

CAREER VIEW

BUILDING SCIENCE

Building Science is an applied science, made up of a number of disciplines looking at all of the factors in construction from the first stages of the design process, to the project's impact on buildings and architecture. This will include management of the design and construction phases, what materials buildings are constructed from, their immediate environments and their safety and sustainability in materials and construction. Building scientists also predict how structures will perform under all the pressures that they endure – especially in this country with its dramatic weather patterns and shaky ground. Their aim is to understand or prevent building failures, and guide the design of new techniques and technologies in a world where resources are increasingly stretched and the need to live safely and sustainably is critical.

WHY STUDY BUILDING SCIENCE?

The study of Building Science covers a wide range of building theory, research and development, as well as practice, from construction processes and project management to building technology, energy efficiency, lighting, acoustics and digital craft. A building science qualification combines well with other courses in architecture, interior architecture and design, and with degrees such as law, commerce and secondary teaching. In response to natural disasters, climate change and rapidly changing demographics, there is an urgent need for building science professionals in New Zealand in built environment research and development, planning and regulatory controls, construction and property management.

WHAT SKILLS DO BUILDING SCIENCE STUDENTS DEVELOP?

During their degree, Building Science students develop a highly marketable set of skills.

Students develop awareness of their personal strengths and limitations in respect to **professional knowledge** of the built environment field. As building science is multi-disciplinary, students gain an understanding of other knowledge systems and a desire to continue and expand their learning and stay up to date with new knowledge and practices in the area of sustainability. Response to technological and social change is essential.



Project management skills. Building Science students learn the theory, practice and current technologies of project management from implementation through to delivery of projects, including its constraints, cost planning and control, critical path, consultation, administration and quality control. These fundamentals give graduates a head start as nearly all operational environments require skills in foresight, planning, execution and review.

Career View explores how degrees and courses relate to employment opportunities and to life/work planning. It includes graduate destination information and current employment issues. Your comments and suggestions are always welcomed.

Wellington Careers and Employment.
wgtn.ac.nz/careers

Practical and adaptable. Students are able to operate in a wide variety of settings and learn how to implement the appropriate practices of a construction site, such as health and safety, the use of tools for site set-out, surveying, quality inspections and general construction management.

The ability to use **ICT skills** to communicate with clients using design and modelling software is now common practice, and increasingly virtual reality and 3D technologies are used.

Students will learn to think rigorously and creatively, analyse complex data, conditions and circumstances and to synthesise knowledge and solve problems in an imaginative and creative way. They will also be able to think in terms of how systems interact, which coupled with **pragmatism** is very useful for the implementation of concepts and ideas.

Building Science graduates are skilled in many aspects of **communication**. These include writing, graphic/visual means and verbal communication. They can also listen, interact and negotiate in a range of interpersonal, group and professional situations and work effectively in a team setting, keeping a cool head under pressure.

Work in built environments involves a great deal of collaborative **teamwork** between the different professions and trades required to achieve successful development. Structures must meet the requirements of building codes, resource management and the client's brief. During their degree studies, students work on projects in groups and learn about the work of other construction professionals.

Degree studies also develop intellectual **leadership skills** and the ability to operate in a responsible, fair and ethical manner using sound professional judgement.



PROFESSIONAL ASSOCIATIONS

There is no specific registration required for building scientists however professional associations such as the New Zealand Institute of Building (NZIOB) has a wide membership within the building industry. Some professional bodies have a membership category that allows students and new graduates to belong. Joining an association as an undergraduate or new graduate is a way to form networks, to begin professional development and hear about companies that are recruiting in areas of interest.

NZIOB has free student membership, and enables Building Science students to meet a wide variety of practitioners, many of whom are managers or owners of construction businesses. Student members receive opportunities to attend exclusive site visits and community property development events.

The Property Institute of New Zealand (PINZ) represents valuers, property managers, property advisors and consultants and its membership includes a growing number of other property professionals. Membership has many advantages for graduates from ongoing learning opportunities and networking with other property professionals.

Energy Management Association of New Zealand (EMANZ) supports its members through a range of activities that raise skills, knowledge and all-round competence in energy management.

