Photovoltaics and Solar Energy

SOLAAH

The stream includes training in technology development, manufacturing, quality control, reliability and life-cycle analysis, cell interconnection and encapsulation, a range of solar cell applications, system design, maintenance and fault diagnosis, marketing, policy development and the use of other renewable energy technologies. Emphasis is placed on gaining hands-on experience of working with solar energy devices, modules and systems.

Innovative teaching techniques have been developed to enhance the learning environment including the 'Virtual Production Line' and 'Virtual World Solar Car Challenge'. UNSW academics in the photovoltaic field have been consistently ranked amongst the leaders worldwide through international peer review. This team has held the world record for silicon solar cell efficiencies for decades and were responsible for developing the most successfully commercialized new photovoltaic technology internationally throughout the same period. From 2006 onwards we have seen an explosion of interest in the School's technologies from major industry players all around the world.

Second Area of Specialisation

The cross-disciplinary nature of photovoltaics and renewable energy applications necessitates many PV engineers possessing broad engineering backgrounds or else working in teams with other engineers. A good example is the UNSW Solar Car Project involving PV engineers, electronics engineers, control engineers, mechanical engineers, chemical engineers, power engineers, biomedical engineers, computer engineers, and communication engineers. Therefore it is important for photovoltaic engineers to have a broader understanding of other engineering disciplines.

A unique feature of this stream is that in Year 2, students have the opportunity to select a strand to complement their education in Photovoltaics and Solar Energy. Each strand comprises 18 units of credit with the opportunity to subsequently select additional electives in the corresponding area in the final two years, subject to the
approval of the Undergraduate Coordinator. The strands available are listed below and cover areas such as computing, electronics, mathematics, mechanical engineering, civil engineering, physics, chemical engineering, and architecture. Students may also formulate their own strands subject to the approval of the Undergraduate Coordinator.

Selection of a second area of specialisation is subject to the stream rule that states that no more than 60 UOC of first-year level courses may be counted toward the BE (Hons) in Photovoltaics and Solar Energy.

Photovoltaics and Solar Energy is also available as a component of the dual degree programs.
**Faculty**
Faculty of Engineering

**School**
School of Photovoltaic and Renewable Engineering

**Study Level**
Undergraduate

**Minimum Units of Credit**
168

**Specialisation Type**
Honours
Available in Program(s)

Program(s) in which this honours is available

Bachelor of Engineering (Honours) - BE (Hons)
**3707 Engineering (Honours)**
Faculty: Faculty of Engineering
Campus: Kensington
Units of Credit: 192
Typical Duration: 4 Years
Specialisation Structure

Students must complete 168 UOC.

Level 1 Core Courses

Students must complete 42 UOC.

Note: Students doing a Computing Strand should take COMP1911.

ENGG1000  |  6 UOC
Introduction to Engineering Design and Innovation

MATS1101  |  6 UOC
Engineering Materials and Chemistry

One of the following:
MATH1131  |  6 UOC
Mathematics 1A

MATH1141  |  6 UOC
Higher Mathematics 1A

One of the following:
MATH1231  |  6 UOC
Mathematics 1B

MATH1241  |  6 UOC
Higher Mathematics 1B

One of the following:
PHYS1121  |  6 UOC
Physics 1A

PHYS1131  |  6 UOC
Higher Physics 1A

One of the following:
PHYS1221  |  6 UOC
Physics 1B
PHYS1231 | 6 UOC
Higher Physics 1B

One of the following:

COMPI911 | 6 UOC
Computing 1A

ENGG1811 | 6 UOC
Computing for Engineers

**Level 2 Core Courses**

Students must take 42 UOC of the following courses.

Note: Students selecting Mathematics Strand and Physics Stand, and BE/BSc students majoring in 'Mathematics' or 'Physics' should replace MATH2019 with MATH2011 Several Variable Calculus and MATH2121 Theory and Applications of Differential Equations.

MATH2089 | 6 UOC
Numerical Methods and Statistics

SOLA2051 | 6 UOC
Project in Photovoltaics and Renewable Energy 1

SOLA2052 | 6 UOC
Project in Photovoltaics and Renewable Energy 2

SOLA2053 | 6 UOC
Sustainable and Renewable Energy Technologies

SOLA2060 | 6 UOC
Introduction to Electronic Devices

SOLA2540 | 6 UOC
Applied Photovoltaics

One of the following:
Level 3 Core Courses

Students must take 18 UOC of the following courses.

