

Career and Relevant-to-Industry Skills Programme (CRISP)

The MacDiarmid Institute for Advanced Materials and Nanotechnology

Frequently asked questions (FAQs) and further information

July 2021

FAQs

Why should I participate?

The skills being developed through CRISP aim to support the likely career paths for MacDiarmid Institute alumni, including academic, industry and government roles. The skills that the CRISP programme imparts are likely to support your career steps in many of the transitions from academia into non-academic roles. Many of them are also essential for academic careers!

How has the list of topics been selected?

The list of topics is intended to provide options to mix and match skills that could help you to enter the career of your choice after completing your PhD. These skills are recognised by employers, so are intended to provide MacDiarmid Institute alumni with a competitive edge in the local and international job market. The programme will also provide new graduates with the tools to take on non-academic roles with the confidence that they can contribute to a company's success as a new employee.

What can we learn from MacDiarmid Institute alumni?

By informally surveying MacDiarmid Institute alumni, we have identified 233 destinations of our alumni (MSc, PhD and Postdocs), chiefly those who left the Institute since 2014.

Of these roles:

- 76% were in New Zealand; around one-third of students were from New Zealand.
- Around one-quarter of these graduates are in 'senior' professional roles.
- Around 40% are academic roles.

In start-ups and industry:

- Around 30% of graduate roles are in industry. Of these, around half are in a multi-national, 85% are technical or scientific roles, and one-third are in senior or managerial roles.

- Around 10% were in start-ups, including at least 13 separate NZ deep tech start-up companies, and four of our own affiliated start-ups.
- Six alumni are CEOs/Founders of MacDiarmid-affiliated start-ups.

In government, professional services and NGOs:

- A quarter of graduate roles are not in academia or industry. Of these roles, about 30% are scientific / technical and around 20% are senior or managerial.
- We have graduates in (at least) five government ministries.

Recent developments and trends:

- The number of our own affiliated start-up companies continues to grow at 2-3 per year, each likely to be employing (or led by) MacDiarmid alumni.
- We have ramped up our internships programme, which provides work experience for finishing PhD students in Government (public sector) settings (e.g. MBIE, MfE, OPMCSA) as well as in industry.
- We remain in close contact with our alumni network through the LinkedIn group, networking events, Alumni Scholarships, supporting specialised coaching for entrepreneurial alumni, etc.

Feedback from those hosting interns, the interns themselves, and our alumni network has been accounted for while developing CRISP.

Can such short modules make a real difference to my career?

The introduction to each skill set delivered by CRISP will sometimes only scratch the surface. Some professional roles have entire academic and commercial disciplines focused on them. By starting to learn and apply these skills, you will develop a generalist base from which to grow your own career specialisation. In some cases, initial exposure to a topic will help you to make decisions about your own future at a critical time in your career. You will also be introduced to knowledge and networks if you subsequently need to tap into deep expertise.

How are workshops being developed?

Workshops are being co-developed with professional partners (e.g. corporate, investor, professional services, government and University technology transfer offices) to ensure they provide highly relevant and up-to-date approaches on specialist topics. Further, we are endeavouring to identify the best possible facilitators available in NZ for each module, and ensure that content and delivery are co-ordinated between modules. We will shoulder-tap people to assist with co-development, but please let us know about any good people or courses you know of at MI-CRISP@vuw.ac.nz.

Where skills are relevant to multiple types of employers, the content is being developed in a way that highlights different use-cases. E.g. where professional communication for start-ups and corporates

may need generic science communication skills and specific ability to develop investor “Information memoranda” these will be identified and expanded upon.

What is involved in a typical module?

Each module will focus on a particular set of skills. Each will aim to provide entry-level awareness, understanding and tools that enable you to start using these skills immediately and working towards proficiency over time, knowing where to go for further support.

Typically a module will introduce the basic principles of the topic early with some context as to how it relates to selected careers. Tools may be introduced to support participants to apply the concepts being taught e.g. a Gantt chart could be introduced to help a materials characterisation scientist to apply project management to development of a new industrial process.

