

The School of Biological Sciences (SBS)

Postgraduate Welcome Guide

2021



Welcome

Tēnā koutou katoa,

A warm welcome to the School of Biological Sciences (SBS) at the University of Auckland. You are joining a thriving and engaged postgraduate community within SBS that has an international reputation for excellence in both teaching and research that will provide an outstanding platform for your future career.

The School of Biological Sciences (SBS) is ranked in the world Top 100 departments of Biological Sciences and is a vibrant and exciting environment to work, offering a wide range of multidisciplinary research opportunities in Plant, Marine and Animal Biology, Bioinformatics, Biotechnology and Biomedical Science. Our staff are recipients of both national and international research funding and awards, and feature regularly in scientific communique and social media.

We offer real world research experience with our Joint Graduate Schools with Crown Research Institutes, the Department of Conservation, the Auckland Museum and Auckland Zoo, as examples. Our facilities are equipped to global standards enabling students to acquire internationally competitive skills. Post graduate professional training which also contributes directly to the New Zealand economy is available through Diploma and Master Degrees in Bioscience Enterprise.

The School also provides excellent support for both study and networking – we look forward to welcoming you to the next exciting and fun stage of your career.



Professor Allen Rodrigo
Head of School – School of Biological Sciences (SBS)

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SBS Key Contacts

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Jacqueline Beggs	Putaiao Committee Chair j.beggs@auckland.ac.nz	Ext. 86823
Anne Gaskett	Equity Committee Chair a.gaskett@auckland.ac.nz	Ext. 89509
Dave Goldstone	Research Committee Chair d.goldstone@auckland.ac.nz	Ext. 84607
Julie Davis	Group Services Manager j.davis@auckland.ac.nz	Ext. 82008
Peter Mayne	Technical Manager p.mayne@auckland.ac.nz	Ext. 87913
Merrion Baker	Academic Services Team Leader m.baker@auckland.ac.nz	Ext. 83113
Boyd Taylor	Business Ops Manager Leigh Marine Lab boyd.taylor@auckland.ac.nz	Ext. 83602
Marlene Pillay	Group Services Coordinator hod.biologicalsciences@auckland.ac.nz	Ext.86642
YY Tan	Group Services Coordinator hod.biologicalsciences@auckland.ac.nz	Ext. 84072
Lulu Brahne	Group Services Coordinator (Research Support) l.brahne@auckland.ac.nz	Ext. 84367
Sanchaya Soundararajan	Group Services Coordinator (Rod Dunbar Lab) sanchaya.soundararajan@auckland.ac.nz	Ext. 89661
Patricia Rodriguez	Academic Services Coordinator p.rodriguez@auckland.ac.nz	Ext. 83097
Evgeniya Kruglova	Academic Services Coordinator e.kruglova@auckland.ac.nz	Ext. 85720
Rubaiyat Afroze	Group Services Administrator rubaiyat.afroze@auckland.ac.nz	Ext. 87221
Ayumi Shino	Group Services Administrator ayumi.shino@auckland.ac.nz	Ext. 82134
Gloria Hinestroza	SBS Receptionist sbs.reception@auckland.ac.nz	Ext. 87279
Lynette Carter	Facilities Coordinator l.carter@auckland.ac.nz	Ext. 85385

SBS Postgraduate Advice

AP Gavin Lear	Doctoral Advisor g.lear@auckland.ac.nz	Ext. 82573
AP Greg Holwell	Doctoral Advisor g.holwell@auckland.ac.nz	Ext. 83652

Dr Suzanne Reid	Postgraduate Sub-Doctoral Advisor	s.reid@auckland.ac.nz	Ext. 89066
AP Jane Allison	Postgraduate Advisor Bioinformatics	j.allison@auckland.ac.nz	Ext 83572
Dr Alwyn Rees	Postgraduate Advisor Marine Institute	ta.rees@auckland.ac.nz	Ext 83603
AP Bruce Burns	Postgraduate Advisor Biosecurity and Conservation	b.burns@auckland.ac.nz	Ext. 83135
AP Kerry Loomes	Bioscience Enterprise Programme Advisor and Programme Coordinator	k.loomes@auckland.ac.nz	Ext. 88372

SBS Mentors for Graduate Students

Dr Shane Lavery	Postgraduate Mentor	s.lavery@auckland.ac.nz	Ext. 83764
AP Tony Hickey	Postgraduate Mentor	a.hickey@auckland.ac.nz	Ext. 82615
Dr Karine David	Postgraduate Mentor	k.david@auckland.ac.nz	Ext. 83793

SBS Research Groups

SBS is divided into [three research groups](#):

1. Biomedical and Applied Biology (BMA)
2. Cellular, Molecular and Organismal Biology (CMO)
3. Ecology, Evolution and Behaviour (EEB)

Key Contacts:

Prof Anthony Phillips (BMA)	Academic Head	a.phillips@auckland.ac.nz Ext. 82037
Jo Dodd (BMA)	Technical Team Leader (TTL)	jr.dodd@auckland.ac.nz Ext. 88244
AP David Goldstone (CMO)	Academic Head	d.goldstone@auckland.ac.nz Ext. 84607
Keith Richards (CMO)	Technical Team Leader (TTL)	k.richards@auckland.ac.nz Ext. 87287
AP Tony Hickey (EEB)	Academic Head	a.hickey@auckland.ac.nz Ext. 82615
Bryony Smart	Technical Team Leader (TTL)	bryony.smart@auckland.ac.nz Ext. 85272

Key Health & Safety Contacts

For general queries regarding health and safety please contact your supervisor and/or a technical staff member.

Peter Mayne	Technical Manager	p.mayne@auckland.ac.nz Ext. 87913
Howard Fox	Health, Safety & Wellness Manager	howard.fox@auckland.ac.nz Ext. 88872
Tracey McGall	Health, Safety & Wellness Manager	tracey.mcgall@auckland.ac.nz Ext. 85172
Bryony Smart	Terrestrial Safety Plans	bryony.smart@auckland.ac.nz Ext. 85272
Sandra Anderson	Terrestrial Safety Plans	sh.anderson@auckland.ac.nz Ext. 85290
Peter Schlegel	Marine Field Research Safety Advice	p.schlegel@auckland.ac.nz Ext. 83988
Esther Stuck	Marine Field Research Safety Advice	e.stuck@auckland.ac.nz Ext. 83988

Emergency Numbers

[Unisafe](#) staff are on site 24/7 and will respond immediately to assist in any case of [emergency](#).

