A FUTURE IN
BIOMEDICAL
SCIENCE
WHAT IS BIOMEDICAL SCIENCE?

The fields of biomedical science and biotechnology have merged and flourished over the past decade, moving from what were initially medical applications to a wide range of industries including agriculture, pharmaceuticals, plant and veterinary science.

The fundamental basis of biomedical science research is investigating how the human body works at the molecular level, in order to find and evaluate new medical treatments for diseases and genetic disorders as well as manufacturing diagnostic tests. This research has expanded into areas such as drug delivery, medical devices and dosage form design. As an example, clinical epidemiology and biomedical engineering now come under the biomedical sciences umbrella.

Biotechnology is about using scientific knowledge of biological systems and living organisms to create new products and solve problems. Recent developments include bioremediation, which is the use of genetically engineered bacteria to synthesise human insulin for people with diabetes, the creation of transgenic plants that can produce their own pesticides, and industrial fermentation to produce biofuels, such as ethanol, from waste materials.

Are you inspired by the potential of science to improve people’s health and well-being? Are you a problem-solver who likes hands-on practical work? Can you see yourself turning your passion for science and technology into a profession that is expanding into massively evolving industries? Then a career in biomedical science may be for you.
OUTLOOK AND TRENDS

Increasing crossover between biomedical and food sciences – As legislation concerning health and safety measures around food production becomes more stringent, an understanding of biomedical science will become increasingly beneficial. The Food Act of 2014 promotes food safety by focusing on the processes of food production, bringing in food control plans (FCPs) for high risk food production activities. FCPs will need to detail hazards such as germs, bacteria and chemicals in ingredients, and other contaminants that could be harmful to humans.

Most biotechnology opportunities are in human wellness and animal-based bioscience – Biotechnologists work in many different areas, but job prospects are best if you work in either human wellness, such as developing health-promoting foods, or in animal-based bioscience, such as developing veterinary medicines. Although biotechnology organisations are spread across New Zealand, almost a quarter of the opportunities are based in the Auckland and Northland regions.

Growth industries – The Technology Investment Network’s 2015 TIN Report reveals New Zealand’s TIN 200 companies collectively grew to $8.952 billion in annual revenue, a $600 million (7.3 per cent) increase over last year. Export revenues are up by 7.5 per cent to an all-time high of $6.5 billion, and a record 19 companies now have revenues of $100 million or more. Job growth across the TIN200 has accelerated with 2410 new jobs created in 2014/15, taking total job numbers to 37,333.

Stable growth for science technicians – Forecasts are for stable growth in the number of science technicians over the 2013 to 2023 period, with a projected growth rate of 1.1%. The best opportunities lie in the applied sciences and in fields the government has prioritised for funding, which are biological industries, health, environment, and high-value manufacturing and services.

Source: Ministry of Business, Employment and Innovation

Environmental Science and Research study on influenza – A survey of 1,800 Aucklanders commenced in 2015 as part of a five-year international project studying the effects of influenza on a population. A world first, the findings of this research will provide researchers and policy-makers with new information that may reduce the annual impacts of influenza in New Zealand and globally.

Source: Environmental Science and Research

Medical Technologies Centre of Research Excellence (MedTech CoRE) – In October 2015 MedTech CoRE was launched to deliver a single point of contact for New Zealand’s medical technology research. The consortium of researchers come from Auckland University of Technology, Callaghan Innovation, the Universities of Auckland, Canterbury and Otago, and Victoria University of Wellington.

WORK SETTINGS

Biomedical science is an area of rapidly expanding opportunities with roles in laboratories and in the field. Professionals usually work regular hours, with some evening and weekend work if involved in long-running projects or experiments. Typical workplaces include:

- Crown Research Institutes (CRIIs) such as Environmental Science and Research (ESR) and Plant and Food Research (PFR)
- Private research institutes
- Universities and other tertiary institutions
- Pharmaceutical and biotechnology companies
- Health product and food-for-health product companies
- Government organisations like the Health Research Council (HRC) or Ministry for Primary Industries (MPI)

CAREER ROLE EXAMPLES

Biomedical scientists – help solve health care problems such as cancer, diabetes or obesity through studying how living organisms work. Conduct research and undertake testing of different treatments for dealing with diseases of humans and plants.*

Biotechnologists – study living organisms such as animals, plants, fungi, bacteria and viruses. Use this research to develop medical, industrial and agricultural products.
Research technicians - carry out research, testing and experiments in life sciences. They set up, operate and maintain laboratories for teaching and research, maintain databases and write reports and papers on research results.

*Biomedical scientists differ from medical laboratory scientists who have a specialist Medical Laboratory Science qualification and work in hospitals and private medical laboratories testing blood and tissue samples taken from patients.

**SKILLS AND KNOWLEDGE**

**Technical skills**
- Excellent biomedical technology and biomedical laboratory skills
- Sound understanding of the application of biomedical knowledge in industry practice
- Strong experimental design, statistical and computer skills
- Excellent writing skills, for compiling reports and publications
- Acquisition, analysis and evaluation of research results and other information
- Good knowledge of biochemistry, microbiology, molecular biology and biotechnology
- Understanding of industrial processes
- Knowledge of safety procedures relating to hazardous substances
- Understanding of statutory and ethical responsibilities

**General skill requirements**
- Ability to work in a team
- Excellent communicator, particularly in explaining complex ideas and technical terms to clients or co-workers
- Strong project management and research skills
- Hands-on practical aptitude
- Competent time management and prioritising skills
- Capable problem-solver

**PERSONAL QUALITIES**
- Lateral thinker, objective, enquiring
- Logical, methodical and precise
- Eye for detail
- Flexible and quick to adapt to new projects or changing requirements

**FURTHER STUDY OPTIONS**

For those wanting more specialised study, postgraduate-level programmes include the Graduate Certificate and Graduate Diploma in Science, Master of Science and Doctor of Philosophy in Marine Biology.

