Why Renewables & Environmental Technology at SRUC?

Today’s issues of climate change and energy security are driving the expansion of renewable energy technologies and improvements in the efficiency with which energy is used in industries, communities and homes. Environmental concerns are also stimulating the development and application of new technologies to improve the sustainability of human activities.

Reductions in greenhouse gas emissions can be achieved by reducing resource use, increasing the re-use and recycling of materials and making greater use of renewable, low carbon materials for building construction and as industrial raw materials.

Innovations in our agricultural systems can reduce the carbon footprint of our food supply, whilst advances in environmental technologies can improve the management of wastes and control of pollution.

Well-trained, enterprising graduates will be crucial for continued progress towards such a sustainable, low carbon economy. SRUC’s Renewables & Environmental Technology courses aim to produce graduates with scientific and technical skills, together with an understanding of energy, the environment and land-based industries, so that they can contribute to these developments and thereby help to combat climate change.

Major areas of study include renewable energy (e.g. wind, solar, hydro and biomass), energy efficiency, green building technologies, sustainable land use, waste management, pollution control, recycling and the production of bioproducts and industrial raw materials from algae and crops. A wide range of exciting career opportunities are emerging for graduates in this sector.

Which Courses Where?

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<th>Course</th>
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<th>Edinburgh</th>
<th>Elmwood</th>
<th>Oatridge</th>
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Course Overview

HND / BSc / BSc (Hons) Renewables and Environmental Technology

The Renewables and Environmental Technology degree is awarded by the University of Glasgow.

- **BIOENERGY**
  - Biomass
  - Biogas
  - Biodiesel
  - Bioethanol

- **BIOPRODUCTS**
  - Biopolymers
  - Biolubricants
  - Fibres
  - Chemicals

- **BIOMASS**

- **ENVIRONMENT**
  - Sustainability
  - Climate change
  - Waste management
  - Life Cycle Analysis
  - Impact assessment
  - Pollution

- **EMERGING GREEN TECHNOLOGIES**

- **BUSINESS**
  - EU / UK obligations
  - Legislation & regulation
  - Business management
  - Financial support
  - Planning, Contracts

- **BUILDINGS**

- **ENERGY EFFICIENCY**

- **TRANSPORT**

- **EQUIPMENT**

- **SOLAR**

- **HYDRO**

- **WIND**

- **RENEWABLE ENERGY**

- **BIOPOWER**
  - Biomass
  - Biogas
  - Biodiesel
  - Bioethanol

- **BIOPRODUCTS**
  - Biopolymers
  - Biolubricants
  - Fibres
  - Chemicals

- **BIOMASS**

- **HEAT PUMPS**

- **WASTE**
HND Green Technology

The first year of the course introduces students to environmental issues and provides a strong foundation in the key aspects of biology, physics and chemistry that are required for subsequent studies in the generation and use of energy, with a particular focus on bioenergy. Classes will also develop your technical and laboratory practical skills as well as relevant transferable skills such as IT, numeracy, written communication, planning and problem-solving.

Course Content – Year 1:

- Environmental Awareness
- Small Scale Rural Electrical Energy Systems
- Farm Power
- Fundamentals of Landscape Surveying
- Cell Biology: Theory and Practice
- Microorganisms: Growth Activity and Significance
- Biochemistry: Theory and Practice
- Chemistry and Physics for the Life Sciences
- Quality and Health & Safety Systems in Science Industries
- Information Technology Applications Software
- Plant Physiology
- Arable Crop Production
- Soils and Crop Establishment
- Crop Protection and Harvesting Mechanisation
- Green Technology Project (graded unit)

Example of a first year module:

Small Scale Rural Electrical Energy Systems

This module will develop your basic knowledge and understanding of electricity, which is required for subsequent studies and work in the field of energy efficiency or in the design, marketing and project planning of small-scale renewable energy systems. It provides an introduction to electricity and how it is distributed around the country and within buildings, as well as the operating principles and main characteristics of simple electrical machines. This module will also provide an introduction to electronic theory in the context of simple electronic devices.
HND Green Technology

Second year studies explore in greater depth the application of the scientific principles established in the first year e.g. in the generation and use of energy in buildings, transport, agriculture and industry. You will also learn how environmental technologies are used in the management of wastes and pollution and consider how our agricultural systems can be manipulated to maximise their productivity whilst minimising their environmental impacts. With the Green Technology case study, you will have the opportunity to apply your overall knowledge and understanding from other modules to the environmental improvement of a particular site.