Personal safety and emergency contacts:

Emergency Services	Ambulance, Fire, Police	Dial 111
On Campus Emergency	Unisafe Security	Dial 966 (internal phone) 0800 373 7550
Unisafe City Campus	Security Office	Dial 85000
Poison Information Centre		0800 POISONS 0800 764 766

Emergency Defibrillator and EpiPen Locations:

- Thomas North Atrium Level 2 by the elevator (Defibrillator and EpiPen)
- Thomas North Atrium Level 4 by the elevator (Defibrillator and EpiPen)
- Thomas Building (110) Level 5 Room 538 (First Aid Kit with EpiPen)
- Biology Building Level 1 corner near MAC 1 (Defibrillator and EpiPen)

Health and Safety

The University's health and safety policy is available for your perusal online <https://www.auckland.ac.nz/en/health-safety-wellbeing/health-safety-topics.html>

The School of Biological Sciences Safety Manual:

Local SBS information is available on our [SharePoint site](#)

Please ensure that you have discussed the HSW requirements with your supervisor prior to accessing SBS facilities. We expect all staff and students to be collectively responsible for the health, safety and wellbeing of each other.

Fire/Emergency Evacuation Procedures

Ensure that you familiarise yourself with the location of your local fire extinguisher and blanket.

- Learn the location of your local emergency exits and assembly points. Remember to always follow the signs
- Learn the identity of your fire warden in your area.

For more information, go to <https://www.auckland.ac.nz/en/about-us/emergency-information/fire.html>

Accident/Incident Report Forms and Near Miss Register – Forms are available from your supervisor or on the [SBS Share Point Site>Health & Safety, Compliance, Biosecurity, Field Trips](#).

- You are encouraged to report and near misses to the technical team leaders (TTL) using the Near Miss register form.
- Your supervisor or HSNO laboratory manager will also have copies of the aforementioned forms.

Laboratory Users Quick Reference Guide – Available in all labs. This easy to use quick reference guide provides information on:

- Chemical and Biological decontamination
- Autoclaving
- Safe Class II Biosafety Cabinet Use
- Importing and transferring of Restricted Biologicals and GMO's

Risk Assessments and Safe Methods of Use:

[University home>Staff Intranet Home>Human Resources>Health, safety, and wellbeing, health and Safety Risk management>Chemical Safety> Safe methods of use – essential protocols](#)

Chemical Disposal information:

[University home>Staff Intranet Home>Human Resources>Health, safety, and wellbeing, health and Safety Risk management>Chemical Safety> Storage and Disposal of chemicals](#)

Material Safety Data Sheet:

[University home](#)>[Staff Intranet Home](#)>[Human Resources](#)>[Health, safety, and wellbeing, health and Safety Risk management](#)>[Chemical Safety](#)>[Chemical Safety Databases](#)

Field Trip Safety

Field trip safety information is available on page 52 of the SBS Health and Safety Manual. Risk assessments must be done before all field trips and submitted in advance for approval to sbs-field@auckland.ac.nz . All field trips must include first aid trained staff.

Additionally, all students undertaking field research are required to complete an Ecology induction. Inductions are run regularly. Contact sbs-field@auckland.ac.nz to find out when the next one is. Please note: Students must attend an induction in advance of any field work.

Field Work

- For LOW RISK field work there must be one field trip participant who is **outdoor first aid certified** for every 20 participants
- For MODERATE/HIGH RISK field work more first aiders are required – please contact sbs-field@auckland.ac.nz for further information
- **Unaccompanied Field Trip (working alone)** – If you have to conduct field research alone you MUST first gain an outdoor first aid certification.

Any queries regarding field trips are to be directed to sbs-field@auckland.ac.nz .

Technicians are available to offer technical advice and occasionally to assist with field work. A range of field equipment is also available for loan.

There is a [Field Trip Flow Chart](#) in the Field Trip Document Folder within the Health and Safety Section of [Share Point](#) which explains the process of preparing for your Field Trip.

Please read the [SBS Field Trip Guidelines](#) – a document which should be provided to you by your supervisor.

A [Risk Assessment Form \(RAM Form\)](#) and [Field Trip Intentions Form \(FTIF\)](#) must be completed before any field trip is undertaken. These are also available as template documents to download in the Field Trip Documents section of Share Point.

All Field Trip documents to be approved must be signed off by the Field Trip Leader and the Academic Field Trip Supervisor before submitting to sbs-field@auckland.ac.nz for approval.

RAM Forms must be received and approved at least 2 weeks before departure and Field Trip Intention Forms no later than the day before departure, ideally 3 days or more ahead. Any additional questions regarding information on field trips and required gear please contact sbs-field@auckland.ac.nz

First Aid Qualifications

Anyone undertaking regular fieldwork should obtain an outdoor first aid qualification. A course in terrestrial outdoor safety is available to postgraduate students in their first year. Send enquires to sbs-field@auckland.ac.nz. Field work participants are responsible for adhering to the safety protocols and should have contingency plans drawn up in their schedule.

Queries regarding access cards and keys:

SBS Reception is the main point of contact for all enquiries regarding access cards and keys.

SBS Reception
Thomas Building 110, Room 256B
sbs-reception@auckland.ac.nz
Ext: 87279

SBS Access and Containment Information

The Thomas Building (110 & 110N) in SBS is a [Containment Facility](#). In order to acquire access to this facility you will need to complete the **SBS Canvas Containment Course**. Completion of the SBS Containment Course (consists of a reading and quiz), is available on Canvas and is required prior to having your access to SBS granted and activated

SBS access card process for New Graduate Students:

1. Check that you are currently enrolled with the University.
2. Visit [AskAuckland](#) to obtain a Campus ID Card.
3. A copy of the latest SBS access card form is available from SBS Reception.
Please note: your supervisor must sign off on your request form and that the access start and end date is clearly indicated.
4. Drop off or email the completed forms to SBS Reception (SBS-reception@auckland.ac.nz).

Instructions for SBS Canvas Containment Course:

1. Enrolment into the Canvas Containment Course will be actioned by reception once the requisite forms have been received. 100% pass rate is required before your access can be processed.
2. Go to the University Home page and click on 'Staff' or 'Students' and then 'Canvas' (<https://canvas.auckland.ac.nz/>).
3. Log into Canvas using your UPI & Password.
4. Ensure you read the SBS Containment Course Parts 1 and 2 under the heading 'Readings' and the other important readings before taking the quiz.
5. You will find the 'Quiz on Reading' further down the page under 'Course Summary' or in the left hand column list 'Quizzes'.
6. Participants should set aside at least 20 minutes to complete the quiz.
7. After completing all 10 questions press the 'Submit' button and you will be advised of your score.
8. To pass, you must achieve a mark of 100%.
9. You are allowed multiple attempts until you achieve the 100% pass mark.

Keys

1. To acquire keys to rooms that you will be using, you require authorisation from either your lab manager or supervisor in charge of the space.
2. To request an office key, complete the Key Request form available from SBS Reception.
3. Submit the completed form to SBS reception for processing.
4. You will receive an email from hobson@armstrong.co.nz within about a week (please also check your junk mail) once your key is ready to be collected from UniSafe Security.
5. If your keys are lost or stolen, immediately contact Security on Ext. 85000 or (09) 923 5000 and complete a [Lost key form](#).