National Association of Women in Construction

(NAWIC) encourages women to pursue, establish and sustain successful careers in the construction industry. One of the objectives of NAWIC is to increase the participation of women in the construction industry. They hold regular events to inform and up-skill women in construction and to promote networking and information sharing for the betterment of the construction industry as a whole. Their members include quantity surveyors, project managers, planners, designers, architects, engineers and building scientists.

WHERE DO BUILDING SCIENCE GRADUATES WORK?

Architecture and construction are global industries across private and public sectors. While local government bodies employ building professionals to permanent positions, they also contract private companies for specific projects. Graduates are equipped with skills and attitudes that are sought by many employers.

Large construction companies may take on Building Science graduates as trainees or cadets for about three years. From there they may specialise in quantity surveying, engineering, project management or become construction supervisors. As trainees they will acquire experience in all areas of construction including estimating, tendering, plant operations, setting up projects and supervising, gaining an understanding of how sub-contractors work and the contractual relationships with them. Construction work can involve long hours and work outside, requiring stamina and enthusiasm. It is useful to gain practical experience on a site while studying.

Building Science graduates may also work in the technical aspects of construction such as concrete manufacturing, working on the plant, or doing quality control or testing. Companies that specialise in building materials and products may also hire Building Science graduates, particularly with some experience behind them.

National, regional and local government employ people with Building Science degrees in relevant areas such as urban and rural planning and property

management. Previous industry experience is likely to be a requirement for some roles. **Regional councils and local authorities** employ building inspectors, building officers, project assistants and managers. Work within local authorities is often varied. Entry-level positions may be found in parks and reserves or within building consent, housing or property groups. Some councils offer graduate programmes and scholarships.

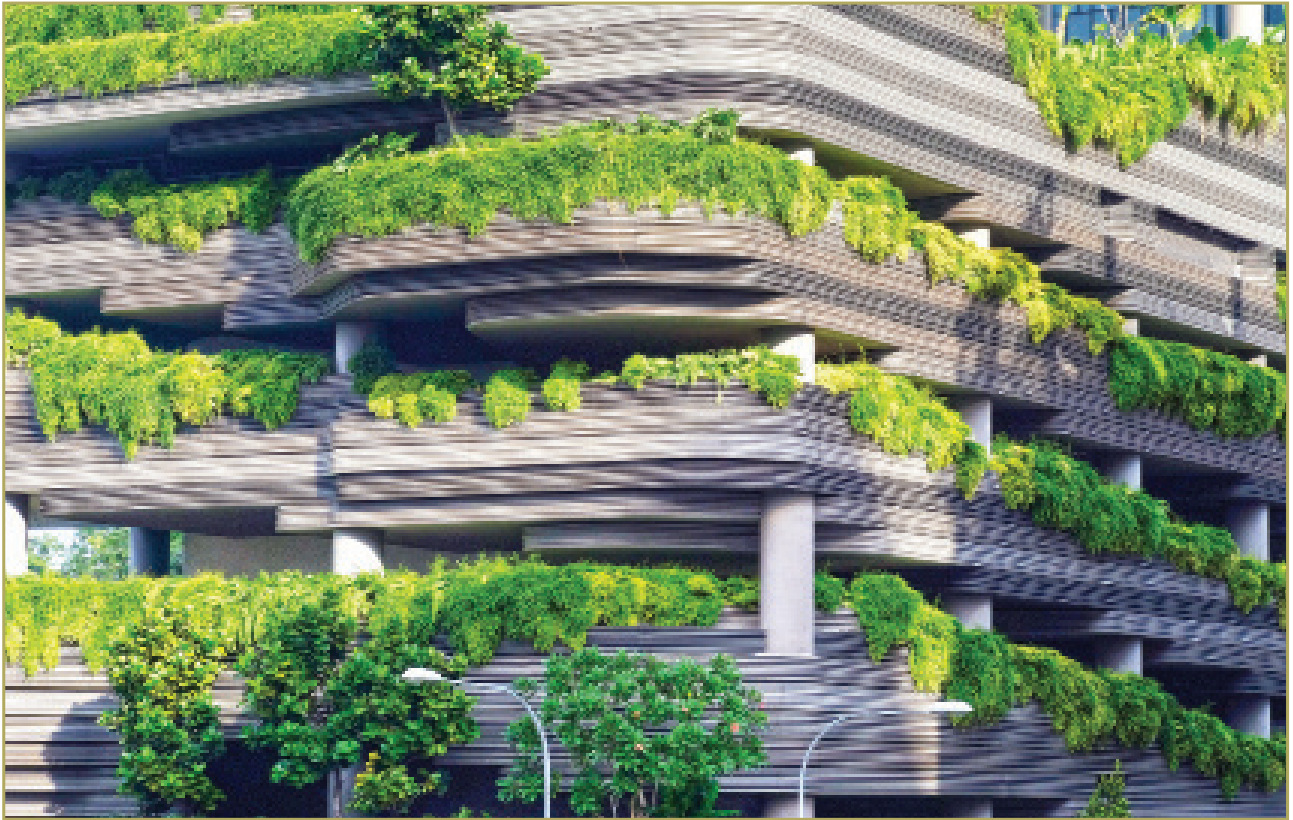
The **Ministry of Business, Innovation and Employment (MBIE)** has opportunities for Building Science graduates in operational and policy areas especially in the building regulatory, policy advice, weathertight or the licensed building practitioner areas. The operational and project management skills that Building Science graduates have can also be useful in areas such as government procurement.

