

## ***Information for universities seeking to have a qualification accredited by the Australian Institute of Physics.***

Physics is the study of matter and energy and their interaction. Physical laws are universal and international in their application. A graduate physicist should be able to mathematically model a wide range of physical processes by :

- making appropriate assumptions and limitations,
- estimating the magnitudes of effects of inputs and outputs,
- making measurements to test and refine models of physical processes,
- connecting models and their impact on the wider community in meaningful ways, and
- communicating models and their outputs to both expert and non-expert audiences.

The Institute encourages universities to offer degree programs that will provide its graduates with automatic eligibility for admission to the grade of Member of the Australian Institute of Physics. The accreditation of qualifications is overseen by the Registrar of the Institute, who is a member of the Executive of the Institute.

### **(1) Assessment guidelines for Membership of the Institute**

It is expected that accredited qualifications will satisfy one of the following three categories:

#### **(a) A Bachelor degree with a major in Physics or Applied Physics or with major studies involving substantial applications of Physics:**

As a minimum requirement, 1 year equivalent of the total degree program should be classifiable as physics, with a half year equivalent of "core principles of Physics" (as specified below) beyond the introductory degree program level, or such alternative arrangements as satisfy the Institute. Accreditation panels will expect to see evidence of sequential development of physics and mathematics knowledge and skills.

The inclusion of substantial experimental experience is mandatory. Some laboratory components should be included at higher levels. While simulations may have a role in experimental work, they should not dominate the laboratory experience.

The mathematics components should reflect the importance of mathematics to physics and should have require students to understand material beyond an introductory level. As a guide, a three year degree program should include appropriate problem solving skills in Pure and/or Applied Mathematics including Differential Equations, Vector Analysis, Linear Algebra and Complex Analysis.

#### **(b) A Bachelor degree with Honours in Physics or Applied Physics:**

It is assumed that the requirements for such a degree program will be comparable, but not necessarily identical to the requirements in (a) above. Please note that if the three-year

bachelor degree satisfies the requirements of the AIP there is no need to provide information on an honours program.

**(c) Other qualifications:**

Other qualifications which are demonstrably at least the equivalent of any of the above, may be deemed sufficient grounds for admission to Graduate Membership of the Institute, as determined by the Accreditation Panel on an individual basis.

**Notes:**

- "Core principles of Physics" is taken to include a balance of topics such as: Classical Mechanics, Electromagnetism, Quantum Physics, Nuclear and Particle Physics, Thermal Physics, Optics, Condensed Matter Physics, Waves and Sound and Relativity.
- It is recognised that this core material may in some cases also be embedded in topics such as Geophysics, Photonics, Optoelectronics, Laser Science, Medical Physics, Biomechanics, Biophysics, Space Science, Materials Science, Nanoscience, Nanotechnology, Plasma Physics, Astrophysics, Crystallography, Surface Physics, Electronic Device Physics or Atmospheric Physics. Accreditation Panels will assess degree programs on the breadth and level of the physics and mathematics understanding demonstrated by students rather than just on the description of the content.

**(2) Issues considered in the accreditation process.**

In examining a degree program for accreditation purposes, the accreditation panel will consider the following input factors:

- the general academic practices and standards of the education institution;
- the objectives of the degree program and the methods adopted to achieve these objectives;
- the requirements for and standards of admission to the degree program;
- the duration of the degree program;
- the breadth, depth and balance in the subjects involved and the intellectual effort and demands of the degree program;
- the methods of assessment of student progress;
- the arrangements for practical training and experience as part of the degree program;
- the teaching staff conducting the degree program, their numbers, professional qualifications and experience and their educational expertise;
- the accommodation and facilities available including equipment, libraries, laboratories, workshops etc.

The primary output factor of concern to the Accreditation Panel is the quality of the student experience. This will be assessed through interviews with students and consideration of student outputs, however the University may wish to provide further submissions to the Panel on:

- pass, withdrawal rates rates for the program as a whole at some subjects//units courses;
- marks/grade distribution profiles of some subjects//units courses;
- the general quality of student work (laboratory/project reporting, assignments and examinations);
- Graduate employment/study destination;

Each university requesting accreditation of a degree program or degree programs, will be required initially to provide the information listed below in a clear and concise form and subsequently to host a visit of up to one day's duration by an Accreditation Panel. This panel will normally comprise 3 members of the full Accreditation Committee of the Institute.

### (3) Documentation required:

(It is anticipated that much of the documentation required could be extracted by Universities from existing handbooks, university web sites and similar publications.)