Access to SBS Equipment

There is a comprehensive list of equipment available for booking on the [SBS SharePoint Site>Health & Safety, Compliance, Biosecurity, Field trips](#). See the notes next to the list of equipment for details on the restrictions and consult the booking calendar for availability. Please be sure to report any damage promptly to ensure the equipment is repaired quickly.

Short Loan Laptops & Projectors

[SBS SharePoint>Equipment Bookings>Laptops & Projectors>Calendar](#)

SBS Reception holds 3 laptops and 3 projectors for short loan (<24hr) bookings by graduate students. These laptops should not to be taken off campus. Bookings are made via SBS reception directly on ext. 87279 or sbs-reception@auckland.ac.nz.

School Vehicles

SBS has five vehicles available for use by postgraduate students to conduct official university business. Official business refers to use of school vehicles for teaching or research purposes. The vehicles are not under any circumstances to be used for private purposes.

School policy dictates that vehicles are:

1. To be driven only by persons aged 21 and over with a full NZ Drivers Licence.
2. Prospective drivers must sign the School's Driver declaration form (available at reception) and provide their drivers licence so that a copy can be recorded.
3. Prior to using the vehicle you must ensure that you have an account to charge the usage to and this must be noted in the vehicle log book.
4. Be sure to make a note of the odometer mileage before you set out and record the odometer reading at the end of your booking.

For vehicle bookings, please contact SBS Reception sbs-reception@auckland.ac.nz

Meeting Room Bookings

Please ensure to **book a room far in advance of the meeting date** to allow for access and facility requirements to be met. For meeting rooms that are bookable via the Intranet you will need to make the booking at least 24 hours prior to the meeting.

SBS has seven meeting rooms bookable through SBS Reception (by [email](#) or phone ext 87279) and all other University meeting rooms are bookable via the [Intranet](#).

SBS Meeting rooms booked through SBS Reception are:

		# Seats	Whiteboard	Screen(s)	Video conference
Thomas Bldg	110-131	10	✓	✓	✓
Thomas Bldg	110-143	10	✓	✓	✓
Thomas Bldg	110-263	Tea room		✓	
Thomas Bldg	110-280	12	✓	✓	
Thomas Bldg	110-278	8	✓	✓	
Thomas Bldg	110-406	10	✓	✓	✓
Thomas Bldg	110-448	10	✓	✓	✓
Thomas North Bldg	110N-2004	12	✓	✓	✓

Stationery

General office and lab stationery items are available for staff and postgraduates from SBS Reception.

Printing allocation

All PhD students are eligible for unlimited printing while studying. This allocation is managed via SBS Reception. This is based on an estimated usage amount so if you are unable to print, please contact SBS reception in the first instance.

Travel

[University home>FOR>Current students>Student life>Travelling overseas for University activities](#)

If you get an opportunity to travel overseas to an activity related to your study, you will need to understand the University [travel policy](#) and guidelines.

Travel and Expense Claims

Some expenses may be reimbursed through your supervisor's account (see PRESS Account below).

If your supervisor has advised you to put in a claim, consult the School's Finance team. You must provide a GST receipt for audit purposes, and your student ID number. A mileage allowance for travel by car may be claimed. If you make a claim for mileage,

petrol expenses may not be claimed as well. Allow at least two weeks before initiating enquiries about the whereabouts of your reimbursement – it takes about that length of time to process claims.

How to book flights:

1. Fill in the “SBS Travel form – for PG Students” located on [SBS Sharepoint>General SBS Documents and Forms SBS Travel approval form and Travel Quick Guide](#).
2. Contact the university’s travel agent, Orbit travel.uoa@orbit.co.nz for flight, accommodation, or rental quotes.
3. Once you have confirmed your itinerary with Orbit, email one of the [Group Service Administrators](#) a copy of your SBS Travel form for the record.

Postgraduate Clubs and Associations

[University home>FOR>Current Students>Postgraduate students>Postgraduate clubs and associations](#) AUSA www.ausa.org.nz

- **FMHS PGSA** (Faculty of Medical and Health Sciences Postgraduate Students’ Association) <https://www.fmhs.auckland.ac.nz/en/faculty/pgsa.html>
- **Chiasma Club** <https://flexiblelearning.auckland.ac.nz/medsci205/24.html>
- **Faculty of Science Postgraduate Society** email: fos-res-fellows@auckland.ac.nz
- Information on **application closing dates** for all Semesters and Late Year can be found at <https://www.auckland.ac.nz/en/for/future-postgraduates/fp-important-dates.html>
- The **Postgraduate Staff Student Consultative Committee Meetings** are held twice a semester and consists of representation postgraduate programmes. Request for volunteers will be done during the first 3 weeks of each semester.
- **BioGrad** - Postgrad Student Organisation for the School of Biology.
We aim to:
 - Provide a platform of social support for postgraduate students in SBS to increase student well-being, develop professional collaboration, and foster personal relationships.
 - Increase postgraduate representation by communicating with faculty and administration across the school.
 - Host professional development workshops and events for postgraduate students.
 - Give back to the community through service events and public science outreach.
 - Connect postgraduate students in biology with undergraduates interested in research to create mentorship and generate undergraduate research opportunities.Website link: www.biograd.ac.nz
- We are also on Twitter (@bio_grad) and Facebook! Follow and join to keep up to date on events and workshops!"

Staff Service Centre (SSC)

The Staff Service Centre is the point of contacts for assistance with various University questions. Contact the Staff Service Centre at extension 86000 or submit an online ticket through the Staff Intranet Home Page.

Auckland Science Analytical Services

The Auckland Genomics Centre has a number of services and instruments that can be booked online using iLab Solutions website; this is at <http://asas-centres.ilabsolutions.com>. Please note that your PI's approval is required for initial setup of your iLab access within their lab group, and may be required for approval of costs charged.

SBS Seminar Series

The School of Biological Sciences hosts a dynamic weekly research seminar program, with seminars generally **every Monday from 1-2pm in the MAC1 seminar room, Biology Building 106**. Seminars cover a wide range of research topics across (and sometimes beyond!) ecology, evolution and behaviour, cellular, molecular and organismal biology, and biomedical and applied biology, as well as presenting research innovation in higher education learning and teaching. We host speakers from across New Zealand and Eastern Australia, and welcome suggestions for excellent speakers who can present broadly applicable research findings suitable for a diverse audience of biologists.

For any further information, or to suggest a speaker, please contact one of the seminar coordinators: Dr Kim Handley: kim.handley@auckland.ac.nz

Dr Augusto Barbosa: a.barbosa@auckland.ac.nz

Dr Nobuto Takeuchi: nobuto.takeuchi@auckland.ac.nz

Postgraduate Course Structure

Most postgraduate courses in the School of Biological Sciences are run as a series of seminars. During these seminars, you will probably spend a good deal of time discussing the reading you've done on an assigned topic and will be asked to present a seminar.

A **seminar on presentation skills** will be held for SBS students on the second Wednesday of semester. In 2021 this will be at **4pm Wednesday 10 March**, in Mac 1.

