We value and support all teachers of physics, whatever your background.

You have probably never heard of Eric Green, but I want to give you an idea of the impact that his work has had on physics in the UK.

Mr Green was my physics teacher at secondary school. His lessons stimulated my interest in physics, leading me to study it at university. I am now a professor of experimental physics; my research has been picked up and developed by industry and I have supervised more than 80 PhD students, many employed in high-tech industries in the UK.

Of course, Mr Green didn’t teach just me. A quick calculation of the number of people he influenced directly – or indirectly, through people like myself – illustrates the critical role of teachers to the future of physics, and thereby to the economy.

At the IOP, we aim to make access to high-quality physics education open to all. To achieve this, we must ensure that teachers of physics are properly recognised and rewarded for the amazing things that they do.

So whether you are a physics graduate or have another background, we offer you support from your first teaching practice throughout your entire school career.

This booklet describes some of the ways that we do this, from materials to develop your own understanding of physics to advice on running practical demonstrations in the lab. You’ll also find out about our teacher support networks and online discussion forum.

With best wishes for your initial teacher education.

Professor Roy Sambles FRS CPhys FInstP
President of the Institute of Physics
IOP Student Teacher Affiliation

We offer FREE support to all student science teachers.

We’re here to help you teach physics whatever your specialism and whatever the level of the students you are teaching.

As part of the physics teaching community, we will send you regular email updates with tips, teaching resources, career support and events specially created for student and early career teachers of physics.

You will also be able to join our TalkPhysics discussion group especially for early career teachers. It is a safe place to share reflections, ask for help and build up a strong support network. (See pages 8 and 9 to find out about TalkPhysics.)

Sign up now at iop.org/student-teacher

(Please note that we will not share your details with any other organisations and will only contact you with information relevant to teachers of physics.)

Mentoring for physics specialists (England only*)

We are able to offer a personalised light-touch mentoring programme to a number of student physics teachers. To find out more, visit stimulatingphysics.org/mentoring.

*This programme is funded by the Department for Education
Our bloggers

During the past few years, we’ve been fortunate to have PGCE students blogging during their training year. We asked them to be honest – and they were. Here are some excerpts from their early postings. Read them in full at iop.org/ltpblogs.

“I am a few weeks into my science PGCE and it has been brilliant. The best thing so far is that it has reinvigorated my interest in science. I’m noticing science in action everywhere I go, giving me ideas for potential lessons and examples of science in the real world.”

“In our very first week, we were set loose on a class of 16- and 17-year-olds. I still can’t believe that we survived the lesson, really enjoyed it, and most importantly, that some students actually learned something. That is probably the most important lesson I’ve learned in the first few weeks: it is not about you, but all about the students and their learning.”

“My one piece of advice for starting at your first school is to get stuck in straight away. I have helped in transition days for new year-7 pupils and open evenings at two different schools, attended child-protection courses and various CPD events. The first few weeks are the time to do all of this because when the teaching starts, I don’t think I will have as much free time.”

“I’d say the first few weeks of the PGCE have been quite overwhelming, but it has really helped to be with a group of people who are in the same boat.”

“I have been in school for four weeks now and I’m absolutely loving it. Some bits more than others, which is not surprising. Even after a hard day I still want to come back the following day – except if it is a weekend. Weekends are bliss!”

“One piece of advice that I got was to make friends with the technicians at the school. This has proved to be invaluable. The technicians have been extremely supportive, so far, of my ideas for experiments, dusting off old equipment and helping me rehearse experiments in advance.”

“My most comedy moment so far? Being told by my year-8 pupils that I look like Miley Cyrus. Not sure if this was a compliment or not?!”
Meet our team

We have drawn together some of the best and most experienced practitioners to create support networks for all teachers of physics.

Physics Network Co-ordinators (PNCs)

We have more than 50 PNCs throughout the UK and Ireland. They are very experienced teachers and former teachers who run free events and workshops for local teachers. You can also contact them for advice and support.

To find your local PNC, visit iop.org/network

Niloufar Wijetunge
PNC

I aim to build a network of teachers in my local area to promote dialogue and support them in teaching physics.

I'm particularly keen to ensure that we can inspire students to pursue physics post-16. Establishing strategies to tackle the shortage of girls in physics is also very important to me.

I've been teaching for more than 15 years (science up to GCSE, and physics and maths at A-level). I have run lots of science enrichment projects in schools and in my spare time, I'm a personal trainer.

Teaching and Learning Coaches (TLCs)

Additionally, in England, our team of Stimulating Physics TLCs offer mentoring and workshops exclusively to early career teachers of physics.