Recent research in the school includes topics in aquaculture, aquatic biogeochemistry, fisheries and mangrove diversity.

**SALARY GUIDE**

<table>
<thead>
<tr>
<th>Role</th>
<th>Salary Range</th>
</tr>
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<tbody>
<tr>
<td>Biomedical scientists</td>
<td></td>
</tr>
<tr>
<td>Technicians and research associates</td>
<td>$35,000 – $55,000 (Bachelor’s degree)</td>
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<tr>
<td></td>
<td>$55,000 – $75,000 (Master’s degree)</td>
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<tr>
<td></td>
<td>$75,000 – $95,000 (PhD-qualified)</td>
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<tr>
<td>Research team leader</td>
<td>$130,000 or more</td>
</tr>
<tr>
<td>Biotechnologists</td>
<td></td>
</tr>
<tr>
<td>Biotechnology technicians (Bachelor’s degree)</td>
<td>$35,000-$55,000</td>
</tr>
<tr>
<td>Biotechnologist (Master’s degrees)</td>
<td>$55,000-$75,000</td>
</tr>
<tr>
<td>Biotechnologist (PhD)</td>
<td>$76,000-$94,000</td>
</tr>
<tr>
<td>Research team leader</td>
<td>$130,000 or more</td>
</tr>
<tr>
<td>Science technicians</td>
<td></td>
</tr>
<tr>
<td>Newly qualified</td>
<td>$36,000</td>
</tr>
<tr>
<td>Three – five years’ experience</td>
<td>$40,000 - $45,000</td>
</tr>
<tr>
<td>Senior – 10 years plus</td>
<td>$50,000 - $60,000</td>
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</tbody>
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Sources: Futureintech and Careers NZ
Salary range is indicative of the New Zealand job market at the time of publication (2016) and should only be used as a guideline.

**THE AUT APPROACH**

Final-year students can enrol in a research project, that may involve a placement with an employer organisation.

AUT is home to three biomedical research facilities:
- AUT-Roche Diagnostics Laboratory is a significant university and commercial laboratory collaboration. It gives undergraduate and postgraduate students access to the latest scientific evaluations in chemistry, molecular diagnostics, immunology and haematology. The lab is also used for research and development of new molecular tests to detect pathogens and their emerging variants.
- Institute of Biomedical Technologies (IBTec) is a multidisciplinary and interfaculty university research institute with three research centres – the Centre for Respiratory Therapies, the Centre for Cardivascular Diagnostics and the Centre for Biomedical Material.
- Microbiology Suite contains isolation and culture facilities, PC1 and PC2 biocontainment laboratories, batch and continuous bioreactors, biofilm bioreactors, microcosms, rapid enumeration tools.
I was initially attracted to biomedical science because it covers many areas of science which meant I would have diverse opportunities in laboratories and research.

I’m very interested in organic synthesis work, especially in the synthesis of anti-cancer drugs. My PhD project topic, ‘Dual-functional molecules for the treatment of cancer’, is the first organic synthesis project at AUT. Organic synthesis is about the construction of novel compounds through organic chemistry. This is now widely used in pharmacology study, not only to synthesize new structures as a potential drug, but also to create biological active natural products.

On completing my PhD – hopefully in 2017 – I’d like to work in a technician, manager or specialist research role in the area of organic synthesis for anti-cancer drugs. This could be for a research institute, university or a pharmaceutical company’s new product development department.

Biomedical science graduates are very employable, especially in lab work, because they are knowledgeable across three different sciences – biology, chemistry and medical science.

Almost all food or pharmaceutical industries have new production development departments that need biomedical scientists to transfer the new patents or new technical knowledge into products. Biomedical scientists and researchers are particularly useful in new production development departments because the transfer process needs people with biological, medical and chemistry knowledge. That mix of knowledge and skill base also helps students get into postgraduate projects.

Biomedical graduates also find career opportunities with the pharmaceuticals industry in roles such as quality control, quality assurance, technical purchasing, production department, formulation department – even sales.”

*The first Bachelor of Science biomedical science graduates will come through in 2018. The undergraduate degree major expands on the current postgraduate biomedical study options.*
USEFUL WEBSITES

Institute of Biomedical Technologies (IBTec)
www.ibtec.aut.ac.nz

Institute of Environmental Science and Research Ltd (ESR)
www.esr.cri.nz

NZ Biotechnology Industry Organisation (NZBio)
www.nzbio.org.nz

Science NZ
www.careers.sciencenewzealand.org

FURTHER INFORMATION

For more information on biomedical science and the Bachelor of Science, please visit our website: www.aut.ac.nz/biomedical

FUTURE STUDENTS

Contact the Future Student Advisory team for more information: www.aut.ac.nz/enquire
futuresstudents@aut.ac.nz
@AUTFutureStudents

CURRENT AUT STUDENTS

Contact the Student Hub Advisors team for more information: 0800 AUT UNI (0800 288 864)
www.aut.ac.nz/enquire | studenthub@aut.ac.nz
@AUTEmployabilityandCareers

EMPLOYABILITY & CAREERS

For other Future Career Sheets visit:
www.aut.ac.nz/careersheets
For employability and career support, AUT students can book an appointment through https://elab.aut.ac.nz/

CITY CAMPUS

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The information contained in this career sheet is correct at time of printing, August 2019.