SOLA3010 | 6 UOC
Low Energy Buildings and Photovoltaics

SOLA3020 | 6 UOC
Photovoltaic Technology and Manufacturing

SOLA3507 | 6 UOC
Solar Cells

Level 4 Core Courses

Students must take 30 UOC of the following courses.

ELEC4122 | 6 UOC
Strategic Leadership and Ethics

SOLA4012 | 6 UOC
Photovoltaic Systems Design

SOLA4951 | 4 UOC
Research Thesis A

SOLA4952 | 4 UOC
Research Thesis B

SOLA4953 | 4 UOC
Research Thesis C
Discipline Elective

Students must take 6 UOC of the following courses.

Note: Approval of the Undergraduate Coordinator is required for selection of courses from outside the school.

any level 3 course offered by Faculty of Engineering

any level 4 course offered by Faculty of Engineering

any level 3 Photovoltaics and Solar Energy course

any level 4 Photovoltaics and Solar Energy course

Level 1 Prescribed Electives

Students must take at least 12 UOC of the following courses.

CHEM1031 and CHEM1041 will only be available to students enrolled in a program which has a Chemistry major.

BABS1201 | 6 UOC
Molecules, Cells and Genes

BIOM1010 | 6 UOC
Engineering in Medicine and Biology

BIOS1301 | 6 UOC
Ecology, Sustainability and Environmental Science

CEIC1000 | 6 UOC
Sustainable Product Engineering and Design

CHEM1011 | 6 UOC
<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM1021</td>
<td>6</td>
</tr>
<tr>
<td>CHEM1031</td>
<td>6</td>
</tr>
<tr>
<td>CHEM1041</td>
<td>6</td>
</tr>
<tr>
<td>CHEM1811</td>
<td>6</td>
</tr>
<tr>
<td>CHEM1821</td>
<td>6</td>
</tr>
<tr>
<td>COMP1521</td>
<td>6</td>
</tr>
<tr>
<td>COMP1531</td>
<td>6</td>
</tr>
<tr>
<td>CVEN1701</td>
<td>6</td>
</tr>
<tr>
<td>ELEC1111</td>
<td>6</td>
</tr>
<tr>
<td>ENGG1100</td>
<td>6</td>
</tr>
<tr>
<td>ENGG1200</td>
<td>6</td>
</tr>
</tbody>
</table>

**Chemistry 1A: Atoms, Molecules and Energy**

**Higher Chemistry 1A: Atoms, Molecules and Energy**

**Higher Chemistry 1B: Elements, Compounds and Life**

**Chemistry 1B: Elements, Compounds and Life**

**Engineering Chemistry 1A**

**Engineering Chemistry 1B**

**Computer Systems Fundamentals**

**Software Engineering Fundamentals**

**Environmental Principles and Systems**

**Electrical and Telecommunications Engineering**

**Grand Challenges for Engineering**

**Undergraduate Special Projects**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1300</td>
<td>6</td>
<td>Engineering Mechanics</td>
</tr>
<tr>
<td>ENGG1400</td>
<td>6</td>
<td>Engineering Infrastructure Systems</td>
</tr>
<tr>
<td>GEOS1111</td>
<td>6</td>
<td>Fundamentals of Geology</td>
</tr>
<tr>
<td>GMAT1110</td>
<td>6</td>
<td>Surveying and Geospatial Engineering</td>
</tr>
<tr>
<td>MATH1081</td>
<td>6</td>
<td>Discrete Mathematics</td>
</tr>
<tr>
<td>MATS1101</td>
<td>6</td>
<td>Engineering Materials and Chemistry</td>
</tr>
<tr>
<td>MINE1010</td>
<td>6</td>
<td>Mineral Resources Engineering</td>
</tr>
<tr>
<td>PHYS1231</td>
<td>6</td>
<td>Higher Physics 1B</td>
</tr>
<tr>
<td>PSYC1001</td>
<td>6</td>
<td>Psychology 1A</td>
</tr>
<tr>
<td>SOLA1070</td>
<td>6</td>
<td>Sustainable Energy</td>
</tr>
</tbody>
</table>

**Strand Electives**

Students may choose up to 18 UOC of elective courses in a particular area of focus (Strand) such as Computing, Electronics, Electric Energy, Communications and Control, Mathematics, Mechanical Engineering, Chemical Engineering, Physics, Faculty of Built Environment or may also formulate their own Strands subject to the approval.
of the Undergraduate Coordinator.