Large government departments and agencies with significant property assets or responsibilities, such as the **Department of Corrections** or the **Ministry of Education**, can employ Building Science graduates as property managers or advisers.

The **Energy Efficiency and Conservation Authority (EECA)** works to encourage, support and promote energy efficiency and renewable energy. It may also employ building scientists with experience as technical advisers, researchers, policy analysts or engineers.

Environmental engineering and consultancy services include multidisciplinary consultancies or environmental management consultancies with a focus on sustainable built environments, materials and products, lighting design, acoustics, insulation, cladding and building materials.





Graduates with an interest in the technical aspects of mechanical plants in commercial buildings, in particular HVAC (heating, ventilation and air conditioning) can specialise in this area. It is common for larger organisations to have a graduate development programme, and work with off-shore projects is a possibility after some practical experience has been acquired. Such companies include **Aecom**, **Beca**, **GHD**, **Opus International Consultants** and **Tonkin + Taylor**.

Quantity estimating/surveying is another area that Building Science graduates with experience in construction, especially project management can progress into. To become a registered Quantity Surveyor, you need at least three years of experience from becoming a Member or Associate, as approved by the NZIQS Registration Board. Graduates can also undertake a postgraduate qualification in quantity surveying.

Building Research Association of New Zealand (BRANZ) researches energy efficiency in buildings, indoor air quality in buildings (heat and moisture control and ventilation) and weather tightness. Their work is a mixture of research, commercial testing of building materials' performance and work on standards and building codes. A postgraduate Building Science qualification can lead to research, testing or consultancy roles, usually on top of some experience in the building industry.

Private practice – self-employment. Some Building Science graduates set up their own practices or consultancies after gaining several years' experience in building information management (BIM) and digital simulation of building as well as giving technical advice in heating, cooling, lighting and acoustic performance with architecture and construction practices.

Education. Universities employ architecture and Building Science graduates as tutors and faculty staff. Graduates considering an academic career usually require a PhD and a record of publication to be competitive for junior positions. Teaching at secondary school level is a viable career option for Building Science graduates particularly Technology. Where there are teacher shortages, scholarships may be offered and TeachNZ can advise on this. A postgraduate teaching qualification is required.

Media, journalism, writing and editing for online content, journals or magazines may require further study or experience in technical or science writing, communications or journalism. Writers with a specialist background who can communicate knowledge in a clear and interesting way to a broad cross section of readers may find a niche market for their skills. Technical writing is another option where specialist knowledge is needed for writing manuals, reports or documents to do with standards and regulations.

GRADUATE PROFILES

JOB TITLES

Following is a selection of titles taken from our graduate destination surveys. Some roles may require postgraduate or conjoint qualifications and training.