Modules will use a variety of instructional methods (pedagogies) e.g. small group work, challenging problem-solving, interactivity.

What should I consider when choosing modules?

Modules will not assume any background knowledge. We anticipate that each of our students will find some topics of relevance or interest, and will be able to identify a range of skills that fit with their career aspirations. That is, you should choose both:

- Modules in which you know you have an interest, and would like to build your skills; and
- Modules in areas which you would like to find out more about.

If you already have a strong knowledge base in an area covered by a particular module, you may wish to check before signing up that the content will make a meaningful progression for you. To do this, or if you have any other questions to help you understand how to plan your participation, please contact MI-CRISP@vuw.ac.nz.

Will there be selection of students for workshops?

Due to capacity constraints, we may have to limit the attendance at some of the modules. We will attempt to accommodate preferences as far as possible, while managing oversubscribed or undersubscribed topics in a fair manner. Some workshops will be held in parallel with MacDiarmid Institute Symposia, and our aim is to provide modules with less limited capacity in those workshops.

How will travel and emissions be considered in selection?

Attendance at a selection of modules within each workshop will be supported. However, some preference may be given to those enrolling in more than one module within a multi-day workshop in order to minimise travel budget and related CO₂ emissions.

How will equity be considered in selection and programme design?

In keeping with our commitment to supporting equity and diversity, we encourage participation in CRISP from all individuals, and maintaining diversity may be a factor in selection of students for specific modules.

We will also ensure consideration of equity and diversity in all planning, subject matter partner selection, co-development and delivery of the modules. We are conscious of potential inequities relating to geographical location, and the balance we must strike with minimising transport emissions. If you have any specific concerns or suggestions about equity or diversity in CRISP, please let us know by contacting MI-CRISP@vuw.ac.nz.

Do I need my PhD supervisor's agreement to participate?

You should discuss and plan your participation in CRISP with your academic supervisor(s). Your MacDiarmid Institute academic supervisor(s) should be familiar with the requirements of CRISP, and you can expect their support for participation in Institute activities like this programme. For information about what you should expect from your supervisor and how to manage expectations with them, please see our [Supervisory Expectations](#) and [Supervision Policy](#) documents.

How do I balance my time for research/PhD work and these courses?

Remember that participation in any particular module is entirely optional. While we have set a target of participation in 8 modules for achievement of a full CRISP programme, each individual module attended will be recognized by the Institute, and we recommend a maximum participation of 12 days over a 2-year period. Again, your participation in CRISP should be discussed and planned with your academic supervisor(s).

Why is the MacDiarmid Institute offering CRISP?

The Institute has a longstanding interest in contributing to the economic and social wellbeing of New Zealand. One of the most important ways we do this is by producing graduates who can add significant value - see our alumni profile above. To assist New Zealand to address the complex challenges faced by society, including sustainability, our graduates should be equipped to use their scientific capabilities in New Zealand companies, and within government and other institutions that can make a positive impact. In this way, the scientific training provided by the MacDiarmid Institute will help to deliver many of the productivity, sustainability, economic and social goals NZ needs to achieve to thrive as a society.

Although our graduates typically have the technical skills to thrive outside of academia, the transition from a pure research degree can be daunting. To help with this transition, and to encourage participation in particular activities such as start-ups, the Institute has often provided training and development opportunities on an *ad hoc* basis, or through the Future Leaders' Programme (FLP). CRISP (which replaces the FLP) will structure and formalise these training opportunities.

How will participation be recorded and certified?

Your participation will be monitored via our online registration and attendance verification processes. Modules will not be assessed and only your participation will be reported. We will aggregate your participation data for a certificate of attendance, available on request or on completion of 8 badges. Participation in CRISP is intended to be included on your CV, and endorsed by the MacDiarmid Institute, but will not (at this stage) form part of any academic transcript.

What will it cost?