For resources and workshops for presentation skills, please visit:

<http://www.library.auckland.ac.nz/services/student-learning/postgraduate>

University of Auckland's Library Student Learning Services offers Postgraduates information on where to find resources and workshops.

Seminar structure

Give the structure of your seminar careful consideration. It must be a compelling narrative. Start with a brief introduction to the topic that gets everyone in the audience primed. The introduction also has to establish relevance and generate excitement. Explain the aims of your research by clearly presenting the questions you are trying to answer. Then talk briefly about the key elements of your experimental approach, explaining the rationales for your strategy. Present the key results in a concise manner. Give the punch lines and stay away from technical details. Finally, discuss your results with a wider perspective, point out their importance, and how this research could be developed further.

Content

You must adhere to the time allocated. The chairperson has the right to cut you off when your time is up. Hence, you must consider very carefully how much you pack into your talk. The key is to select what is really important and essential to drive your message home.

Visuals

Graphics support your seminar in more than one way. Seeing is believing. If you can visualise biological phenomena with schemes and pictures, the audience will understand faster and are more likely to believe you. Pictures show graphically what you would otherwise have to describe using lots of words. Furthermore, they give you as the speaker a very helpful guide through the sequence of your talk. However, carefully consider this: the best visuals are the punchy ones i.e. they have a single clear message. Hence, keep slides simple, do not overload them. Any text should be read easily from the back of the room. PowerPoint runs on both Mac and PC and is easy to use. PCs are used on seminar days so check for any changes if you have prepared your presentation on a Mac computer.

Speech

Do not read your talk from notes. Have eye contact with the audience, and try to move around a bit. Radiate enthusiasm. At all times evaluate whether the audience is with you. If you seem to have lost them, you can repeat a few key points to bring them up to speed again.

Question Time

Leave some time for questions at the end of your talk. Try to answer the questions yourself and don't look to your supervisor for help. You can safely assume that you are the expert in the room, therefore answer or speculate with confidence.

Trial Run

Have at least one trial run with your supervisor or members of your research lab.

Feedback

Expect to receive feedback.

Programme Information

Supervision Approval Form

Final approval from PG advisor for admission to BSc (Hons), MSc in the School of Biological Sciences requires completion of the form for supervisors. Students wishing to enrol in BIOSCI 761 for PGDipSci must also complete the form for supervision of their thesis proposal. The form is available at the following link:

For Future Students:

[University home>Faculty of Science>School of Biological Sciences>FOR>Future postgraduates](#)

For Current Students:

[University home>Faculty of Science>School of Biological Sciences>FOR>Current students Confirmation of Research Topic and Supervision](#)

Post Graduate Diploma (PGDipSci)

SBS offers the following PGDip programmes:

1. **Biological Sciences (BIOSCI)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/biological-sciences-pg.html>
2. **Bioinformatics (BIOINF)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/bioinformatics-pg.html>
3. **Biotechnology (BIOTECH)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/biotechnology.html>
4. **Biosecurity and Conservation (BIOSEC)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/biosecurity.html>
5. **Bioscience Enterprise (BIOENT)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/bioscience-enterprise.html>

For the PGDip, students must take courses worth 120 points, at least 90 points of which must be from the prescribed schedule outlined at the above links.

The total enrolment for the PGDipSci must not exceed 160 points.

Students who are looking to proceed to the MSc programme on completion of their PGDipSci must enrol in the BIOSCI 761 as part of their PGDipSci. They must have the requisite grades* and identified a thesis research topic in consultation with a member of the academic staff who has agreed to supervise the MSc project.

*Grades averaging B- or better in at least 90 points in the 700-level courses taken for the PGDipSci.

BIOSCI 761 Thesis Proposal

BIOSCI 761 is offered in both Semester One and Semester Two therefore confirmation of the research topic and supervision may be deferred until the start of the second Semester of the student's PGDipSci.

Enrolments in this course require completion of the [confirmation of research topic and supervision form](#).

Thesis proposal presentations are scheduled on the Friday of the second week of mid-semester break:

Friday 16 April 2021 (Semester 1) and Friday 10 September 2021 (Semester 2)

BSc (Hons)

[University home](#)>[University calendar](#)>[Programme regulations](#)>[Science](#)>[The Degree of Bachelor of Science \(Honours\) – BSc \(Hons\)](#)

SBS offers the following Honours programmes:

1. **Biological Sciences (BIOSCI)** <https://www.auckland.ac.nz/en/study/study-options/find-a-study-option/biological-sciences/postgraduate.html>
2. **Bioinformatics (BIOINF)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/bioinformatics-pg.html>
3. **Biotechnology (BIOTECH)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/biotechnology.html>

[University home](#)>[Faculty of Science](#)>[School of Biological Sciences](#)>[FOR](#)>[Future postgraduates](#)>[Postgraduate study options](#)>[Planning a postgraduate programme](#)>[Bachelors \(Honours\) postgraduate degrees](#)

Students should commence their dissertation project at the start of Semester 1. Supervisors should make every effort to ensure that the project is organised and defined at the end of Semester II of the previous year.

For **laboratory-based work**, supervisors should have carried out preliminary work on the topic to ensure that it is feasible to complete the project within the time available.

For **field-based projects** it may be essential for the student to initiate some preliminary work as soon as their Stage III examinations are completed, or over the summer vacation period.

It may also be possible for students to acquire a knowledge of the experimental techniques to be used in their projects by working in the laboratory over the summer vacation.

MSc

SBS offers the following MSc programmes:

1. **Biological Sciences (BIOSCI)** <https://www.auckland.ac.nz/en/study/study-options/find-a-study-option/biological-sciences/postgraduate.html>
2. **Bioinformatics (BIOINF)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/bioinformatics-pg.html>
3. **Biotechnology (BIOTECH)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/biotechnology.html>
4. **Biosecurity and Conservation (BIOSEC)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/biosecurity.html>
5. **Bioscience Enterprise (BIOENT)**
<http://www.science.auckland.ac.nz/en/about/subjects-and-specialisations/pg-subjects/bioscience-enterprise.html>

The MSc Thesis Proposal (BIOSCI 761) is a prerequisite for MSC in addition to obtaining supervisor sign off on an agreed project.

<https://www.auckland.ac.nz/study-options/programmes/postgraduate/7075/master-of-science-msc>

Enrolment in the 120 point MSc must commence on 1 December, 1 March or 15 July and may be a mixture of part-time and full-time enrolment. (See [Confirmation of research topic and supervision form](#)).

Mid-Year Progress Report

It is University policy that each MSc student enrolled in a thesis must provide an annual progress report. The report must be approved by the student's main supervisor before submission and will be reviewed by the SBS PG Advisor. Students will receive notification and a template to use approximately 4 weeks before the mid-term report is due.

