The University of Manchester
Manchester Institute of Education

Secondary PGCE

Science PGCE Trainee Handbook 2023-2024

The purpose of this handbook

The purpose of the PGCE Science Trainee Handbook is to orientate you regarding all matters concerning your PGCE year. It will give you an idea of the PGCE Science course content and will help you navigate different aspects of the course, from placements to assignments. It will introduce you to the Science PGCE Curriculum, the Teacher's Standards and Core Curriculum Framework (CCF) from a subject perspective.

This handbook will give you an overview of teaching sessions specific to PGCE Science and outline the Educational and Professional Studies (EPS) sessions. It provides detailed information regarding subject specific reading to maximize your knowledge of teaching of your subject. It also highlights the expectations of trainees and mentors in your subject area, with a summary of key roles and responsibilities.

This subject handbook should be used in conjunction with PGCE Secondary Handbook which has useful guidance for all trainees regardless of subject area.

Contents

1. Welcome to the PGCE Science course at UoM

The University of Manchester Science PGCE Course is designed to ensure you are fully prepared to begin your career in education and to allow you to enter the profession as an Early Career Teacher (ECT). Throughout the course you will learn how to apply subject and curriculum knowledge, pedagogy, and assessment techniques to ensure that your students make progress and develop an interest in the subject. During the course you will be asked to engage in wider debates around education which will broaden your understanding from sociological and political position, allowing you to adapt your practice to a variety of school settings.

2. Support for individual needs and/or disability

Please make the course tutors aware of any individual needs or disability to allow us to support you as best we can. Alongside the support from your tutors, you can register with the Disability Advisory and Support Service (DASS) at the University of Manchester. Further information is available at www.dass.manchester.ac.uk. In the School of Environment, Education and Development (SEED) you can also access support from the Information, Advice and Guidance (IAG) Team in person 9am to 5pm Monday to Friday at the SID desk on the 2nd floor of the Arthur Lewis Building or you can e mail the team at seed.iag@manchester.ac.uk. To find out more you can follow the team on Instagram @uomseed.

3. Aims and overview of the PGCE Science course

The PGCE Science course draws on a range of expertise from the UoM Tutor team, teachers within partnership schools, and a range of experts within the field of education. The course focuses on many diverse aspects of science teaching; a broad overview is given below, although a more comprehensive overview of curriculum content is provided later in this handbook. You will receive a day-by-day breakdown of session plans at the start of each university teaching block:

- Understanding the importance of Science, and its different specialisms, and its place in the secondary school curriculum
- Developing subject and curriculum knowledge in Science
- Developing planning and pedagogy in the Science classroom
- Understanding how students learn in Science
- How to become an engaging and creative Science teacher
- Assessing progress in Science: how can we check what students know, think, and understand?
- Inclusive teaching which represents all learners and addresses their needs
- Understanding how to address barriers to learning in Science
- Securing your first job as a Science teacher

You will spend around 125 days in your placement schools, guided by trained mentors who will support your progress and give advice on all aspects of the role. All our PGCE courses aim to provide contrasting placements in order to give trainees a rich and diverse experience.

All trainees will gain experience teaching KS3, KS4 and KS5 Science while working towards achieving

Qualified Teacher Status (QTS). You will be awarded a Post Graduate Certificate in Education if successful, this will enable you to teach students aged from 11 to 18. The Science PGCE course follows the University of Manchester ITE Curriculum, which incorporates the Core Curriculum Framework (CCF), and is delivered in conjunction between the University and our partner schools. The aim is to provide a balance between the theoretical and practical elements of teaching Science and will equip you to address all areas of the Teacher's Standards.

