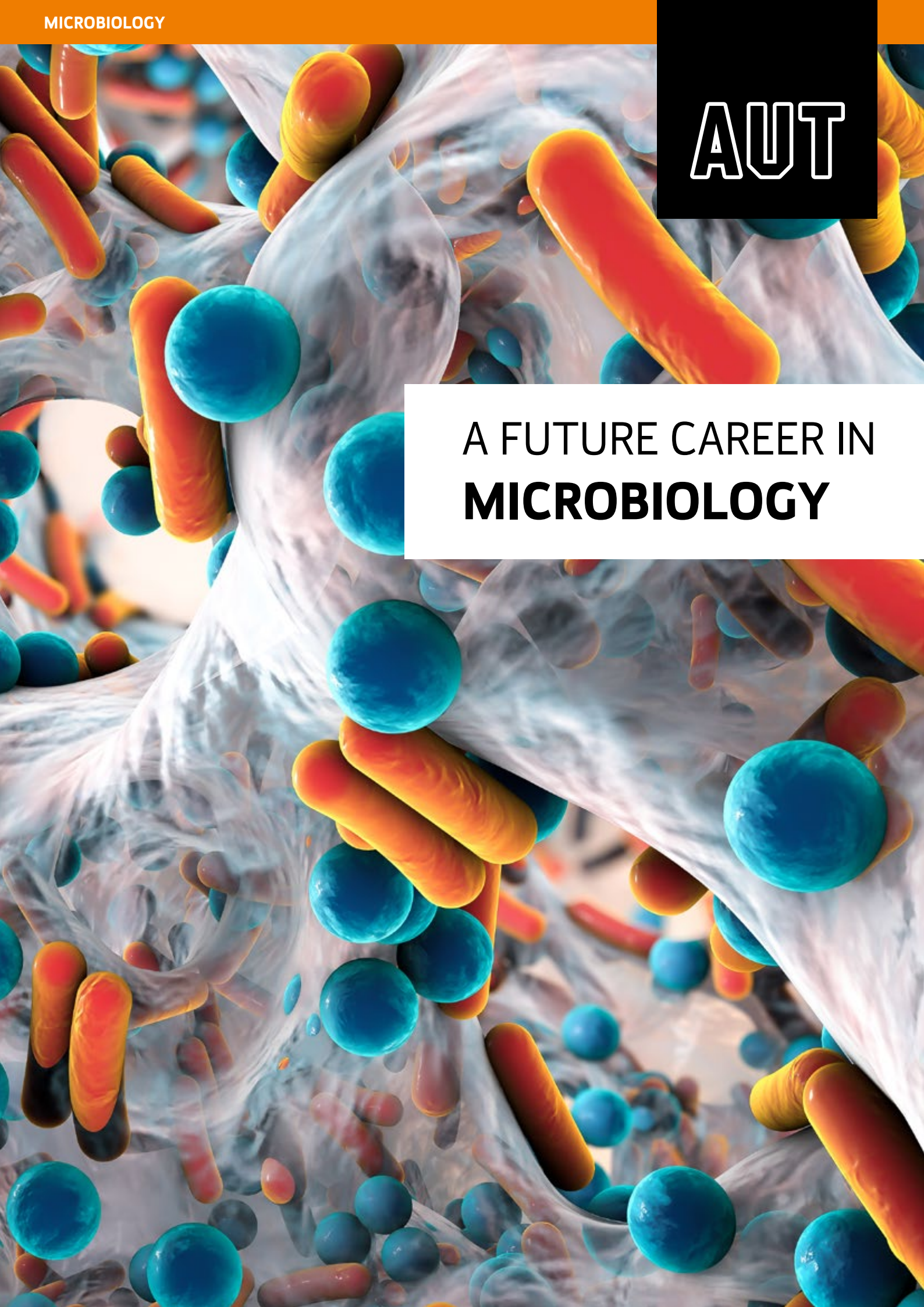