Supervision

[University home](#)>[FOR](#)>[Current students](#)>[Postgraduate policies, guidelines and forms](#)>[Supervision](#)

Finding a Supervisor (excluding Bioscience Enterprise programme)

Before your enrolment/admission can be approved, you will be required to have identified a research topic and to have come to an agreement with an academic staff member about supervision of your thesis/dissertation or BIOSCI 761/762 projects. In areas where there is a wider choice of courses or where field work is involved, the advice of potential supervisors should be sought at an early stage. Students are encouraged to consider as wide a range of options as possible, and to consult a number of staff before reaching a final decision.

The form is available at the following link:

For Future Students:

[University home](#)>[Faculty of Science](#)>[School of Biological Sciences](#)>[FOR](#)>[Future postgraduates](#)

For Current Students:

[University home](#)>[Faculty of Science](#)>[School of Biological Sciences](#)>[FOR](#)>[Current students Confirmation of Research Topic and Supervision](#)

Postgraduate research topics are listed on the SBS website:

<http://www.sbs.auckland.ac.nz/en/about/our-research.html>

SBS staff research interests and contacts:

<http://www.sbs.auckland.ac.nz/en/about/our-research/research-sections.html>

Staff at the Joint Graduate Schools:

<http://www.plantandfood.auckland.ac.nz/en.html>

<http://www.coastalandmarine.auckland.ac.nz/en.html>

<http://www.biodiversity-biosecurity.auckland.ac.nz/en.html>

<http://www.dairy.auckland.ac.nz/en.html>

You are welcome to initiate discussion with potential supervisors on possible research projects in your area of interest, by emailing or phoning them to set up an initial appointment.

If you would like to have a preliminary discussion regarding your MSc contact Postgraduate Coordinator Dr Suzanne Reid (s.reid@auckland.ac.nz) to make an appointment.

The student/supervisor relationship will be different for each student, but you do have common rights and expectations. Your supervisor is there to give you direction and to help you with problems. He or she has been doing research for some time and is a valuable source of information for someone who is starting out. You should have a clear and mutual understanding of the areas of the research in which the supervisor will undertake responsibility.

Making the most of a Supervision Meeting

Before the Meeting:

Submit any work you want feedback about to your supervisor so she/he has plenty of time to read it.

Review your notes and records from your last meeting which will help you evaluate the progress you have made.

Identify any problems/difficulties you are having.

Decide what you want from the meeting and prepare an agenda with your questions and concerns.

Agenda Setting:

Let your supervisor know what you want from the meeting; your supervisor may have other things to add to the list. Know the things that are the most important for you to clarify (the matters that will hold you up if you leave without answers).

The agenda might include:

- Progress since last meeting (a must!).
- Current problems: e.g. lab work; location of resources; feedback received or needed; general problems and difficulties; renegotiation of working arrangements.
- Ideas you want to explore.
- Goal setting: what you want to achieve by the next meeting (a must!).
- Evaluation of overall progress.
- A date for the next meeting (a must!).

Work through the Agenda:

Say when you don't understand.

Don't be afraid to ask questions.

Explore alternatives; use problem-solving strategies.

References suggested; new understandings etc.

Keep a copy for yourself; send a copy to your supervisor(s).

Getting Feedback:

At different times, you will need critical feedback about your work, such as:

- Ideas
- Methods
- Interpretation of the literature
- Experimental / field work
- Written work
- Overall progress

Supervisors have a responsibility to provide you with constructive feedback. There are three basic questions you should be asking your supervisor:

- What are the strengths in my work?
- What are the weaknesses?
- What do I need to do to improve my work

Other suggestions:

When you hand in written work, attach a cover-sheet cueing the supervisor to the "state" of the work and also ask for any particular feedback you require (e.g. this is first draft. Is the argument logical? Does the introductory paragraph work?)

- Have I explained x clearly enough? Have I covered the field?

- Give your supervisor time to read your work.
- Develop skills of self-assessment.
- Ask your peers for feedback.
- Be open-minded to criticism.

Submission date for theses will depend on actual enrolment date and whether you are in full time, part time or a mix of full and part time study. If you are granted an extension of time to submit your thesis you will not necessarily be granted continued eligibility for the award of Honours. Each request is considered by the SBS Postgraduate Coordinator and the Associate Dean of Science (Postgraduate) on a case-by-case basis.

3-Minute Thesis Competition

The [3 Minute Thesis Competition](#) gives you three minutes to explain your thesis with the help of one single static PowerPoint slide as a visual aid.

SBS Showcase

SBS holds an annual showcase to celebrate our research and teaching, usually in late October. It is expected that all PhD students will attend this event; the date is confirmed at least six months in advance and is circulated by email.

All first year PhD students (typically defined as having begun their PhD in the year since the last Showcase) are *required* to give a short (2-minute) talk outlining their research. All third year PhD students (typically defined as being in the third year of their PhD on the day of the Showcase) are *required* to present a poster. All other PhD students are welcome to present a poster if they wish. There will be prizes for the best talks and posters.

This is an excellent opportunity to learn about the different research and teaching going on in the School, and to get practice presenting your research to a broad scientific audience, as well as get to know other students and staff in the School.

Faculty of Science Postgraduate Poster Competition

All students who are currently enrolled in postgraduate research (Honours, Masters and PhD) in Science may enter the FoS Postgraduate Poster Competition, usually held in September. Check the web link: [Faculty of Science>Current students>Postgraduate>](#) for information on the [Faculty Postgraduate Research Showcase](#).

Previously prizes included \$500 for first, \$300 for second and a third prize of \$100. The best 20 posters from Science will be entered into the School of Graduate Research Showcase and will be eligible to win further prizes.

Additional information on how to present posters, including workshops, will be available in advance of the competition. This is a great way to present your academic research effectively and prepare to show case it in other venues including conferences.

Please contact the School of Biological Sciences coordinator Suzanne Reid s.reid@auckland.ac.nz for more information.

Extension

The extension of time does not normally exceed four months and does incur additional fees. They are charged at the rate of 10 points per 2-month enrolment. To apply, you will need to complete an [Application for Senate Approval of Extension of Time \(AS-503\)](https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/forms-for-students.html) online at <https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/forms-for-students.html>. If you are not able to work on your research in any capacity, you should apply for [suspension \(AS-502\)](#) at the above website. It does not normally exceed one year and incur additional fees. Please provide the following documents as extension/suspension is only permitted in exceptional circumstances beyond the student's control:

- An explanation letter, including the reasons for extension/suspension and how it is affecting the research completion, a timeline to submission, as approved by the supervisor, to establish what is completed and what work remains;
- An independent evidence in support of your application such as Medical/Counsellor's Certificate (*up-to-date, dates of sickness/surgery and expected recovery period*), Death Certificate, communications among the involved parties relating to possible delays and technical problems related to a specific situation etc.;
- A supervisor's letter of support, confirming the details outlined in an explanation letter.

Please remember you need to supply all proper evidence to avoid delays.