The Department for Education believes, and we agree, that 'the quality of teaching is the single most important in-school factor in improving outcomes for pupils- and that is particularly important for pupils from disadvantaged backgrounds' (Department for Education 2019). The Initial Teacher Training (ITT) Core Content Framework sets out a minimum expectation in the curriculum that trainee teachers should experience:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974307/ITT_core_content_framework_.pdf

The University of Manchester PGCE course has been carefully structured so that all trainees can experience the activities detailed in ITT Core Content Framework in sequence that will support you as a trainee to succeed in the classroom. As a trainee, your subject tutor has designed the course so that you can experience the ITT Core Content Framework requirements in University sessions, in school practice, during University EPS sessions, and through academic assignments. You will find that your PGCE will go well beyond the minimum expectation of the ITT Core Content Framework and provide a curriculum that encourages research, criticality of theory, and demonstrates expert practice in teaching your subject. This will be further elaborated as you progress through the course.

4. The PGCE Science Curriculum

Science Tutors

There are three University tutors and three associate tutors, all of whom are qualified and experienced teachers:

Rob Buck (RB, subject leader)	C2.17	robert.buck@manchester.ac.uk
Zahra Alijah (ZA, course tutor)	C2.17	zahra.alijah@manchester.ac.uk
Andy Howes (AH, head of ITE)	C2.17	andrew.j.howes@manchester.ac.uk

Associate Tutors

Naina Kotecha (NK)	naina.kotecha@manchester.ac.uk
Mark Williams (MW)	mark.williams-6@manchester.ac.uk

The Science subject team have structured a curriculum that allows you to experience many aspects of teaching both within and outside your specialism. Through dialogue with subject mentors and observational visits, our science curriculum has been grounded in the needs of schools. The key to the curriculum is that trainees learn through observation, rehearsal, practice, and critical discussion.

Learning will take place in both university and the placement school settings; classroom practice will

be complemented by independent study tasks and the completion of academic assignments. At university you will experience a wide variety of sessions led by UoM tutors. You will also have opportunities to work with teachers from within our partnership schools, attend lectures/workshops from experts in various fields of science education, and will connect with a variety of researchers and specialists from within UoM. While on placement, alongside your teaching and the feedback you will receive on this, you will also develop through formal mentor meetings, observations of other teachers, and formal and informal meetings with colleagues. Importantly, you will be encouraged to reflect on your progress with your peers; something you will find invaluable.

Science Curriculum intent, implementation, and impact

The intention of the University of Manchester Science PGCE courses are to train teachers who can provide a high-quality science education to pupils in a range of school settings. Trainees will develop their understanding of the importance of the science subjects in educational contexts, how the National Curriculum is used to guide students' learning, and how to interpret exam specifications to deliver creative, engaging, and relevant lessons. Trainees will understand the sciences are broad and diverse subjects, each with their own demands in terms of subject knowledge and practical skills. Science trainees will reflect on their teaching and learning experiences to make informed choices on how best to teach science. They will be able to demonstrate sound assessment practices to ensure they are informed as to how their pupils have made progress in an activity, lesson, scheme of work, or phase of learning. Most importantly, trainees will learn from their practice and academic study that the sciences are subjects suitable for all pupils, no matter their need or background, and they will create a teaching culture that fosters inclusion and progress for all.

Intensive Training and Practice (ITAP)

Starting from the 2024/25 academic year, all initial teacher training (ITT) programmes in England must include an Intensive Training and Practice (ITAP) component. Intensive Training and Practice (ITAP) is designed to increase coherence between theory and practice and allow trainees to reflect on how research can inform practice. ITAP is part of the university component of the course and does not have to take place in a school; however, where it does, it must be additional to the placement itself.

During ITAP, trainees observe and reflect upon expert practice. The design of the experience should support trainees to understand what it is that makes such practice effective and to reflect on how it could be embedded in their own practice. Trainees should then have the opportunity to apply what they have learned through, for example, rehearsal and/or live practice, receiving constructive feedback from expert colleagues.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1079080/ITT_Reform_Accompanying_Document.pdf

The UoM five ITAP day themes reflect areas within our curriculum (and the CCF).

- Behaviour for learning (core area 1.2)
- Subject and curriculum knowledge (core area 2)
- How pupils learn (core area 3.2)

- Adaptive teaching (core area 3.3)
- Assessment (core area 4)

Following the ITAP days trainees will be encouraged to log their experiences reflections in their RoAD.