Course Content – Year 2:

Core Modules:
- Renewable Energy: Microgeneration Systems
- Farm Scale Renewable Energy
- Energy Performance of Buildings
- Transport: Towards a Sustainable Future
- Biomass: Technologies for Energy & Bioproducts
- Pollution & Waste Management: An Introduction
- Land Use Systems
- Agroecosystems: Energetic Efficiency
- Statistics for Science 2
- Business Management: An Introduction
- Green Technology Case Study (graded unit)
- Green Technology Examination (graded unit)

Elective Modules (choose 3):
- Farm Buildings and Controlled Environments
- Low Environmental Impact Construction
- Environmental Auditing of Buildings
- Mathematics for Construction Engineering
- Scottish Rural Development

Example of a second year module:
Biomass: Technologies for Energy and Bioproducts
This module will introduce you to the concepts of biomass availability, production and utilisation. Physical, chemical and microbial conversion processes will be studied to examine the extraction, processing and manufacturing technologies that are necessary for the production of natural products. These products will include biofuels such as bioethanol & biodiesel, biosolvents, essential oils & biolubricants.
Course Content

BSc Renewables and Environmental Technology

To prepare students for professional employment, the third year is designed to further develop your depth of understanding, knowledge and skills in renewable technologies, as well as your skills in project management, research, data handling, communication and team-working that are so important in the workplace. Studying two elective modules will allow you to tailor your course to areas that interest you and at third year level you will have more scope to undertake background reading and independent study to develop your own ideas and interests.

Course Content – Year 3:

Also: BSc (Hons) Renewables and Environmental Technology Year 3

3 years full-time

Core Modules
- Bioenergy Production Technology
- Renewables Technology (non-biomass)
- Bioproducts: Technologies and Supply Chains
- Renewable Case Study
- Project Management
- Research Skills and Data Analysis

Choice of Elective Modules (choose 2)
- Climate Change and the Global Environment
- GIS and Remote Sensing
- Multi-purpose Woodland Management
- Land and Habitat Restoration
- Experimental and Analytical Techniques
- Crop Products and Potential
- Management Skills & Entrepreneurship
- Economic Policy and Analysis

Example third year module:
Renewables Technology

This module will develop your understanding of the engineering and technological issues associated with non-biomass renewable energy sources, by means of practical engineering technology exercises and associated tutorials. This will enable you to assess the suitability of the construction and performance characteristics of key engineering components associated with the renewable technologies and to critically analyse large-scale renewable energy schemes through consideration of their technology, potential, and environmental impact. In addition you will be able to appraise energy storage devices and review the economic issues associated with the development of renewable energy projects.
Course Content

BSc (Hons) Renewables and Environmental Technology

In your fourth year you will undertake an extensive individual research project, investigating a topic of your choice under the supervision of a tutor. Conducting your own research project will allow you to develop advanced level, specialist knowledge in a particular field of interest, and this can be very useful for subsequently gaining employment or a postgraduate research position in that subject area. While working on your research project you will also develop a wealth of skills, from practical and investigational skills to planning and time management which are also very relevant to future employment or postgraduate study.