Thesis Submission

Submission of Masters Thesis

Students who are completing a Research Masters (90 point or 120 point) are required to submit their thesis for examination:

- **Start date 1 March – submit by 4pm 28 February following year**
- **Start date 15 July – submit by 4pm 14 July following year**
- **Start date 1 December – submit by 4pm 30 November following year**

For students who are studying part time for the entire period of study, due date is 24 months after the start date. For students who are mixed full time part time students, please contact Department or Faculty for your due date if unsure of due date.

For students who have already had an extension or suspension, submission date will be specific to the length of the extension or suspension, and they will have been notified at the time of the extension or suspension being granted. Student should contact the Department or Faculty if unsure of due date.

If due date falls on the weekend, then the student has until the following Monday 4pm to submit their thesis. Students must submit the following to the Faculty of Science Student Resource Centre (301-G402) for examination purposes:

- **One soft-bound** (spiral) copy of your thesis
- An electronic PDF copy of your thesis (this may be submitted via USB device, CD or emailed to sciencemasters@auckland.ac.nz)

The following must be submitted to the **Faculty of Science Student Resource Centre** (301-G402) at the completion of the examination of your thesis and you will be informed by email when you need to do this:

- 1 hard bound final copy of your thesis
- Printed email receipt from thesis submission to Research Space (<https://researchspace.auckland.ac.nz>)

ALL Tuition Fees must be cleared prior to submitting and your thesis will not be examined until these have been paid in full. If the student will not be able to make the above deadlines, please discuss the option of applying for an extension either with your supervisor, your department or the Faculty.

Thesis Examination Process

Once you have submitted your thesis to the Faculty of Science Student Resource Centre, the examination process will likely take two to three months. Every endeavour will be made to ensure that the examination is completed in time for the next graduation but, due to factors outside our control, the examination process can extend this timeframe.

Master of Science/Master of Bioscience Enterprise Grading System

If you have any queries about the examination process, please contact your Faculty Student Centre email: sciencemasters@auckland.ac.nz with the subject heading: MSC EXAM PROCESS, including your ID number. For general guidelines on the presentation of your thesis, please refer to the [Guide to Thesis and Dissertations](#) for information on how to format your thesis correctly.

For general regulations on Masters, BSc (Hons), and PGDipSci degrees, please visit the University Calendar and go to: [Academic and general statues and regulations>General Postgraduate Regulations](#)

Copying/Binding reimbursement

You may use your supervisor printing allocation to print and bind one soft copy of your MSc thesis for examining. A digital copy is also required.

For binding, most of the information you require will be found in the booklet "A Guide to Theses and Dissertations". You can have your thesis bound at the University Bindery (leave your thesis for binding at the Serials Unit, General Library, between 8.30am and 5pm, Monday to Friday).

Please use the website: <http://www.library.auckland.ac.nz/bindery>.

The University bindery charges and the bindery authorisation form are detailed on their website and a copy of the authorisation form is below.

Final turn in of your thesis or dissertation

Upon successful completion of defence or submission of thesis, students should tidy their lab and desk space. Make sure your supervisor can locate important samples and reagents that you may have generated. Clean your refrigerator or freezer space and return any equipment in clean condition to the appropriate technician. Return your access card to Reception and obtain a Key Return Form to turn in your keys to the University Key Controller 24 Symonds Street, Building 409.

MSc & BSc(Hons) Publication Fund

DEADLINE FOR SUBMISSIONS: Applications considered at any time.

SBS will make \$500 payments to eligible MSc/BSc Hons students to encourage publication of their work. Students who have received an SBS writing stipend are **not** eligible for this payment. There are 4 requirements:

1. That submission of a paper to a refereed scientific journal is within 6 months of the student submitting their MSc/BSc Hons thesis/dissertation.
2. That the student had a major role in *writing* the manuscript (indicated by a key authorship position e.g. first author).
3. That the student was enrolled as a student in SBS, University of Auckland.
4. That at least one co-author is a staff member at SBS (this includes Joint Graduate School co-appointees).

Applications can be emailed to [Dave Goldstone](mailto:dave.goldstone@uak.ac.nz) at any time, detailing how you meet the criteria and accompanied by the notification/receipt of paper from the journal.

Doctoral Forms and Processes

Please contact Patricia Rodriguez (p.rodriquez@auckland.ac.nz) for information about all doctoral forms and processes. All completed forms should be sent to her for processing after you have obtained your supervisor's signature.

1. Postgraduate Research Student Support (PReSS Accounts)

The PReSS Account provides funding for doctoral students to support their research and enable them to complete in a timely manner.

PReSS account funding is available to currently enrolled doctoral candidates, regardless of whether they are international or domestic, or whether they are working on campus or off.

The PReSS funding for SBS is \$2,900 per annum for a full-time candidate, and will be pro-rated for part-time candidates. Funds are lodged at the Research Office. (Only \$1200 yearly can be allotted to conference travel.)

Only direct research costs are covered by PReSS Account funding, please see below link for guidelines.

<https://pressaccount>

Please contact our SBS Financial Administrator, Ken Manikam, k.manikam@auckland.ac.nz for instructions on how to access PReSS account funds.

2. Provisional Year Review (PYR) (held at the end of the first year)

As part of the PhD programme, a progress review (**PYR Provisional Year Review**) is due at the end of your first enrolment year e.g. if PhD starts in February 2018, PYR will be in February 2019. This is on the candidate's **registration summary**. Candidates will be also contacted approximately 6 to 8 weeks before the PYR is due with instructions on the process.

[Provisional Year Review process](#)

<http://www.auckland.ac.nz/uoa/cs-pg-doctoral-forms>

Please make sure to leave the **last week of the month** of your PYR is due free for this requirement.

The review will result in either full registration being granted, an extension of provisional status for a fixed time, or departure from the PhD programme.

The Provisional Year Review consists of an oral presentation, submission of the full thesis proposal, and an interview with the postgraduate provisional year review committee.

- The candidate will make an oral presentation (20 minutes).
- General questions (5 minutes).

(Other people i.e. lab group are welcome to attend presentations and general questions. Please note: PYR room seats maximum 20.)

- Panel interview (20 minutes) (Only Review Committee & candidate. Supervisors have the opportunity to attend.)
- Panel meet with student only (5 minutes)
- Panel meet with supervisors only (5 minutes)

Candidates must provide a copy of the full Research Proposal, Doctoral Candidate Needs Analysis and the PYR form. <https://provisional-year-review-full-thesis-proposal>

3. Doctoral annual reports

This report shows the candidate's progress every year after the PYR.

<https://doctoral-annual-report>

4. Suspensions, absences, extensions, change to part time/full time, changes of title, registration date or department and termination.

All of these are applied for on a **DOC6 form**. (In 2020 the University is moving to an online process for management of these administrative aspects of the PhD.)

<https://application-registration.html>

Candidates who need to be away from the campus for more than one month, but no more than one year, must apply for an absence before they leave the University (see [Doctoral Candidates - Periods of Temporary Absence Policy and Procedures](#)).

5. University of Auckland Doctoral Scholarship Extensions

If you hold a University of Auckland Doctoral Scholarship or you have been receiving external funding, you may be eligible to apply for a University of Auckland Doctoral Scholarship Extension.