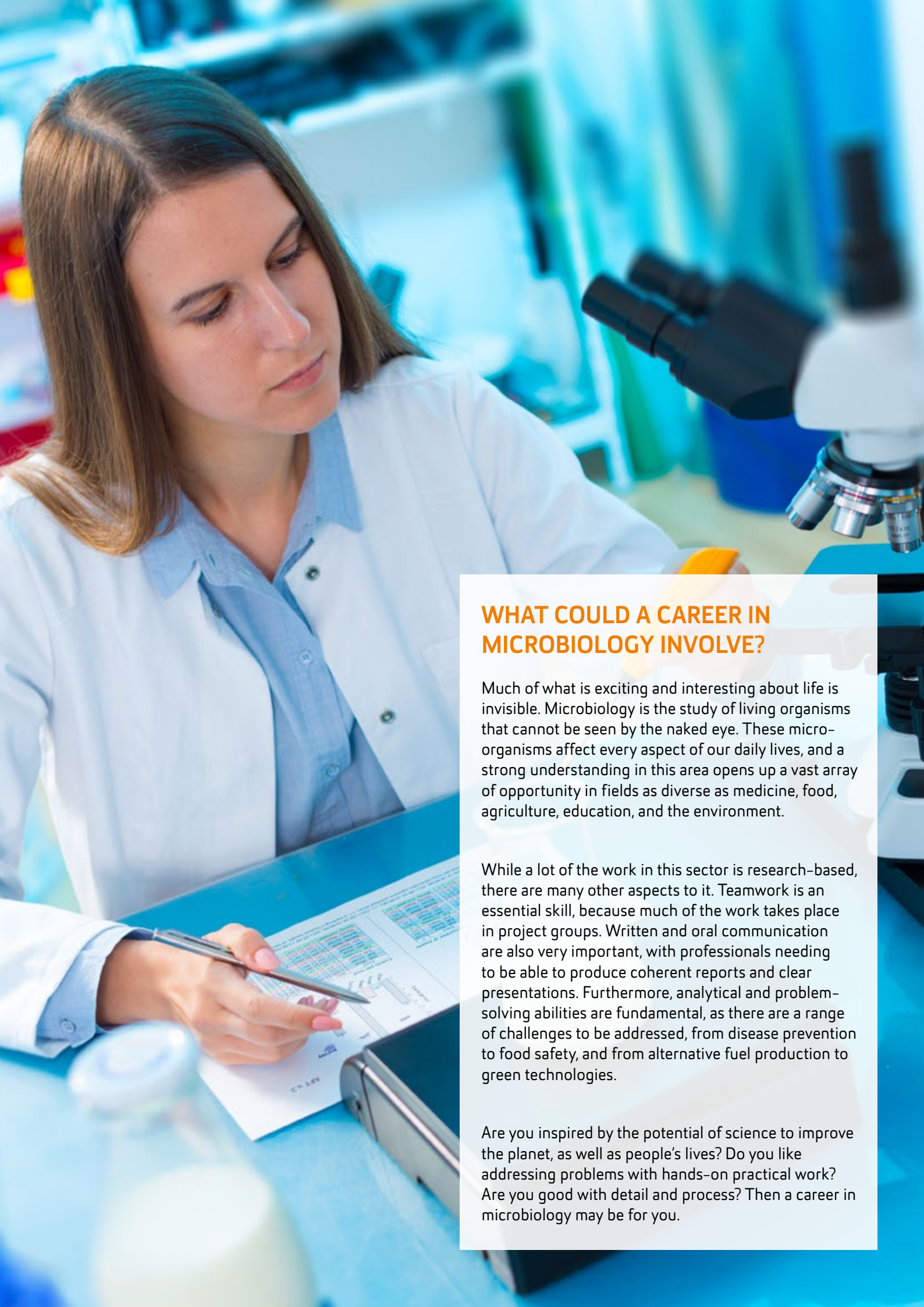