Note:

- The Strand options listed are subject to change and may not be available every year.

- Strand options are for students commencing the second year of their program; third year students should complete the strand courses they have already nominated and consult the School Office as required.

ARCH1361 | 6 UOC
Architectural Science and Building Environment 2

BENV1072 | 6 UOC
Design for Energy Efficiency

CEIC2000 | 6 UOC
Material and Energy Systems

CEIC2001 | 6 UOC
Fluid and Particle Mechanics

CEIC2002 | 6 UOC
Heat and Mass Transfer

CODE2170 | 6 UOC
Building Information Modelling

COMP1921 | 6 UOC
Computing 1B

COMP2041 | 6 UOC
Software Construction: Techniques and Tools

COMP2121 | 6 UOC
Microprocessors and Interfacing
<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP2911</td>
<td>6</td>
<td>Engineering Design in Computing</td>
</tr>
<tr>
<td>ELEC2133</td>
<td>6</td>
<td>Analogue Electronics</td>
</tr>
<tr>
<td>ELEC2134</td>
<td>6</td>
<td>Circuits and Signals</td>
</tr>
<tr>
<td>ELEC3104</td>
<td>6</td>
<td>Digital Signal Processing</td>
</tr>
<tr>
<td>ELEC3105</td>
<td>6</td>
<td>Electrical Energy</td>
</tr>
<tr>
<td>ELEC3106</td>
<td>6</td>
<td>Electronics</td>
</tr>
<tr>
<td>ELEC3114</td>
<td>6</td>
<td>Control Systems</td>
</tr>
<tr>
<td>ELEC3115</td>
<td>6</td>
<td>Electromagnetic Engineering</td>
</tr>
<tr>
<td>ELEC3117</td>
<td>6</td>
<td>Electrical Engineering Design</td>
</tr>
<tr>
<td>ELEC4614</td>
<td>6</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>MATH2011</td>
<td>6</td>
<td>Several Variable Calculus</td>
</tr>
<tr>
<td>MATH2121</td>
<td>6</td>
<td>Theory and Applications of Differential Equations</td>
</tr>
<tr>
<td>Course Code</td>
<td>UOC</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>MATH3041</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MATH3101</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MATH3121</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MATH3261</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MECH3610</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MECH4620</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MECH9720</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MMAN2600</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>MMAN2700</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>PHYS2111</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>PHYS3111</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>PHYS3113</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Mathematical Modelling for Real World Systems

Computational Mathematics

Mathematical Methods and Partial Differential Equations

Fluids, Oceans and Climate

Advanced Thermofluids

Computational Fluid Dynamics

Solar Thermal Energy Design

Fluid Mechanics

Thermodynamics

Quantum Physics

Quantum Mechanics
Thermal Physics and Statistical Mechanics

PHYS3118 | 6 UOC
Quantum Physics of Solids and Devices

TELE3113 | 6 UOC
Analogue and Digital Communications

**Recommended Level 1 Electives**

- ELEC1111 Elec & Telecomm Eng (6 UOC)
- SOLA1070 Sustainable Energy (6 UOC)

**Enrolment Disclaimer**

You are responsible for ensuring you enrol in courses according to your program requirements. myUNSW enrolment checks that you have met enrolment requirements such as pre-requisites for individual courses but not that a course will count towards your program requirements. Do not assume that because you have enrolled in a course that the course will be credited towards your program.
Additional Information

Professional Recognition

The BE (Hons) in Photovoltaics and Solar Energy is fully accredited by Engineers Australia.
Pre-2019 Handbook Editions

Access past handbook editions (2018 and prior)

Pre-2019 Handbook Editions
© UNSW Sydney (CRICOS Provider No.: 00098G), 2019. The information contained in this Handbook is indicative only. While every effort is made to keep this information up-to-date, the University reserves the right to discontinue or vary arrangements, programs and courses at any time without notice and at its discretion. While the University will try to avoid or minimise any inconvenience, changes may also be made to programs, courses and staff after enrolment. The University may also set limits on the number of students in a course.

Authorised by Deputy Vice-Chancellor (Academic)
CRICOS Provider Code 00098G
ABN: 57 195 873 179