- a statement of the objectives of the degree program;
- a statement of the requirements for completion of the degree (or the degree sequence for which accreditation is sought);
- a demonstration that the physics and mathematics in the degree program meets the AIP requirements (see section 5);
- details of all subjects including syllabi, classifiable as physics or mathematics, which could be included in a properly constituted degree program including details of texts, the relevant pre- and co- requisites and a statement of the methods and types of assessment used and their relative weightings;
- a description of a typical program of study leading to the award of the degree;
- brief resumes of the continuing and contract physics staff involved in teaching the degree program and a summary list of all physics teaching staff which includes their highest qualification and professional memberships. If this qualification is not in physics then the highest physics qualification should also be given.;
- A profile of the experience and qualifications of staff involved in face to face teaching in the degree program for the current semester. This includes all sessional staff involved in the teaching program and is probably best presented as a matrix.
- A map of the physics and mathematics studied in the program and its assessment against the following list of competencies for a graduate physicist:
  - 1. Demonstrate knowledge of fundamental physics concepts and principles;**
  - 2. Evaluate the role of theoretical models and empirical studies in the past and current development of physics knowledge;**
  - 3. Apply physics principles to understand the causes of problems, devise strategies to solve them and test the possible solutions.**
  - 4. Use a range of measurement and data analysis tools to collect data with appropriate precision and carry out subsequent analysis with due regard to the uncertainties.**
  - 5. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations;**
  - 6. Work effectively and ethically in a multi-faceted scientific environment; and**
  - 7. Be responsible, critically reflective, self-directed and motivated learners.**
- Evidence of a quality improvement process for the past 5 years. This should include any results of any internal evaluation data of courses/units/subjects/programs relevant to the program being accredited and any evidence of action taken in light of these results.
- any other material considered relevant by the university.

#### **(4) Arrangements for a Site visit:**

The Accreditation Panel will wish to meet the Chair of the Academic Unit or his/her nominees in the first instance, to clarify any queries related to their examination of the documentation previously provided. The panel will also wish to meet a sample of staff and students in separate sessions.

The panel will want to examine samples of the following covering a range of academic ability of the students involved:

- previous examination papers and typical student responses;
- examples of students' laboratory notebooks;
- examples of written and other work submitted by students for assessment.

In order to cover the range of student abilities, examples of assessment tasks may need to be collected over more than one academic year.

The Panel will tour the physical facilities available to students enrolled in the degree program, including laboratories, computing facilities, lecture theatres, libraries, technical workshops etc.

#### **(5) Report**

Following the site visit, the Accreditation Panel will produce a report which will be confidential between the Academic Unit involved, the Panel and the Executive of the Institute.

The Chair of the Accreditation Panel is expected to produce the first draft for discussion within one month of the site visit and if he/she is unable to do that he/she will ask another panel member to write the draft. The report should be finalised within two months.

#### **(6) Accreditation Process**

1. The Registrar or proposed Chair of the Accreditation Panel contacts the Head of the Academic Unit and discusses the accreditation process.
2. The Registrar appoints an Accreditation Panel which normally consists of three individuals from the Accreditation Committee. The panel typically comprises one member who is also a member of the Membership Committee, one Accreditation Committee member from the state in which the accreditation is to be carried out and one member from an adjoining state.
3. The Registrar or Accreditation Panel Chair writes to the Academic Unit and formally invites the University to put forward their degree program(s) for accreditation. Enclosed with this letter is an attachment giving details of the accreditation process and a further document defining the criteria against which degree programs will be assessed.
4. The university makes a written submission in the manner required by the Institute (section 3).
5. The submission is circulated to the Accreditation panel and then a date for a one day visit to the university is agreed with the Panel Chair.
6. The Panel Chair writes the draft report and after getting the agreement of the rest of the Panel, sends it to the university for comment.
7. The Panel Chair attempts as far as possible to get the agreement of the university. When no further progress seems possible or necessary, the report is presented to the Membership Committee for acceptance. The Registrar then submits it to the Executive of the Institute for approval. In the event of a negative report or one lacking the agreement of the university concerned, the Registrar will also advise the Executive of these matters and recommend on any relevant action as a consequence of the report.

8. After approval of the Executive, the final report is signed by the President and sent to the university. A covering letter is also sent advising the university of an appeals process in the event that it wishes to challenge any aspect of the report.
9. The appeals will be considered by the Executive after receiving a written submission from the university and written comments on that submission from the Chair of the Accreditation Panel. The university will have the right to have a member of the staff present its case in person provided that all costs associated with such presentation are met by the university.

## **(7) Fees and Charges**

The fee for an accreditation within Australia is \$2000, plus travel costs, accommodation costs and GST. Upon application through the Registrar, the AIP Executive may reduce the fee.

The conditions and fees for accreditation for institutions outside Australia is available through the Registrar.