

Chairperson: Dr Kevin McGuigan

Please reply to:
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Mr Brendan O'Dea
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31st May 2012

Re: Teaching Council of Ireland's consultation on proposed requirements for entry to initial teacher education programmes (post-primary)

Dear Mr O'Dea

Please find enclosed a response from the Institute of Physics in Ireland to the Teaching Council's consultation on entry to initial teacher education programmes (post-primary).

If you require any further information, please do not hesitate to get in touch.

Yours sincerely,



Dr. Kevin McGuigan
Chairperson
Institute of Physics in Ireland

Teaching Council of Ireland proposed entry requirements for entry to a programme for initial teacher education (post-primary)

Institute of Physics in Ireland Response

May 2011

The Institute of Physics in Ireland (IOP) is a scientific membership organisation devoted to increasing the understanding and application of physics in both Northern Ireland and the Republic of Ireland. It has over 2000 members, and is part of the Institute of Physics which has a world-wide membership of over 40,000 and is a leading communicator of physics-related science to all audiences, from specialists through to government and the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

The Institute also accredits physics degree programmes in the UK and Ireland and keeps a register of all such degrees.

The Institute has extensive experience in providing support for the teaching of physics at all levels. It does this through its network of teacher co-ordinators who work closely with the Department of Education to provide ongoing professional career development through workshops, demonstrations, conferences, talks, newsletters and one-to-one support. The IOP also has close contact with providers of initial teacher education in physics both in Ireland and the UK.

From this background of experience in physics teacher education the Institute of Physics in Ireland welcomes the opportunity to submit a response to the Teaching Council consultation on its proposed entry requirements for entry to a programme for initial teacher education (post-primary).

The Institute warmly welcomes the aspirations of the Teaching Council's draft policy, particularly in its overall thrust to achieve cohesiveness across all subject areas. We are confining our comments to those areas which impact on the teaching and learning of physics, a subject of critical importance to the understanding of all science and a significant driver of innovation in areas as diverse as medical technology, energy and communications.

Physics Qualifications

The Institute concurs with the suggested requirements for entry in respect of the curricular subject of Physics as indicated on Page 64 of the document. Certainly the Institute can confirm that all IOP accredited degrees meet and exceed these standards. Typically an IOP accredited physics degree would have 240 ECTS (European Credit Transfer System) credits, compared with the requirement in section 1 (c) that the qualifying degree should carry at least 180 ECTS.

The IOP document¹, '*The Physics Degree Graduate Skills Base and the Core of Physics*' details the skills and achievements that graduates of accredited degree

programmes should have. The Institute has also worked closely with the UK's QAA - Quality Assurance Agency for Higher Education and all accredited physics degrees comply with its benchmark statement for physics, astronomy and astrophysics².

Successfully accredited degree programmes are listed in the IOP Register of Accredited Degree Courses³.

Given the content of such accredited degree programmes the Institute suggests that the Teaching Council could accept all IOP accredited degrees as meeting their requirements for entry to initial teacher training.

Experimental/practical work

All IOP accredited degrees (including theoretical physics degrees) carry a significant element of practical work. For a non-theoretical physics degree this normally accounts for about 15 ECTS. However the Institute notes that it may be difficult for students to quantify their practical work in a theoretical physics degree as the work may be incorporated within a range of modules which include both theory and experiment,

The Institute concurs that such experience is essential for entry to teacher training programmes. This issue is particularly important given the focus of the NCCA's (National Council for Curriculum and Assessment) review of Leaving Certificate physics.

Applicants from non-standard degrees

The Institute is very keen to encourage the participation of suitably qualified graduates in the teaching of physics. This is particularly important in the case of physics as, according to research by the Association of Secondary Teachers in Ireland⁴, around 60% of all Junior Certificate Science teachers are also Leaving Certificate Biology Teachers. This suggests that physics, in the earlier school years, is not being taught by a specialist physics teacher.

With relatively small numbers of students taking physics at third level and reflecting trends experienced in the UK, it is likely that that such out-of-field teaching will increase at all levels throughout schools. It is of particular note that in the UK many engineers are recruited as physics teachers. Since much of engineering is applied physics this is highly valuable and useful experience for a potential physics teacher.

It is significant to note that at school, "physics" is a preparation for further study and practice in physics, engineering and a range of other subjects. Almost any graduate will have some holes in their knowledge and it is important to accept that as an issue that can be solved

It may be of use to the Teaching Council to know that the IOP is developing a set of diagnostic questions which test a potential teacher's depth of understanding of basic physics. The tests will be available on-line.

To facilitate the necessary up-skilling of teachers the IOP is also working closely with the Professional Development Service for Teachers through its teacher network co-ordinators to provide courses and workshops.

The third-level providers of physics courses are also keen to facilitate potential teachers by giving access to those modules which an applicant might need to complete their portfolio prior to their application for teacher registration.

Applications for registration for the teaching of Mathematics and Applied Mathematics

Ideally the Institute believes that mathematics should be taught by suitably qualified mathematics graduates. However given the pressure that some schools are finding to maintain numbers in physics classes, it is likely that some schools would prefer to appoint physics teachers who can also teach mathematics. The Institute believes that an IOP accredited physics graduate has the necessary mathematical core knowledge and skill to teach mathematics and particularly applied mathematics. In particular it is worth noting that IOP accredited physics programmes are required to include, as a minimum, the following areas of mathematics:

- Trigonometric and hyperbolic functions; complex numbers
- Series expansions, limits and convergence
- Calculus to the level of multiple integrals; solution of linear ordinary and partial differential equations
- Three-dimensional trigonometry
- Vectors to the level of div, grad and curl; divergence theorem and Stokes' theorem
- Matrices to the level of eigenvalues and eigenvectors
- Fourier series and transforms including the convolution theorem
- Probability distributions
- Classical Mechanics

The Institute of Physics in Ireland would be very pleased to continue to work with the Teaching Council of Ireland, Department of Education and Skills and other bodies to help provide support and training to teachers at all levels and throughout their professional development. In particular, should the Teaching Council require input in relation to applicants for registration as physics teachers, we would be very pleased to assist.

References:

1. The Institute of Physics - The Physics Degree

http://www.iop.org/education/higher_education/accreditation/page_43310.html
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2. Quality Assurance Agency Benchmark Statement for Physics, Astronomy and Astrophysics

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Subject-benchmark-statement-Physics-astronomy-and-astrophysics.aspx>

3. IOP Register of Accredited Degree Courses

http://www.iop.org/education/higher_education/accreditation/page_43310.html

4. ASTI Junior Cycle Science Survey April 2010

<http://www.asti.ie/publications/other/>

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