Titles can include:

Architectural technician • acoustic engineer •
acoustician • building consent consultant • building
construction analyst • building inspector • building
materials consultant • building officer • building
researcher • building supervisor • building technician
• CAD technician • draftsperson residential planner •
energy conservation consultant • engineering cadet •
fire design and regulations analyst • graphic designer •
lecturer • lighting adviser, designer or supplier • policy
adviser • project adviser • project manager • property
consultant • property manager • quantity surveyor
• site co-ordinator • sustainable engineering systems
designer • urban designer • urban planner • technical
advisor • technical writer



Daniel Carew

Assistant Project Manager
Frequency Projects



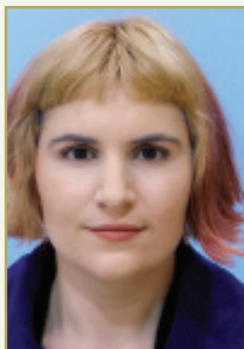
I completed both Project Management and Sustainable Engineering majors in the Building Science degree, as I wanted a well-rounded qualification across many knowledge areas in construction and project management. The Building Science degree is becoming increasingly recognised in the industry and this enabled me to discuss many assistant project management roles with different prospective employers.

At the end of my second year at university, I was fortunate to secure a summer position at the Wellington City Council providing administrative support to major projects in the Building Consents department, which gave me insight into regulatory building compliance systems. This is a good background to have when working on commercial construction projects. I then wanted to try my hand at the sub-contractor level. Six months as a mechanical services engineering cadet during my studies offered me a different perspective and I came to respect the pressures design consultants work under. Graduating, I felt I had gained the skills and industry experience I needed for my first project management role, which came with Arrow International (NZ) Limited in Christchurch, handling residential repair insurance claims for design + build contracts.

The group projects during my degree helped me to build the communication skills that I now need in order to deal with multiple disciplines in construction and design. From project management classroom study, I started to develop my own work ethic and plan tasks whether they be daily or over the next few weeks. Along with excellent time management, these personal management skills are invaluable for demanding projects which graduates can expect to be part of. Through a combination of previous intern experiences working in an office environment and on-site, I have learnt to work effectively for clients and project teams in fast-paced and rapidly changing projects. On any given day in my current employment at Frequency Projects, I have to liaise between structural engineers, geotechnical engineers, architectural designers, quantity surveyors and building contractors to ensure time, cost and quality are managed for the client.

Esther-Grace Reid

Project Co-ordinator – Property Projects
Department of Corrections



I did a general first year in Architecture with the intention of specialising in Architecture or even Landscape Architecture. During the first year, I got to hear more about the Building Science degree and found that I enjoyed the project management and sustainable engineering side more than the architectural side. I was actually accepted into Architecture but after reflecting through the summer of my first year I realised I was more technically minded, loved the detail and enjoyed the communication with people, which is Building Science related rather than developing a design for a building or landscape.

This is my first job since completing my Bachelor of Building Science and I have been here for a year and half. Part of my role is managing two small building projects along with being an assistant project manager on a larger project for the department. One of the projects is a collaboration of different areas within Corrections, including IT and Education, which gives me the opportunity to extend my skill base. I feel as though I am part of making a difference to create environments that enable offenders to turn their lives around.

From my degree I have gained a knowledge of how buildings work. However, just as important for the role I'm in now, I also understand the contractual and legal obligations that are required in order for a project to go ahead and be maintained. Also, good communication is an art form and essential in getting a project to run well. I may not have perfected the art but I am learning a lot more about it. The other factors in making sure a project goes well are cost, time and quality, which need to be balanced and any issues resolved.

My degree has helped as it means I have the background knowledge and understanding of the building process and projects. My Building Science studies also helped me learn how to challenge and grow my thinking as there were so many times when I had to pick up how to use a programme within a week, or push myself to get a massive assignment done in a short period of time. My advice would be to make the most of the lecturers, tutors and student learning services available as they are there to help you and they want to see you achieve.

Sara Wareing

Building Services Co-ordinator
McKee Fehl Constructors Ltd.



I arrived at Building Science in my second year of study through a process of trial and error. I had my heart set on being an Architect and worked hard in the joint introductory first year for Architecture and Building Science. I succeeded in getting into the competitive second-year class for Architecture. However, I saw I was succeeding in and enjoying the Building Science courses more than the Architecture and Design ones because I found the technical aspects more satisfying. It was functional and applied and more like the graphics I had enjoyed at school.

I already intended going on to postgraduate study as part of my original Architecture degree plan, so it was natural for me to go ahead with a Master's in Building Science. For Master's I shifted my focus from Project Management to Sustainable Engineering. In both the coursework and project of my Master's I was pushed to think for myself. The answers to questions did not always exist and I found myself asking, "no-one knows this; how do I figure this out?" This ability to think for yourself and be self-motivated, set your own goals and choose your own finishing points are underlying skills in absolutely everything. My Master's project was the evaluation of the thermal performance benefits of a Housing Warrant of Fitness.