Course Content – Year 4:

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<th>BSc (Hons) Renewables and Environmental Technology Year 4</th>
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<tr>
<th>Core Modules</th>
<th>Choice of Elective Modules (choose 2)</th>
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<tr>
<td>• Honours Project (equivalent to 3 units)</td>
<td>• Carbon Management</td>
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<td>• Innovations in Low Carbon Technology</td>
<td>• Advanced Multi-purpose Woodland Management</td>
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<td>• Rural Planning &amp; Environmental Impact Assessment</td>
<td>• Sustainable Environmental Management</td>
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<td>• Sustainable Engineering and Architecture</td>
<td>• Waste Reduction &amp; Recycling</td>
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<td>• Environmental Economics</td>
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<td>• Food and Agri-business Economic Policy</td>
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<td>• Professional Practice and Business Law for the Land Based Sector</td>
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<td></td>
<td>• Any one year 3 or 4 module available at the Ayr campus, subject to timetabling constraints.</td>
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Example fourth year module: Innovations in Low Carbon Technology

The transition to a low carbon economy on a global basis, will require a huge diversity of approaches which in turn will require a myriad of innovations. Many innovations are likely to be synergistic and a detailed understanding of the technologies will enable people, companies and countries to become better innovators and drive economic as well as environmental development. Evolving technologies also have the potential to be disruptive and completely alter the ways things are done and ways of life. This module aims to provide a forum within which to review the emerging technologies, study selected technologies in detail, and explore the innovative possibilities they provide for energy production, transmission, storage and use and will attempt to identify disruptive technologies and explore their effects. It will also consider the influence of UK public sector bodies in driving for a low carbon economy and encourage rational discussion of developmental priorities.
What’s the Course Like?

Renewables and Environmental Technology is a broad-based programme, preparing graduates for employment in the renewable energy and environmental sectors of employment.

Classroom work is interactive, encouraging debate and critical thinking and includes practical laboratory, building design and engineering workshop exercises to help students to really understand the concepts and topics studied. The green credentials of SRUC’s new Ayr campus, where this programme is delivered, enable the building itself to be the focus for some classes relating to the environmental and energy performance of buildings.

Not only will you learn about environmental issues and a range of renewable and low carbon technologies, but you will also develop an understanding of project management and the regulatory, business and financial aspects of deploying green technologies. Throughout the course you will also develop other skills for the workplace, e.g. in IT, data handling, problem-solving and communication.

Teaching isn’t confined to the classroom. Case studies, study tours, conferences and visits to relevant development sites, research institutes and commercial companies further demonstrate the implementation and latest applications of the technologies studied.

To further prepare you for employment, you will undertake real case studies involving the development of specific sites. The third year case study involves working as a group to investigate a problem and deliver recommendations to an external client as both an oral presentation and a written report.

In the fourth year you will undertake a supervised individual research project in a relevant topic of your choice. This allows you to develop skills and specialist knowledge in a particular area of interest, to help prepare you for employment in that field.

Student Voice

Anna Wakeling is now a Technical Designer with Prescient Power Ltd

“During my time at the college we studied a wide range of topics relating to how energy is used. What I loved was that we learnt new things about the use of energy in everyday items and also how inefficient we are at using, storing and distributing energy. We also learnt how we can make our use of energy more efficient and we applied these principles to building design and use, agricultural practices, forest management, machine use and to the different components required for renewable technologies etc. - the list goes on!”

“There were lots of site visits and engineering practicals to show the applications of technology which helped me to get my head round the lecture material. “

“During my whole time at college the staff were fantastic. They taught their topics well and were always up-to-date with the latest figures or new technologies. They were passionate about their topics and that shone through in their teaching. They were always available to help you out if you were stuck on a particular problem.”
Career Prospects

With a Renewables and Environmental Technology degree or HND in Green Technology you will be well equipped for a career in the renewable energy and environmental sector. This field of employment continues to expand, with a wide range of exciting job opportunities and excellent prospects for subsequent career progression.

The Renewables & Environmental Technology programme prepares graduates for careers as consultants, researchers, project managers, designers, energy advisers and technical representatives for organisations and companies dealing with renewable and environmental technologies. Former graduates have an excellent track record of gaining relevant employment.

