Manager

Business and Administration

Although a science degree is not needed, people with a science background may pursue this area of work. People with a background in business, commerce, accounting, management, and finance are needed in this field. Business and administration seeks to identify new partners and manage existing alliances. An MBA may be required for some positions. The business direction of the company is determined and pursued. There are career possibilities at financial consulting firms who work with pharmaceutical companies to help with budgeting and developing a business plan.

Skills	Sample Positions
<ul style="list-style-type: none"> - Communication and Interpersonal Skills - Business Sense - Organized - Able to Negotiate - Persuasive - Teamwork Skills - Able to Manage Budgets - Presentation Skills 	<ul style="list-style-type: none"> - Financial Analyst/Planner - Manager - Human Resources Manager - Business Development Manager - Business Development Analyst - Communications Manager

CANADIAN PHARMACEUTICAL INDUSTRY PROFILE

- Canadian pharmaceutical sales make up **2% of the world market**. Canada is the 9th largest world market in pharmaceutical sales.
- Pharmaceuticals made up **16 percent of total health expenditures** in 2019, costing more than physicians. **Drug sales are growing** more rapidly than any other health related expenditure.
- The pharmaceutical sector **employed around 31,500 people** in 2020 and created about **35,000 indirect jobs**
- Pharmaceutical companies are concentrated in **Toronto, Vancouver, and Montreal**
- **Brand-name firms** research, develop and patent new or improved drugs while **generic companies** make copies of drugs after their patent expires
- The **biotechnology** sector plays an important role in the pharmaceutical industry (called **biopharmaceuticals**). Biopharmaceuticals use chemicals derived from living things while traditional pharmaceuticals use synthetic chemicals to create new therapies. Many biotechnology companies form partnerships with, or become acquisitioned by, larger pharmaceutical companies. Emerging fields of biopharmaceuticals include gene and cell therapies, and nanomedicines
- **Leading classes of drugs** in 2019 according to IMS Health:
 1. Oncology
 2. Antiarthritics
 3. Psychotherapeutics
 4. Diabetes therapy
 5. Anti-virals
- Canada's largest drug company is **Johnson & Johnson**, making up 13.3% of Canadian pharmaceutical sales, more than double the sales of any other Canadian pharmaceutical company

- The two largest generic companies are **Novartis** and **Apotex** which make up 5% and 4% of Canada's pharmaceutical market sales

HOW TO GAIN EXPERIENCE

Education

Science students: emphasize your research and analytical skills and the science knowledge you gained in your practicals and lectures. These are great skills and experiences to put on your resume.

Students in other academic areas should highlight their academic achievements as well. You can gain useful experience in courses in marketing, accounting and finance depending on the career area you want to pursue

Research

Science students: volunteer with a professor who performs research in an area that interests you. Get to know your professors in courses you are taking. Visit their office hours or make an appointment. Before approaching a professor for a volunteer position, find out their research experiences and interests, and read a couple of their published papers. They will be impressed if you discuss their publications with them. Look into volunteering at the beginning of the school year if possible, although professors may need volunteers throughout the school year.

Research Opportunity Program: CHM/BIO299, CHM/BIO399, also in Management, Computational Science, Statistics and more. These courses allow you to work on a professor's research project under their supervision in return for a full year course credit.

<https://www.utm.utoronto.ca/experience/rop/>

Independent Research Projects: CHM489, BIO481, CBJ481 (Bioinformatics) involve planning and undergoing a research project under the supervision of a faculty member as well as completing a written and oral report. Look for these courses in the Registrar's Course Calendar.

<https://student.utm.utoronto.ca/calendar//calendar.pl>

NSERC Industrial Undergraduate Student Research Awards (USRA): scholarships that fund undergraduate research projects. NSERC also funds graduate research.

<http://www.nserc.ca>

<https://www.utm.utoronto.ca/cps/2017-2018-nserc-undergraduate-student-research-awards-usra>

Internships

UTM Internship Courses include BIO400, MGT413 and more. For more information check out the UTM internship website. <https://www.utm.utoronto.ca/experience/students/academic-internships>

Professional Experience Year is a program offered through UofT which allows you to apply your knowledge in a 12-16 month project-based professional internship.

<https://engineeringcareers.utoronto.ca/work-experience-programs/professional-experience-year-co-op-program-pey-co-op/>

The NRC Student Employment Program provides students with practical career-related experience in research and development, library sciences, communications, marketing, and other areas.