AUT

A FUTURE CAREER IN
MICROBIOLOGY





WHAT COULD A CAREER IN MICROBIOLOGY INVOLVE?

Much of what is exciting and interesting about life is invisible. Microbiology is the study of living organisms that cannot be seen by the naked eye. These micro-organisms affect every aspect of our daily lives, and a strong understanding in this area opens up a vast array of opportunity in fields as diverse as medicine, food, agriculture, education, and the environment.

While a lot of the work in this sector is research-based, there are many other aspects to it. Teamwork is an essential skill, because much of the work takes place in project groups. Written and oral communication are also very important, with professionals needing to be able to produce coherent reports and clear presentations. Furthermore, analytical and problem-solving abilities are fundamental, as there are a range of challenges to be addressed, from disease prevention to food safety, and from alternative fuel production to green technologies.

Are you inspired by the potential of science to improve the planet, as well as people's lives? Do you like addressing problems with hands-on practical work? Are you good with detail and process? Then a career in microbiology may be for you.

OUTLOOK AND TRENDS

The influence of microbiology on wine characteristics

– New Zealand wines are known for their high quality and unique flavours. The country exports \$1.2 billion of wine each year. Providing winemakers with tools to tailor flavour and maintain quality is key in meeting industry targets and retaining New Zealand's competitive position in the marketplace. The unique environment, or terroir, of New Zealand vineyards provides one way for winemakers to produce the distinctive flavours that characterise New Zealand wines. The global wine yeast market is worth \$50 million, and new products that afford winemakers the ability to tailor wine characteristics are key to its growth.

Source: *Plant and Food Research*

Microbiology vs superbugs – Antibiotic resistance is one of the biggest man-made health threats of the modern age, according to Institute of Environmental Science and Research clinical microbiologist Deborah Williamson.

Microbiologists are working on a breakthrough in bio-synthesised antibiotics, ultimately aiming to create new, affordable antibiotics that deadly superbugs cannot identify and to which they will not be resistant. A recent study defines new ways in which microbes, which are used to make some commonly used types of antibiotics, can be re-engineered to produce modified forms of the original molecules.

The New Zealand health ministry is taking a proactive approach and is implementing a national response to the issue.

Source: *Environmental Science and Research*

Emphasis on safeguards for taxonomic collections

– Taxonomy is how we understand New Zealand's living things, allowing us to identify native and non-native species but also identify pests, weeds and toxic organisms. More resources and a coordinated approach are needed to safeguard and grow New Zealand's taxonomic collections, which are intrinsic to supporting sectors of New Zealand life, from economic growth to human health.

There are a range of challenges from the increase of biosecurity risks associated with trade and tourism, and changing climates affecting the species that are able to live in New Zealand. This means that taxonomic research is more important than ever in equipping us for the future and providing essential baseline knowledge.

Effective biological collection infrastructure is critical in the defence of the economy, environment and society against pests, diseases, and weeds which currently cost New Zealand \$2.45 billion annually, and in ensuring, for example, market access for New Zealand's \$1.5 billion seafood exports.

Source: *Royal Society of NZ*



WORK SETTINGS

Microbiologists work in a range of fields. One of the largest is research and analysis, where employers include:

- Crown Research Institutes (CRIs) such as Environmental Science and Research (ESR) and Plant and Food Research (PFR)
- Universities
- Private companies

Microbiologists also work in the manufacturing industry for employers such as:

- Pharmaceutical, biochemical, biotechnology and agricultural companies
- Food and beverage manufacturers, such as food-for-health product companies
- Food safety organisations
- Health, home and personal care product manufacturers

Jobs can also be found in the environment sector, where employers include:

- Water companies
- Waste management companies
- Environmental consultants

Professionals in this field usually work regular business hours, but may also work evenings and weekends if they are involved in a long-running project or experiment.

They usually work in laboratories and offices, but can also work in the field collecting samples or performing field trials.

CAREER ROLE EXAMPLES

Food microbiologist – Conduct experiments and produce food sample products, as well as designing the processes and machinery for manufacturing food with a consistent flavour, colour and texture in large quantities. Develop the manufacturing processes and recipes of food and drink products, and may work on existing and newly discovered ingredients to invent new recipes and concepts.

Microbiologists – Study microorganisms in order to understand their effects and how they can be used. Focus on the biology of microorganisms at both the molecular and cellular level, as well as their ecology, including viruses, bacteria, archaea, fungi, algae and protozoa.

Research technicians – Conduct research, testing and experiments in the life sciences. Establish, operate and maintain laboratories for teaching and research, maintain databases and write reports and papers on research results.

Technical brewer – Manage the whole process of beer brewing, ensuring the quality and consistency of the product. Involves responsibility for raw materials, operatives and technicians, maintaining the safe and effective running of the plant and machinery and developing new recipes and products.