A number of graduates have found employment as energy advisers, either working for a local council or with the Energy Agency. Another Renewables & Environmental Technology graduate is now employed as energy manager for a local authority, with responsibility for the energy efficiency of over a thousand properties.

Some graduates have entered careers with renewable energy companies. For example, one graduate was appointed as a technical designer, working with solar, biomass and heat pump systems, whilst others have gained employment as technical representatives for companies supplying wind turbines, biomass boilers and organic fertilisers from renewable, sustainable sources.

Many businesses now employ staff to improve their environmental performance and thereby increase profits. One Renewables & Environmental Technology graduate not only secured a post as an environmental co-ordinator with a food company, but achieved such success in the role that he quickly gained promotion, with greater responsibilities.

The move towards low carbon buildings is also creating job opportunities, for example one former graduate was appointed as a building performance analyst with a Solar Homes project. Jobs can also be found with community energy groups, and one past graduate is now working as a woodland co-ordinator for a woodfuel project in Stirling.

Some graduates enter a career in research or education, initially by continuing their education at postgraduate level. One Renewables & Environmental Technology graduate was awarded a scholarship for a MSc by research in Canada and is now working towards a PhD in farm energy at Dalhousie University. Another graduate has been appointed as a lecturer in environmental engineering.

Student Voice

Kieron Smith decided to graduate with a general degree after three years of study, when he was offered a job with a company that provided engineering support services to owners and operators of renewable energy generating equipment.

"I finished my last exam at 12:00, rushed to an interview at 13:00 and was offered a job by 14:30 that day!"

Matthew Black was appointed as an Energy Adviser with Fintry Development Trust when he graduated with an Honours degree after his fourth year.

While a student he worked part-time with the local Energy Agency.

"My job involves providing advice and supervising renewable/low carbon installations within the local community. The Trust aims to maximize sustainable development in the area after investing in a local large scale wind farm. Projects include improving local biomass supply chains, installing renewable heat systems and adopting sustainable transport use through a local car club."
Contact Us

For more specific course information, please feel free to contact our lecturing staff:

<table>
<thead>
<tr>
<th>SRUC Ayr Campus:</th>
<th>e: <a href="mailto:chris.leggate@sruc.ac.uk">chris.leggate@sruc.ac.uk</a></th>
<th>t: 01292 886172</th>
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<tr>
<td>Chris Leggate</td>
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Entry Requirements

**Minimum entry requirements for the BSc/BSc (Hons) Renewables & Environmental Technology:**
Typically four Scottish Highers/Irish Leaving Certificate subjects at Higher level (BBCC) or three A-Levels (BCC), to include a science subject or geography.

**Minimum entry requirements for HND Green Technology:**
Typically two Scottish Highers/Irish Leaving Certificate subjects at Higher level (CC) or one A-Level pass, to include a science subject or geography.

**Advanced entry** into Year 2 or 3 may be possible with a highly relevant HNC/D, Foundation Degree or similar qualification.
How to Apply

Application for full-time study on HND and degree (BA/BSc) courses is through UCAS (www.ucas.ac.uk). Please consult our website or prospectus for further details.

**Codes for UCAS application are as follows:**
- Institution code name: SRUC
- Institution code: S01
- Campus code: Y (Ayr)
- HND Green Technology: 89FC HND/GT
- BSc/BSc (Hons) Renewables & Environmental Technology: CF98 BSc/GT

Those wishing to study part-time will need to contact SRUC directly or apply on-line via the SRUC website at www.sruc.ac.uk/courses.

*The BSc/BSc (Hons) Renewables & Environmental Technology degree is awarded by the University of Glasgow.*
About Scotland’s Rural College (SRUC)

2012 saw the merger of Scotland's four land-based institutions: Barony, Elmwood and Oatridge Colleges and the Scottish Agricultural College. They now form Scotland’s Rural College (SRUC) – the largest institution of its kind in Europe.

SRUC is an unusual organisation. Like a University, we have expertise in the areas of Education and Research, but in addition we also offer unrivalled links with industry through our Consultancy division and business services. We don't just offer undergraduate and postgraduate degree courses but we offer a full range of programmes at all levels from access courses and vocational studies through to PhDs.