<https://nrc.canada.ca/en/corporate/careers/nrc-student-employment-program>

Biotalent's Career Starter Program helps provide young Canadians with valuable work experience in the biotechnology sector. <https://www.biotalent.ca/programs/career-starter-program/>

The Natural Resources Canada Science and Technology Internship Program provides an opportunity for recent graduates in science or engineering to gain relevant and meaningful work experience.

<https://www.nrcan.gc.ca/climate-change/canadas-green-future/green-jobs/87>

Working and Volunteering

Career Centre job postings online include GSES full-time postings for graduating students, RSES full-time postings for recent graduates (for up to two years following convocation), as well as part-time, volunteer, and summer job postings for students in any year of study.

<https://www.utm.utoronto.ca/careers/jobs/job-postings>

The Get Experience Fair and the Summer Job Fair allow you to talk directly to employers and to organization looking for volunteers. These events are hosted by the Career centre.

<https://www.utm.utoronto.ca/careers/events>

Job Directories are a great way to find contact information for local pharmaceutical companies to find out if they hire students for the summer or on a part-time basis.

EDUCATION OPTIONS

The pharmaceutical industry hires people with an undergraduate or graduate degree with a focus on, but not restricted to:

Chemistry

Biology

Biochemistry

Pharmacology

Pharmacy

Anatomy

Physiology

Immunology

Bioinformatics

Computer science

Statistics

Business

Management

Commerce

Accounting

There are also programs specific to pharmaceuticals, some of them listed below.

Undergraduate Programs in Ontario

B.Sc. Biological and Pharmaceutical Chemistry – University of Guelph

B.Sc. Pharmaceutical Chemistry – University of Toronto

B.Sc. Medicinal Chemistry – University of Waterloo

Graduate Programs in Ontario

M.Sc./Ph.D. Pharmaceutical Sciences – University of Toronto

M.Sc./Ph.D. Biotechnology – Brock University – University of Toronto

MPharm Advanced Pharmacy Practice – University of Waterloo

To see more undergraduate and graduate programs in Ontario and other provinces, visit

<https://www.universitystudy.ca/search-programs/>

Post-Graduate College Diploma Programs

Post-graduate college programs are a great option if you would like to earn an extra credential but a Master's degree isn't for you. These programs are usually about a year long, give you valuable hands-on skills, and most programs include a co-op placement in a pharmaceutical setting.

For more information go to the [Post-Grad Programs](#) section on the UTM Career Centre website or visit <https://www.ontariocolleges.ca/en>.

Examples of some programs:

Clinical Research – Humber College, Seneca College

Pharmaceutical Regulatory Affairs and Quality Management – Seneca College

Regulatory Affairs – Humber College

CAREER CENTRE RESOURCES

Check out the [Careers by Major](#) section of the Career Centre website to find out about careers, relevant skills, sample job postings, how to gain experience, and more. Relevant majors in this section include chemistry, biology, management, computer science, and more. [Alumni Profiles](#) outline career paths of graduates in your area of study.

The [Jobs](#) tab links you to information about internships, volunteer, and summer/part-time position. There are also some great job search tools and resources and links. There are links to relevant professional associations, such as the Chemical Institute of Canada and Toronto Biotechnology Initiative. Check out the [Resume and Cover Letter Toolkit](#) to find out how to prepare an effective resume and cover letter in simple steps.

Learn about graduate schools, college post-grad diplomas, and professional degrees under [Further Education](#). There are links to useful web resources about different programs, advice on preparing for grad school, and an outline of relevant Career Centre events.

Check out the [Events Calendar](#) regularly to see what's going on at the Career Centre and to sign up for our events online through [CLNx](#). Our events include fairs, workshops, employer info sessions, and networking events.

You can also log into [CLNx](#) and go to the *Resources tab > Student Resources > Overview > Career Resources* to see a list of web resources like Career Cruising to see a profile of a variety of careers.

USEFUL LINKS

Innovative Medicines Canada has current information about the industry and links to companies
<http://innovativemedicines.ca/>

PharmaJob is a great site for Canadian pharmaceutical job postings. Check out the "Create an alert" link to get updated about future positions in your location and career interests
<https://www.pharmaceutical.ca/>

PetriDish is a career portal that links you to employment opportunities within the biotechnology industry.
<https://www.biotalent.ca/the-petridish/>

Science Careers helps you find a job in a variety of areas in science, including pharmaceuticals
<https://jobs.sciencecareers.org/>