Science Curriculum Structure

Our Science curriculum is structured around a series of 'Core Questions' for you to reflect upon during each university/placement block of your PGCE (see Appendix 4). The full Science curriculum document details what our intentions are for trainees to learn at each stage of the course, and how this intent relates to our core questions. The curriculum document also shows how you will demonstrate the impact of your learning and how it links to the CCF. While we appreciate this is a large and complex document, we encourage you to familiarise yourself with it. Your tutors and school-based mentors will support you with this. An example of the curriculum structure is shown:

Overarching Intention of our UoM curriculum for U1/P1 – Standard across all subjects	**Link to UoM Science intention U1/P1.** It is our intention that trainees in Science:	**How is this addressed in Science University 1 (U1)?** These intentions will be realised as Science trainees address the following Science key questions, and through related Intensive Teacher and Practice (ITAP) days.	**How is impact developed in Science Placement 1 (P1)?** The impact of the curriculum will be developed as the Science trainee critically engages with the key questions and ITAP themes in the context of their placement 2 school or college.
Core Area 1. Teacher Expectations 1.1.1 Communicate a belief in the academic potential of all pupils	appreciate the value of Science and begin to demonstrate this to their students. understand how classroom routines and positive behaviour management promotes high expectations and student progress. identify in planning and practice how committed Science teachers can make the subject relevant and engaging to pupils.	Why do students learn Science? How do Science teachers model enthusiasm for the subject? Comparing pedagogy in Biology, Chemistry, and Physics. Why are they different? Where are they the same? **(ITAP 4&5)** How do we teach KS3/4 Chemistry? Parts 1&2 **(ITAP 8)** How do you plan an effective science lesson?	How do teachers set high expectations and inspire students to learn science? Observe the lessons, routines (start and end), transitions, engaging activities, students as active learners, questions being posed. **(ITAP 4&5) Observe expert colleagues:** - managing a practical lesson, particularly set up and clearing away - how they teach aspects of Chemistry with which you are familiar. **Together with an expert colleague:** - practice and deconstruct management of pupils and apparatus in a lab environment **(ITAP 8)** Observe how expert colleagues: - Introduce and launch tasks with a class, including elements of modelling Together with an expert colleague: - Teach a short episode, setting pupils a task, including modelling. - Reflect and seek feedback.

5. The National Teachers' Standards

The Teachers' Standards outline the core competences, skills, and behaviours expected of all teachers. In order to gain your QTS you will need to gather evidence to show that you meet or exceed each of the Teachers' Standards and you will be assessed against them at the end of the course. You will gain increasing familiarity with the Teachers' Standards over the course of the year by using your Progress Matrix in the RoAD file. The Progress Matrix is designed in a way such that trainees are asked to reflect on and provide evidence for each of the Teachers' Standards. Your University Tutor will explain this in greater detail.

Both school-based mentors and UoM tutors will provide you with feedback throughout the course to allow you to understand the context of these standards, how this can look in the classroom, and how to maximise your progress. At the end of each your PGCE placements you will be assessed as to whether you are 'on-track' to meet the standards. If there are any standards you are struggling to meet you will be supported in this. To be awarded the PGCE (the academic qualification) you will also complete three academic assignments. These are detailed in the Graded Assignment Handbook.

6. Education Professional Studies (EPS)

Alongside your subject sessions in University and school experience you also follow the Education and Professional Studies Curriculum (EPS). EPS is a carefully constructed course within the PGCE, taught in mixed groups comprising trainees from all the PGCE subject areas, and linking to sessions in schools. EPS addresses critical issues for all teachers such as inclusion, diversity and equality, safeguarding, special educational needs, relationships and sex education and education and disadvantage. At the start of the year you will be provided with an overview of all EPS sessions and an EPS workbook which is completed as you work your way through the programme. One trainee's view of EPS is given below:

"The EPS sessions have been a tremendous help with my development as a teacher, as opposed to specifically a science teacher. The sessions on behaviour management in PRUs, the importance of discussing issues surrounding diversity and equality, and the need for decent PSHE education helped me develop a view of a teacher's role in the lives of their students, rather than just their development as a young scientist, geographer, linguist, etc. This is especially important to my development as I see myself more as a teacher of young people rather than a teacher of science, so being aware of all these issues will aid in this development."