To find your local TLC, visit stimulatingphysics.org/mentoring

Alessio Bernadelli
TLC

I have been mentoring early career teachers and coaching teachers of physics from different backgrounds for more than three years.

I always look forward to meeting new teachers. In my region, I organise regular workshops to help early career teachers develop best practice through both discussion and practical activities.

I am passionate about sharing ideas and networking with teachers from all sectors, through online support, face-to-face visits, or even just for a coffee to catch up and encourage them in difficult times.

Niloufar Wijetunge
PNC

Alessio Bernadelli
TLC
IOP resources for teachers of physics

Finding new and engaging resources that you can trust is challenging. So we have created teaching materials that cover every level of physics teaching at secondary level.

Supporting Physics Teaching (SPT)

Teaching physics presents unexpected challenges to both specialist and non-specialist teachers. The SPT materials have been developed for all new teachers of physics, boosting subject knowledge, highlighting common problem areas for pupils and offering teaching strategies. Explore SPT online at supportingphysicsteaching.net.

Teaching Advanced Physics (TAP)

TAP offers a comprehensive set of detailed resources to help you to plan lessons for 16–19 year olds. The resources are aimed at those who are new to teaching this age group, and don’t assume that you have lots of equipment or had advice from experienced colleagues. Adapt the resources to work for you. Download TAP (Word documents) at tap.iop.org.

Practical Physics

Physics practicals are a vital part of your students’ experiences at school. The Practical Physics website describes proven experiments in sufficient detail that they will work in any school laboratory. It also provides notes about teaching and learning, as well as health and safety issues. The site is ideal for teachers who wish to develop their practical craft in physics. Visit practicalphysics.org.

Key Stages 2, 3 and 4

Key Stage 5

All key stages
@TakeOnPhysics
Our Twitter feed is great for new teachers of physics. We use it to share ideas, events and resources: from the best physics apps to raising awareness of physics education policy issues and CPD events around the UK and Ireland.

Follow @TakeOnPhysics to build your own teacher network and connect with the wider physics community.

Classroom Physics
Look out for Classroom Physics in the schools that you visit. It’s the Institute’s termly magazine for teachers of physics. It will keep you informed about the meetings, INSET courses, resources and support that the Institute and other organisations offer to all teachers of physics. It also includes some starter ideas, teaching tips and worksheets, particularly for 11–16-year-old students. You can find it online at iop.org/classroomphysics.

Physics Education
Physics Education is the Institute’s journal on research into physics pedagogy. It is worth looking at for your ITE coursework and it’s also essential reading throughout your career – keeping up with the latest education research is a powerful way to keep your teaching fresh. View the latest journal online at iopscience.org or check for the journal at your ITE centre.
Why it’s good to TalkPhysics

You’re up late planning a lesson and suddenly realise that something you thought you understood now makes no sense whatsoever. Don’t worry – support is on hand 24/7 at TalkPhysics!

TalkPhysics is a digital community of more than 10,000 members – teachers, technicians, teacher trainers and others who are involved in physics education. It is a safe space for exploring ideas, seeking advice and discovering new resources for teaching physics.

You will see that new and early career teachers regularly join in discussions and ask for advice because our members are always supportive and ready to share their experiences.

- **Forums**: easy to use discussion forums. You can attach resources and we have an equation editor too.
- **Groups**: you can join interest groups as well as set up private groups for confidential chats with colleagues.
- **Webinars**: tune in monthly for ideas on classroom practice.
- **Events calendar**: stay up to date with events, workshops and CPD for teachers of physics both locally and nationally.
- **Articles**: regular news, expert comment and updated resources plus simple experiments from our resident cat and dog physicists, Marvin & Milo.
- **Early Career Teacher area**: content tailored to trainee, newly qualified and early career teachers at talkphysics.org/ect.

Join us at talkphysics.org
Tom soon discovered that he was the only A-level physics teacher at the school where he was doing his employment-based training. In addition, he found lots of equipment that he didn’t recognise and no usable scheme of work. TalkPhysics members rallied around, asking him to post photos so that they could identify kit, sharing their SoWs and telling him how they’d survived similar experiences.

Claire was being observed teaching a lesson on conductors and insulators to a mixed-ability class. She was looking for activities that would get the class moving around. Her request prompted 21 comments, many the same day, with suggestions for games, some video clips and practical ideas. It also stimulated a discussion on the pros and cons of different models and approaches.