I got my current job through networking and connections with my thesis supervisor. What I love about my company is the flat management structure, so I am part of the decision making team and have autonomy. A facilities manager is the best way to describe my job, even though that's not my title. In this role I am confronted by unusual things and use my thinking and problem-solving skills multiple times a day. For example, we are currently looking at how to get a rainwater harvesting system working, collecting water from a rooftop garden and re-using it for flushing toilets. There is both construction and engineering knowledge required for such projects, making adaptations to existing buildings to get them working as intended.

I have found that once you have the knowledge, you can see the opportunities to apply it. My Master's meant exposure to ideas and concepts as well as practical application and recognition. I have been lucky to find this path.

Jay Vaai

MBS Technical BIM Specialist
Dominion Constructors Limited



At high school I was into both engineering and science, attracted to practical and applied disciplines. I therefore decided on Building Science with a double major in Sustainability and Project Management and with my growing interest in Building Information Management (BIM), I did as many Architectural Technology courses as I could. One of my favourite courses required us to create a building information model of a 10 storey building which had to have all the servicing, structure and architectural elements modelled. I decided to present this in a format that was uncommon at the time – with a Game Engine. It gained me a lot of points for innovation and today it is very common for the industry to use game technology for visualization of BIM.

It was this project that made me want to do more self-driven project work and so I went on to a Master of Building Science. For me, the difference a postgraduate qualification offered was the opportunity to specialise, the advancement of skills, meeting a specific industry need and engagement with employers. My thesis focussed making an Augmented Reality phone app for presentation of a 3D building information model of a sports club designed by ArchHaus Architects. I was invited to present this project to corporations such as Housing NZ, Beca, and Fletcher Building. It was an awesome opportunity to make impressions and connect with people who all kept me in the loop for where I was going when I finished. I was a very shy person before my Master's and through constant exposure to presentations I have developed a lot of confidence in my communication ability.

What I do now is really multifaceted, working with emerging technologies, in particular applying my construction/BIM modelling knowledge. This involves taking construction models from all the different specialists on a project and bringing them together into a format that can be used for our site team. One end result is that we are able to put our client teams into virtual simulations. They can get a sense of the scale of their project by walking through it. This also requires communication skills to sell the idea of BIM and build the relationship with the client and it's that side of the work that is really important to me.

Shaan Cory

Building Scientist
Beca Limited



When starting university I knew I had a passion for sustainable buildings. My first year was compulsory Architecture, which you then split into the different study streams (such as architecture, building science, interiors or landscape). In that first year, there was only one building science paper, which gave a taste of what would be taught in the Building Science degree. For the assignments, we assessed the thermal, lighting and acoustical environments within Te Papa. The combination of those assignments and my passion for sustainable buildings and their design triggered my decision to progress with Building Science - Sustainable Engineering Systems as my major.

At undergraduate level, I enjoyed assessing real buildings from a thermal, lighting, acoustic and external environment perspective. Being able to determine if and why a space was uncomfortable for occupants was challenging, but was rewarding to give occupants/clients particular measures to improve their comfort. During the postgraduate degree, the most enjoyable course for me was Buildings and Energy. We had to undertake an energy audit of a building in Wellington to identify if there were ways to reduce its energy, cost and associated greenhouse gas emissions.

The degree developed my technical skills for reviewing real buildings in practice and encouraged critical thinking and analysis of the findings. The most valuable skill was being able to use my critical thinking to propose methods for improving the building, its spaces and its environmental impact. This led to a PhD in Building Science, which aimed to reduce the greenhouse gas emissions from all office and retail buildings in New Zealand to be "net zero".

All of my career roles have stemmed from my passion for reducing the environmental impact of buildings in a cost effective manner. Currently I work at Beca Limited on environmental sustainable design and energy management projects. An example is a project undertaken for Victoria University of Wellington where we increased energy savings at the Hub and Rankine Brown Buildings by approximately \$40,000 per year and greenhouse gas emissions by 150 tonnes per year. The energy savings paid the project capital costs back in just over a year.