This Extension is for up to 6 months and is paid at the same rate as a University of Auckland Doctoral Scholarship, i.e. \$28,200 p.a in 2020 stipend plus full fees and international health insurance, if applicable.

You can apply from around 3 months before the end date of your current funding. Please read the University of Auckland Doctoral Extension Guidelines below to determine your eligibility and the category you should apply under.

Endorsements of your progress and date and timeline to submission of your thesis will be required from both your supervisor and your Head of Department.

Applications for extensions can be made by visiting [University of Auckland Doctoral Scholarship Extension](#).

6. Thesis presentation

A detailed guide to the production and submission of a PhD thesis can be found in the University of Auckland "Guide to Theses and Dissertations"

<https://thesis-and-dissertations.html>

Candidates may choose to write their thesis with published or unpublished research papers as chapters. The candidate must be the "lead author" of these and have made a contribution of 65% or more to each. These papers must be accompanied by an introductory chapter and a concluding discussion. The abstract and key words of each paper should not be included as part of a thesis chapter. Each chapter should also not have an individual reference list. There should be only one reference list, placed at the end of the thesis. Full details are in the "Guide to Theses and Dissertations" and in Policy and Procedures and Guidelines for Including Publications in a Thesis.

<https://undertaking-your-research/including-thesis-guidelines.html>

<https://www.undertaking-your-research/including-thesis.html>

Template:

FULL THESIS RESEARCH PROPOSAL

The proposal should be no longer than ~5 (**five**) pages, excluding references, and should include the following:

- **Candidate's name & UoA ID number**
- **Thesis title**
- **Names of Main Supervisor & Co-Supervisor/s**
- **Background** (briefly indicate what you propose to do and state in what way your contribution will be significant and original)
- **Aims and objectives** (clearly specify the purpose of the research, indicating the main hypotheses)
- **Research Design** (Which data is required? What major methods or procedures will be used to collect and analyse the data?)
- **Ethical approvals** (are these required? If so, have they been applied for and obtained?)
- **Resources** (What resources will be required? (eg facilities, funding, travel) and what is their source/availability)
- **Potential problems** (do you foresee any potential problems in relation to your research project? If yes, have alternative plans been formulated?)
- **Revised timeline of research** (briefly give as detailed a timeline as possible for the research and thesis writing, with view to completion in 3 to 4 years).
- **References**

Signatures required:

Candidate _____

Main Supervisor _____

Please indicate if the proposal is to be treated confidentially (tick). Yes ___ No ___

Co-Supervisor/s _____ (Advisors need not sign)

SBS Graduate Committee _____

Example:

THE UNIVERSITY OF AUCKLAND
SCHOOL OF BIOLOGICAL SCIENCES

FULL THESIS RESEARCH PROPOSAL**Candidate's name & UoA ID number:****Thesis title:****Names of Main Supervisor & Co-Supervisors:****Background:**

Wood, also known as secondary xylem, is derived from the vascular cambium during secondary growth and is commonly classified into two groups: softwoods from gymnosperms and hardwoods from angiosperms (Butterfield and Meylan, 1980; Evert, 2006). Softwoods, such as *P. radiata*, are formed mostly of tracheids which are elongated cells with tapered closed ends and have both primary and secondary cell walls. The primary cell wall is formed during cell division, and the secondary cell wall is laid down on top of the primary cell wall after cell enlargement has been completed. The secondary cell wall is composed of three distinct layers, which are usually designated as S1, S2 and S3. Hardwoods are more complex than softwoods and contain mostly xylem vessels and xylem fibres (Butterfield and Meylan, 1980).

During the growth of trees, reaction wood develops as a result of physical stress that causes stems or branches to move from the preferred growth orientation. In gymnosperms, reaction wood develops on the lower side of an inclined stem or branch, and is called compression wood. The wood that grows on the opposite side of the stem to compression wood is called opposite wood (Timell, 1986).

Compression wood is important not only to the tree but also commercially as it lowers the quality of the timber. On drying, compression wood shrinks more than normal wood, which causes warping and other distortions in structural timber. Also, the hardness and brittleness of compression wood makes it difficult to work with using ordinary tools (Harris, 1977; Timell, 1986; Donaldson and Turner, 2001).

Typical anatomical features of severe compression wood are rounder, shorter and thicker-walled tracheids, wide intercellular spaces, helical grooves on the inside of the S2 wall layer, a highly lignified outer S2 wall layer, as well as a thicker S1 wall layer and the absence of the S3 wall layer (Timell, 1986). Cell walls of compression wood tracheids also differ chemically from those of opposite wood tracheids. Compression wood tracheid walls contain more lignin and (1→4)-β-galactan, but less cellulose and galactoglucomannan than tracheid walls of opposite wood (Timell, 1986). The structure of the lignins in compression wood and opposite wood are different, *p*-hydroxyphenyl units (H-units) are found only in compression wood lignin (Brennan et al., 2012). The presence of (1→4)-β-galactan in the outer S2 wall layer of severe compression wood can contribute almost 10% of the cell wall materials. However, small amounts of (1→4)-β-galactan also occur in the primary walls of tracheids in both compression wood and opposite wood (Yeh et al., 2006; Altaner et al., 2010).

All gradations of compression wood occur between severe compression wood and opposite wood. The first feature to occur in the mildest forms is the reduced lignification of the middle lamella and an increased lignification of the outer S2 wall layer, occurring

first in the cell corners. Yumoto et al. (1983) classified compression wood of *Picea glauca* into six grades based on the anatomical features of the compression wood tracheids described above. Donaldson et al. (2004) and Nanayakkara et al. (2009) classified compression wood as mild and severe, based on a number of the anatomical features of the tracheids described above. However, these grading methods can be quite subjective and not all the anatomical features change consistently at different levels of compression wood severity. For example, intercellular spaces can occur in both mild and severe compression wood.

Often, the presence of compression wood, especially mild forms can be very difficult to detect in a tree. Considerable amounts of compression wood have been found in straight growing trees, because wind or slope of the land can alter the optimum position of a tree stem and induce compression wood formation (Burdon, 1975; Altaner et al., 2009). Mild compression wood may be distributed throughout a growth ring and not just restricted to the underside of the leaning stem, and it may also be present in the vertical part of the trunk (Harris, 1977; Xu et al., 2008). The unpredictability of the presence of compression wood requires its detection in wood industries in order to improve timber quality. There is a need to find a method to accurately detect the presence of compression woods and measure their severity.

Several visual detection methods have been developed based on the appearance of compression wood. Severe compression wood can sometimes be visually detected on transverse surfaces of stems by its darker colour, wider growth ring and the eccentric growth of the stem on the compression wood side (Pillow, 1941; Butterfield and Meylan, 1980). However, visual detection is unreliable and is not applicable to mild compression wood. The colour of compression wood is different among species and many exceptions to this colour trend have been reported (Yumoto and Ishida, 1982; Timell, 1986). Also the different appearance and properties of earlywood and latewood make the visual detection more difficult. Furthermore, the surfaces, thickness, moisture and resin content of the sample are critical when using this method. Therefore, visual methods can only be used as a guide to locate severe compression wood in the stem and microscopic studies have to be done to precisely detect and classify compression wood based on anatomical features, particularly the pattern of lignin distribution.