Allwyd had a job interview and had been asked to prepare an hour-long lesson on Newton’s first law and teach the first 20 minutes. As well as suggestions for activities and clips to use, TalkPhysics users gave him advice on how to structure a lesson; a warning that some schools block video-hosting sites; and an insight into what the interviewer would be looking for.
Help! I’m not a physicist

Never really liked or understood physics when you were at school? Dread the thought of having to teach it?

It’s OK. We know that there are plenty of science graduates starting their teacher-training courses who worry about physics. But don’t be afraid of teaching physics, even if it is not your main science specialism.

You can’t escape the fact that, whatever the subject, you need a good understanding to teach it effectively. But you’re a bright graduate who is teaching teenagers. With a little preparation, you will manage to keep a few pages in front of your class. Many trainees discover that they begin to enjoy physics when they start to get to terms with it and can see how all of the pieces of the jigsaw fit together.

In fact, your lack of specialist knowledge can give you an advantage. When you are new to a topic, you may be able to see the difficulties that students are likely to encounter much more clearly than the physics specialist, to whom the ideas have become second nature. To use the jargon, you may find it easier to “scaffold” the students’ learning or identify the steps needed to gain understanding. There is a real satisfaction to be gained from taking a conceptually demanding idea and teaching it well, especially if the idea was new to you a few days earlier.

Some trainee teachers are nervous about physics practical work and this makes them reluctant to use it in their teaching. Most students enjoy doing hands-on work and you need a variety of activities within a lesson to keep it interesting – any experienced teacher will tell you that visual aids are a vital part of their toolkit. Find out what other people do and try their ideas for yourself. The golden rule is to try out everything before the lesson to make sure that it works. Use www.practicalphysics.org for ideas and advice.

Don’t forget, it does your job prospects no harm at all if you can state on your CV that you are keen and able to teach physics.
Surviving teaching practice

As a student teacher, whatever your training route, you will spend the majority of your time in the classroom. Whether you are at the front leading a lesson or at the back observing, this is where you will really learn how to teach.

Make the most of opportunities to observe experienced teachers. It may seem strange advice, but ignore the science because you can learn a lot just from watching. How does he/she:

engage the class?
keep them interested?
modulate his/her voice?
control behaviour?
handle transitions?
emphasise important points?
use body language?
assess progress?
manage materials?
create a positive learning environment?

You should have the opportunity to observe all of the classes that you will eventually teach, so learn the students’ names and become familiar with their classroom routines.

At first, your timetable will be less than 50% of the workload of an NQT. As you gain experience and grow in confidence, you will gradually increase the number of classes that you teach until you will be teaching about 75% of the NQT workload. You should be teaching across the ability range, at both Key Stage 3 and Key Stage 4, and teach all three sciences at some level.

You’ll have plenty of support. In the schools you will have a subject mentor and a professional mentor. You will probably work closely with the class teachers as well. Your tutor will pop in a couple of times to give you feedback and advice. Don’t forget to make time to get to know your coursemates or fellow trainees – remember that they’re going through the same experiences as you.

As the weeks in school progress, you will find that you experience a rollercoaster of emotions. Sometimes you will feel that you are “probably the best teacher in the world”, while at other times you will wonder why you bother. The secret is not to get carried away with your successes and to take your failings on the chin, and bounce back smiling.
Joining the Institute

Membership of the Institute is for everyone who has an interest in physics and its future. We have various grades of membership depending on your specialism and career stage.

- **Member** – for those with at least three years’ post-degree experience during which professional physics skills (this includes teaching) have been acquired.

- **Associate Membership** – available to physical sciences or engineering graduates. After three years in teaching, you can become a full Member.

- **Affiliate Membership** – for anyone with an interest in physics but no formal background.

- **IOPimember** – an online subscription to Physics World.

**Membership benefits include:**

- Access to IOP journals including Physics Education (see page 7)
- Full access to our international magazine Physics World
- Regional networks
- Discounted rates at IOP events and meetings.

For more details about joining the Institute, visit iop.org/membership.

The Institute of Physics is a leading scientific membership society working to advance physics for the benefit of all.

We have a worldwide membership of more than 50,000. Our purpose is to gather, inspire, guide, represent and celebrate all who share a passion for physics.

Alongside professional support for our members, we engage with policymakers and the public to increase awareness and understanding of the value that physics holds for all of us.

Find out about our strategy for success at iop.org/strategy

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The Kitemark is a symbol of certification by BSI and has been awarded to the Institute of Physics for exceptional practice in environmental management systems. Certificate number: EMS 573735

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