7. Roles and responsibilities in your PGCE year

The tables below outline the titles and roles of all the people you will be working alongside at University and on school placements this year.

Who?	Key roles
Programme Director	Oversee the trainee cohort and ensure that all course compliance aspects are adhered to in order for trainees to be complete the course and be recommended for QTS.

	Meet with trainees who are experiencing significant difficulties or are at risk of not completing the course or school placement using the warning system where necessary. Liaise with SLOs, Professional Mentors and Tutors to address issues emerging from specific trainees, schools, or mentors.
School Liaison Officer (SLO Team)	Oversee the partnership as a whole and support the current cohort of trainees to meet the school placement and course requirements. Monitor and QA the partnership, report back to programme director, advisory boards and, where necessary, specific school partners. Contribute to Partnership Committee in order to share appropriate updates and developments with partner schools in order to maintain the collaborative partnership. Support schools, professional tutors, mentors, and trainees to resolve any issues that may be a barrier to a trainee making successful progress.
Subject Tutor	To be the main point of contact for their trainees and their placement schools and be involved with the placing of trainees to ensure they meet the placement requirements. Support schools, mentor, and trainees during school placements including regular visits, moderation observations, file checks, and meetings with mentors/trainees. Support trainees and/or mentors experiencing difficulty or barriers to progress in order to resolve issues and improve trainee outcomes, through setting up and agreeing action plans, Oversee the assessment of trainees in line with UoM and Teachers' Standards. Provide pastoral support where needed.
Trainee *	Meet the expectations outlined in the Secondary handbook and subject handbook, in terms of professionalism, teaching, and record keeping, To be responsive to feedback and open to being mentored in order to improve their professional skills. Represent the university and the meet course and placement expectations.
Professional Support Staff	Support trainees in all compliance and registration checks. Communicate notices from The University of Manchester to trainees such Blackboard notifications and changes to deadlines. Deal with day-to-day trainee enquiries. Help with assignment submissions. The PS staff are a vital component of the successful running of this course.

We are committed to a reciprocal and collaborative partnership with partnership schools, and this is built upon clear systems and communication. This is essential in ensuring trainees receive the best support, training, and outcomes as they enter the profession. The programme director and

partnership lead will maintain a broad overview of trainees' progress and the course impact as a whole.

Who?	Key roles
Headteacher	Provide overall commitment and structure to facilitate effective ITE in school or college.
Professional mentor *	Ensure the key aspects of the partnership agreement are adhered to and oversee all trainee placements. PMs work with the university to resolve any issues should they emerge and ensure subject mentors are experienced and able to give the trainee support and mentoring. Offer observations, support and guidance where needed to both subject mentors and trainees.
Subject mentor *	The SM is your main point of contact with the school. They attend mentor training in order to be prepared for the role and complete the expectations and requirement of the placement. Offer time and support to the trainee to assist them in making progress across the placement including modelling good practice, agreeing clear targets, and checking planning with a strong subject specific element. Model good practice and work collaboratively with the trainee to mentor and coach their development.
Other school staff	Model good practice and encourage the trainee to learn from their experience and/or expertise. Able to work with the trainee if they have a subject or specific leadership role that may support the trainee's progress on placement.

8. Your role as a PGCE Science trainee

PGCE trainees have specific expectations and duties for both University sessions and for school placements. For clarity, these are listed below. We expect all of our students to act responsibly and to maintain high standards of professional conduct throughout the course. This aspect of your practice is hugely important and underpins your ability to meet Teachers' Standard 8 and part 2 of the Teachers' Standards. Fulfilling both is fundamental to gaining Qualified Teacher Status (QTS).
Student teachers are expected to maintain high standards of attendance and punctuality, and to treat fellow students, staff, and pupils with dignity and respect. You will be expected to follow school policies and procedures rigorously.