Other detection methods have been developed based on differences in chemical composition and distribution of cell wall polysaccharides in compression wood and opposite wood. Altaner et al. (2010) specifically located the (1→4)-β-galactan in severe compression wood cell walls of *Pinus radiata* (radiata pine), *Picea sitchensis* (Sitka spruce) and *Picea abies* (Norway spruce) using immunogold labelling with the monoclonal antibody LM5, which binds specifically to (1→4)-β-galactans. More recently Brennan et al. (2012) determined the monosaccharide compositions of the cell wall polysaccharides and showed that compression wood of radiata pine saplings had tracheids cell walls that contained much higher proportions of galactosyl residues than did normal wood. The distribution and concentration of (1→4)-β-galactan in the cell-walls might be used as an important factor to assist in creating a new grading system for compression wood severity.

Aims and objectives

The overall aim is to detect the presence and determine the distribution of compression wood, both mild and severe, in the stems of 2-year-old clonal *P. radiata* trees that have been slightly tilted (<10 degrees). My specific objectives are as follows:

1. To determine whether the ability to form mild and severe compression wood differs among clones of *P. radiata* trees.
2. To determine if it is feasible to locate mild and severe compression wood using colour in transverse discs of these tree stems.

3. To grade compression wood severity microscopically based on lignin distribution.
4. To attempt to map mild and severe compression woods in transverse sections of the stems by immunolabelling the (1→4)- β -galactan with LM 5.
5. To determine the monosaccharide compositions and lignin content of compression woods of different severities to determine if there is a relationship between compression wood severity and the concentrations of glycosyl residues and/or lignin.
6. Use infrared spectroscopy to predict the lignin content and the monosaccharide composition of wood cell-wall polysaccharides in milled compression wood of different severities and in milled stem segments of the trees.

Research Design

Material

The research will be carried on sapling trees (<2 years old) of *P. radiata* harvested in June 2013. The trees were planted in September, 2011 in the field station of the University of Canterbury, Christchurch, New Zealand. There are eight clones of *P. radiata* involved. The trees have been leaned by staking at <10 degrees from the vertical in February, 2012.

Experimental design

Part A. Studies on compression wood using discs and transverse sections

1. Transverse discs of whole stems (~ 3 mm thick) will be cut, wetted and placed over a bright light in an attempt to identify different coloured regions that correspond to severe and mild compression wood. This will be documented by taking photographs of the wet discs using a digital camera. Pith eccentricity and the width of growth rings will be measured to aid the detection of compression wood. The percentage of compression wood area in the discs will be determined using an image analysis programme.
2. Attempt to detect the distribution of (1→4)- β -galactan in transverse sections of whole stems (~ 30 μ m) by immunolabelling using monoclonal antibody LM 5 and determine if this result can be used as a marker to classify compression wood severity.
3. Transverse sections (~ 20 μ m) will be cut from the discs and examined using fluorescence microscopy with UV radiation or blue light to determine the distribution of lignin which is autofluorescent. Some samples will be examined in great detail using confocal microscopy. A grading system will be created based on the anatomical features, particularly the distribution of lignins. The compression woods of different severities will be isolated for further experiments.
4. Determine the monosaccharide compositions of selected mild and severe compression wood in Step 3 by hydrolysing the polysaccharides using 2 M trifluoroacetic acid (TFA) (Albersheim et al., 1967), then separating and quantifying the released monosaccharides using high-performance anion exchange chromatography with pulsed amperometric detection (HPAEC-PAD) (Brennan et al., 2012). The 2M TFA hydrolysis method will be convenient and feasible to use because only a small amount of sample (~ 2 mg) is required.
5. Predict the monosaccharide compositions of the cell wall polysaccharides and lignin contents from small amounts (~ 2 mg) of severe and mild compression woods from selected areas in Step 3 using attenuated total reflectance (ATR) - Fourier transform infrared spectroscopy (FTIR).

Part B. Studies on compression wood in milled stem segments

Apply ATR-FTIR and near-infrared (NIR) spectroscopies to milled wood stem segments from the leaned side and the opposite side of all 8 different clones to predict the lignin content and monosaccharide compositions of wood cell-wall polysaccharides. This will be done using a statistical model that has been developed by a current PhD student using ATR-FTIR and NIR spectroscopies applied to wood samples of known chemical compositions.

Ethical approvals

There are no ethical approvals required for this project.

Resources

All the resources necessary for the project are available.

Potential problems

None are envisaged.

Revised timeline of research

Dates from-to

1. Completion of mandatory PhD goals- DELNA test, Doctoral Skills Induction Programme, presentation to the Department, submission of a literature review suitable for inclusion in chapter 1 of thesis.
2. Travel to Rotorua to meet experts in the field from Scion to discuss the project and learn microscopy and discuss experimental techniques.
3. Travel to The University of Canterbury, Christchurch to source a set of wood samples containing different degrees of compression woods.
4. Develop a technique to view and photograph discs of wood by transmitted light.
5. Develop the method to determine the distribution of (1→4)- β -galactan in the cell walls of transverse sections (~ 30 μ m) of the stems by immunolabelling using the specific monoclonal antibody LM 5.
6. Determine the distribution of lignin in the selected compression woods using fluorescence microscopy. High quality images will be obtained using confocal microscopy.
7. Create a grading system of compression wood severity based on the anatomical features, particularly the distribution of lignin.

Dates from - to

1. Determine the monosaccharide compositions of the cell wall polysaccharides of selected mild and severe compression woods from the discs or transverse sections by 2 M TFA hydrolysis and HPAEC-PAD.
2. Relate the anatomical features to the chemical compositions of the cell walls of compression woods of different severities.
3. Predict the monosaccharide compositions and lignin contents of selected mild and severe compression wood from the discs using ATR-FTIR.

Dates from - to

1. Predict the concentrations of lignin and monosaccharide compositions of milled wood stem segments from the leaned side and the opposite side of the trees using ATR-FTIR and NIR spectroscopy.
2. Relate the chemical compositions to physical properties of the compression woods of different severities.
3. Submit the completed thesis by the end of the year.

References

- Albersheim, P., Nevins, D. J., English, P. D., Karr, A., 1967. A method for the analysis of sugars in plant cell-wall polysaccharides by gas-liquid chromatography. *Carbohydrate Research* 5, 340-345.
- Altaner, C. M., Tokareva, E. N., Jarvis, M. C., Harris, P. J., 2010. Distribution of (1→4)-beta-galactans, arabinogalactan proteins, xylans and (1→3)-beta-glucans in tracheid cell walls of softwoods. *Tree Physiology* 30, 782-793.
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