There will be no personal costs incurred by the student. The MacDiarmid Institute will cover travel, accommodation and course costs from central funds. Some expenses may be met by the academic supervisor's funds (e.g. travel to a Symposium which includes a workshop).

Will there be support for childcare, or similar issues affecting access?

Childcare and other support will be made available and (within reason) funded. Please let us know plans, requirements or concerns at the time of application for a module, or talk to your supervisor.

Tell me more about the selected range of skills.

See "Topics and Skills" below for a full listing of the planned modules. For graduates to thrive in their early career it helps to have a skillset that maximises the impact of scientific training while interacting with academic and non-academic colleagues and teams. The skills offered in CRISP include:

- the ability to plan, scope, deliver and manage a project;
- communicating effectively with professional audiences of all types;
- skills required to work within government and the public sector;
- financial literacy for start-up, corporate and project budgeting purposes (including academic projects);
- identifying and pursuing science-based start-up opportunities and industry partnerships with confidence.

Tell me more about how these skills will assist me in my career.

The main focus of the programme is to develop skills that are valued by the types of companies, industries and entities which employ trained scientists, including employers such as Government, research groups and professional services. Typically a person operating in any such organization relies on a wide range of skills to function effectively and practice at the top of their field.

The programme content is developed to respond to international and local moves towards highly flexible careers, with transferable skills and a strong lifelong learning underpinning successful career progression. So, while many of the skills are focused on commercial and industry requirements, each module will identify how they can be applied in a range of careers. For example, a module on science-market fit may enhance your ability to write scientific grant proposals.

Consider this extended example of a leader of an R&D facility within one of New Zealand's top high-value manufacturing firms.

- They will rely heavily on their technical or scientific knowledge.
- They would also need to carry out a range of non-technical functions to ensure a productive environment within their team, such as:
 - provide regular clear communication to their senior leadership team;
 - manage their R&D team dynamics effectively;
 - interact with the finance department about progress against financial targets;
 - set project targets and manage projects to achieve these;
 - ensure IP is recognised, protected and leveraged by the team and company as a whole;
 - and regularly make or contribute to challenging decisions about actions to be taken across each of these seemingly separate functions.

Topics and Skills

A listing and description of the module topics that are in development - work in progress!

Sustainability (Delivery led by the Sustainable Business Network)

Sustainability of products, processes and business models is a crucial consideration for all companies today. Materials scientists are well-placed to contribute to improved sustainability, but are also in a position to worsen sustainability impacts if they don't consider how materials are sourced, manufactured, distributed and disposed of at the end of a product or processes' life cycle. The Sustainable Business Network is partnering with the MacDiarmid Institute to co-design and deliver a workshop on some of the aspects of sustainability that will provide an understanding of the current dynamics of sustainable business practices, responsible product design and development, circular economy principles and sustainable business models (e.g. the B Corp).

Some of the aspects likely to be covered:

- Identifying CO₂, environmental, ethnic and societal challenges and linking these to the Sustainable Development Goals.
- How to plan, start and run a sustainable business.

- Research commercialisation with impact (i.e. the commercial route for sustainability research).
- Social enterprise and other non-traditional routes to commercialising science.

The friendly TTO (Delivery led by UniServices, with input from other TTOs)

A TTO or Tech Transfer Office is responsible for an institution's research commercialization. This modules will cover how you can leverage the skills at your local TTO:

- Getting the best out of the relationship.
- Timing, approach, expectations.
- Processes, including similarities and differences across TTOs.

Investment dynamics (Delivery led by Bridgewest)

- Finding the right investor, negotiation, due diligence, communication.
- Planning to raise capital (resource, timing, amounts, valuation, capital strategy).
- Financial projections.
- Terms, Investment Memorandums.

Professional communication

Each of us needs to communicate with a wide range of people in our day to day professional lives. Effective communication can enhance or detract from the ability to deliver the objectives in any role or organisation. Where communication is needed between professionals or colleagues from different professional backgrounds and levels of training (some entirely non-scientific) there are skills that can be learnt to support clear, efficient and collegial communication.