We try to offer opportunities to study at whatever level is appropriate for you to join us at, and hope that you will stay with us, seamlessly progressing through educational levels and qualifications, until you have reached or exceeded your educational goal. You will find we offer courses which all link to the ways in which we make use of the land and natural resources around us – from agriculture and food production, the science that supports those industries, the way we interact with and support the environment around us, the business and industry which relies on these resources, to how we use outdoor space and the countryside in our recreation and leisure time.

SRUC comprises 6 campuses in locations around Scotland:

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Out and About

Study Visits

Study visits are an integral part of the course, showing students the relevance and practical applications of the technologies studied in class. Site visits are particularly important for the second and third year case studies, which are based on real scenarios involving particular sites. Each year, students are invited to the All-Energy conference and exhibition, at which they can attend seminars on cutting edge technological advances as well as visit trade stands to gather up to date technical information and begin networking to make contacts for future employment.

Study Tour

In the third year of the course you will have the opportunity to undertake a study tour, with a varied programme of visits demonstrating a wide range of renewable and environmental technologies. Recent study tours have included visits to Ensus bioethanol plant, Narec, the Centre for Process Innovation, Kielder hydroelectric scheme, a manufacturer of hydroelectric turbines and a woodfuel district heating scheme, together with the associated forest management, harvesting, chipping and storage of woodfuel. Sustainable building technologies were also included in the tours, with visits demonstrating low carbon construction methods and the use of insulation, solar panels and heat pumps, as well as systems for rainwater recovery, heat recovery and ventilation. In addition, study tours have visited other universities to find out about emerging developments e.g. Northumbria University's Sustainable Cities Research Institute, with its research into green building design, energy efficiency, geothermal energy, wind power, grid integration and photovoltaics.
Related Courses

SRUC offer courses in the following areas which may also be of interest. Please take a look at our website for further information:

- Land-based Engineering (NC, SVQ)
- Environmental Resource Management (BSc)

Courses at SRUC

SRUC offers a range of Undergraduate (HNC, HND and degree) courses as well as College and vocational courses in the following subject areas:

Agriculture | Golf
Sport | Hospitality
Environmental Studies
Animal and Equine Care
Animal and Applied Sciences
Sustainable Energy Technology
Land-Based Engineering | Business
Countryside and Conservation | Forestry
Horticulture, Landscape and Garden Design
Timetable

First and second years are broad and varied. You will study 15 “modules” (different subjects) each year. Each module normally has half a day of contact-time per week for a 10 week term. Some of this contact time will be lectures and some will be group work, visiting speakers, site visits, lab work, presentations, seminars, etc. You will, of course, have coursework and assignments to do outside the contact time as well.

In your 3rd and 4th year you will study 8 modules per year. Modules in degree years are divided between 2 semesters, so you will study half a day per week for 13 weeks for each module and will have an examination at the end of the semester. During the degree years there is an even greater emphasis on self-study and you will be given assignments to undertake in your own time, outside of the contact hours.

You will see from the course content information that some modules are “core” (compulsory) while some are electives. Leaving you a choice of elective modules allows you to tailor your course to your own areas of interest.

Modes of Study

This course can be studied full-time or part-time. Part time study usually involves studying at half the pace of full-time, making it possible to juggle work or other commitments at the same time as studying.
<table>
<thead>
<tr>
<th>Location</th>
<th>Contact Details</th>
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</table>
| Aberdeen   | Marketing and Student Recruitment Officer SRUC Aberdeen  
              Craibstone Estate  
              ABERDEEN  
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              T: (01224) 711189  
              E: aberdeen@sruc.ac.uk |
| Ayr        | Marketing and Student Recruitment Officer SRUC Ayr  
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              UNIVERSITY AVENUE  
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| Edinburgh  | Marketing and Student Recruitment Officer SRUC Edinburgh  
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              T: (01506) 864800  
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