SKILLS AND KNOWLEDGE

Technical skills acquired in this course

- Well-developed research skills
- Strong statistical and computer skills
- Excellent writing skills, for compiling reports and publications
- Practical skills for performing experiments and operating scientific equipment
- An understanding of industrial processes
- Knowledge of safety procedures relating to hazardous substances
- Clear understanding of statutory and ethical responsibilities

General skill requirements acquired in this course

- Ability to work in a team
- Excellent communicator, particularly in explaining complex ideas to clients or co-workers who may not understand technical terms
- Strong project management skills
- Hands-on practical aptitude
- Ability to work collaboratively
- Competent time management and organisational ability, especially the ability to prioritise
- Capable problem-solver

PERSONAL ATTRIBUTES

- Lateral thinker
- Logical, methodical and precise
- Eye for detail
- Flexible and quick to adapt to new projects or changing requirements
- Objective, enquiring and open to new ideas

SALARY GUIDE

Pay for microbiologists depends on their qualifications and experience.

	Salary
Microbiologists working at the technician level	\$35,000–\$55,000 graduates with Bachelor's degree
	\$55,000 – \$75,000 with Master's degree
Senior Microbiologists	\$76,000 – \$94,000 with PhD
Science Technicians	\$56,000 (average)

Sources: *Futureintech*, *Ministry of Business Innovation and Employment Occupation Outlook*

Salary range is indicative of the New Zealand job market at the time of publication (mid 2016) and should only be used as a guideline.

THE AUT APPROACH

Final-year students can enrol in a research project, which may involve a placement with an employer organisation. AUT has close relationships with the following employers: AssureQuality, EuroFin, Fonterra, LabTests, Nestle, and Tip Top.

Research facilities at AUT include the Microbiology Suite, which contains isolation and culture facilities, PC1 and PC2 biocontainment laboratories, batch and continuous bioreactors, biofilm bioreactors, microcosms, and rapid enumeration tools.

FURTHER STUDY OPTIONS

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

RESEARCH OPPORTUNITIES

Recent research in the school includes sensory analysis, food product development, ecological and evolutionary dynamics of microorganisms, metagenomics, microbial stress responses, and oral microbiology (human, equine and canine).

Kate Rolinson

Supervisor, General Microbiology, Eurofins

Bachelor of Science in Microbiology and Food Science

“Discovering the differences between microorganisms and observing how they react to different environments and stimuli has always been fascinating for me. I also enjoy learning about the nature of microorganisms in food, our bodies and the environment and how they interact with each other.

At Eurofins we test a variety of food products and environmental samples such as water and surface swabs. I started as a junior technician in the general microbiology processing lab three years ago, doing mainly sample preparation and some daily routine QC (Quality Control) work. Over time I developed my technical skills, such as testing the prepared samples and following prescribed methods as requested by the client. Then I worked as a senior technician until I was promoted to supervisor of the lab.

In my job I oversee the preparation and testing of various food and environmental samples in the lab, and also do some testing myself! It is important that the work flows through efficiently, so that the clients have their results as early as possible, and it is my job to ensure that this happens. It is never boring and I'm still learning new things! The work is very fast paced and there is always something to be done.

The most challenging thing about my job is that it requires a lot of micromanagement and problem solving because the microbiology of samples can change, even when refrigerated, so you have to be prepared for whatever work is given to you. I often have to make quick decisions about arranging staff so the work is done well and efficiently and that they are happy and confident with what they are doing.

It has always been an aspiration of mine to get into research, so eventually I intend to further my education and see where that takes me. A life of learning and discovery is my goal.”



EMPLOYER COMMENT

“I employed Kate because I was looking for a highly motivated graduate with a degree strongly associated with microbiology. Her AUT degree was a great fit due to the significant amount of practical laboratory experience covered.

Kate's academic transcript showed she was a very high achiever, and also demonstrated her ability to excel at what she does. Kate's attitude and passion for her work has been a great fit with our culture here at Eurofins and has made her a valued member of the team.”

Sam Smyth, Business Unit Manager

Auckland Microbiology, Eurofins NZ Laboratory Services Ltd.

USEFUL WEBSITES

New Zealand Microbiological Society

www.nzms.org.nz/

Royal Society of New Zealand

www.royalsociety.org.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/home


FURTHER INFORMATION

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

FUTURE STUDENTS

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

futurestudents@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

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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/>


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