Science communication ranges from straightforward communication of scientific concepts to a lay audience, through to the need to generate highly targeted communication materials to a specific audience (e.g. investment memorandum from science based start-up founder to an investor audience; or pharmaceutical evidence brief to a marketing department by a science liaison in a drug company).

This workshop will provide some of the basic aspects of science communication and then help you to contextualise them in various commercial, R&D, start-up and policy settings.

Project management and operational management

From small science projects through to multi-million dollar complex interdisciplinary projects, success depends on getting the right set of skills on the project at the right time under the right conditions. Planning the scope, requirements, timeframes, budget and dependencies enables a project to succeed in meeting its objectives across science, engineering, business, R&D and a range of other settings. Therefore, developing project management skills will enable you to bring successful projects to fruition in many of your potential career paths. This workshop will identify the typical aspects of a

materials science project in a range of commercial settings and introduce you to the critical success factors as well as tools to simplify planning, tracking and managing projects. You'll be able to start using these skills right from the early phases of your research, and keep using them throughout your career. Includes consideration of:

- Programme management, R&D projects, budget management.
- Planning, scoping, feasibility.
- Resource management, scheduling and project team liaison.
- Time management, milestone management.
- Tools (Gantt chart etc.).

Delivering R&D results

Taking a product from the lab to the point of a launch.

- Doing R&D professionally, whether in a start-up or the R&D Department of a large company.
- Optimising a materials science product, process or service.
- Using simulation and modelling to inform product planning (process, product, service), digital twins, or interactions between simulations and additive manufacturing.

Wellbeing

Similar to the 2019 Future Leaders' Programme sessions on Wellbeing, this will cover topics such as:

- Impostor syndrome
- Mindfulness
- Building resilience
- Wellbeing at the MacDiarmid Institute

Advanced communication skills

This will build on the earlier 'professional communication' workshop, taking a particular focus on use of soft skills in the workplace. Other topics may include use of written communications (including email and social media), jobs interviews and CVs, and specific communication challenges e.g. science for a non-science audience, or presentations for business including 'pitching'.

Government and the public sector

This module will introduce required knowledge and skills specific to employment in the public sector, covering topics such as:

- Policy development.
- Government cycles - how the public sector works.

- Influencing people in the public sector.

Introduction to Māori culture, society and economy

Recommended for local and international students alike, this module will include:

- *Te Tiriti o Waitangi* – The Treaty of Waitangi.
- Important Waitangi Tribunal claims, especially Wai 262 which deals with aspects of intellectual property.
- Use of tikanga (practices and values) and te reo (language).
- The Māori economy and Deep tech R&D landscape.

Intellectual property

- What is a patent, why patent, how to patent.
- Costs, process, advisors.
- Tech transfer office responsibility, your responsibility.
- Publishing strategy - avoiding disclosure, enhancing commercial profile.

Lean business canvas

With a focus on specific requirements for Deep tech commercialization.

- Market validation and IP.
- How this fits with the "Impact" section of a research grant.

Financial management

With a focus on building start-up companies.

- Financial planning based on company reporting and accounting principles.
- Managing company or project cashflow and reporting.

Governance for start-ups

An introduction to the management/governance interface, responsibilities, and dynamics.

Team dynamics and team optimisation

Teamwork is a major issue facing all organisations (fitting into a team, optimising team performance, managing a team, hiring for a strong team). This module will cover:

- R&D teams - what are they, and what are their drivers and challenges?

- How do YOU fit in the team and its deliverables?
- Good teams are not just an accident - what's the strategy to form and lead one?

Decision making

- Fit for purpose decisions (not paralysis by analysis).
- Heuristics, emotional intelligence, organisational dynamics.
- Decisions and their consequences in R&D.
- Making decisions while delivering commercial objectives.
- Navigating conflicting advice and opinions (investors, market fit, cultural).

Teamwork in the public sector

Working in the public sector requires a particular focus on team dynamics and people skills, which will be further addressed in this module.