Trainees are expected to:

- Attend all University seminars and lectures, informing your University Tutor of unavoidable absence.
- Make constructive contributions to all University sessions.
- Arrive punctually.
- Respect and maintain school/college policies.
- Remember that, when in school/college, your behaviour and dress should be informed by your role both as a representative of the University and a role model for pupils.
- Be adequately prepared to teach lessons which demonstrate that you have reflected critically on

the pupils' needs, on the issues raised in University sessions, and with your Subject Mentor in school/college.

- Prepare for practical science activities with an appropriately diligent approach to health and safety as well as to engage young people and facilitate specific learning outcomes.
- Demonstrate your competence as a teacher both through your performance in the classroom and through undertaking tasks and assignments set by the University.
- Demonstrate the principles of good planning through producing detailed schemes of work and lesson plans.
- Independently develop your subject knowledge in aspects of the Science you teach.
- Provide evidence that you have met all the Teachers' Standards by the end of the course.

9. Overview of school-based placements

Your school experience is, clearly, the most important phase of the programme and it is within the three placements that judgements will be made about your progress. You will use what you have learnt in University sessions and apply them to your school setting; you will also gain ideas from colleagues and apply them whilst on placement also. You will learn how different departments approach issues like assessment, pedagogy and curriculum.

What Key stages will I get to teach?

All Science trainees will gain an overview of Key Stage 2 in the Primary School Placement (PSP). During secondary school/college placements, they will gain experience of teaching Key Stage 3 and Key Stage 4 classes. Key stage 5 experience will be gained either whilst on placement, or if this has not been possible by attending a short separate placement at a school or a Sixth Form college. All UoM PGCE Science trainees will qualify with the 11-19 track for QTS.

Placements and School Experience

Practical teaching experience is provided through three teaching placements which typically take place in two institutions. The first of these (Placement 1) takes place during Term 1 and will normally be in an 11-16 or 11-18 school. Placement 2 will be completed in a contrasting school or college; this could be contrasting in terms of geographical location, school intake, department structure, Ofsted rating, or curriculum model. Depending on your professional needs, you will normally return to your first placement institution for Placement 3. Only one term can be spent in a Sixth Form College if you have been placed in one. The subject leader and your tutor are responsible for your placement allocations and will take into careful account issues such as transport links and commute times.

Transition Placement

Near the end of the course, trainees spend four days in their employment school (if they have been appointed). Alternative placements to address specific areas of interest may be discussed with tutors closer to the time. The Transition placement is a good way to prepare for your ECT year and to orientate yourself within the department you will be working in.

Your School Timetables

There will be a gradual build-up of teaching load, and you should start with some team teaching. There should be provision for you to observe lessons throughout the placement both within Science

and in other curriculum areas. This allows you to focus on your emerging targets/areas for development.

In Placement 1 you should be teaching 8-10 hours per week. In Placement 2 this increases to 10-12 hours per week. For placement 3 you should be teaching 12-14 hours per week. Your teaching experience should be across all key stages. There can be a gradual build-up of teaching load and some paired or team teaching; however, you are advised to get to your required teaching load as soon as you can (discuss this with your mentor). You will be expected to observe teaching in areas other than Science; watching high-quality practice in other subject areas is an excellent way of improving your own repertoire of strategies and approaches.

Planning Expectations

All your lessons should be planned using the UoM PGCE lesson plan template and submitted to the class teacher a minimum of 48 hours in advance of the lesson. Protocols may vary from school to school so it is important to get clarity on this when you begin placement at a new school. It is vital that you stick to this deadline as it allows time for the teacher to provide feedback on the lesson and for you to make any modifications they suggest. Following each lesson you should (briefly) evaluate it using the section at the end of the lesson plan pro forma. Take the time to reflect on what went well and as you expected, and those areas that require further development. Over time this will allow you to see how you are progressing. It is common for the expectations for submitting individual lesson plans to be relaxed during Placement 3 once you have illustrated they can consistently plan to a high standard. You will be notified when this is the case.

Attendance and Punctuality

Trainees are expected to attend for the whole of each school or college day. You should arrive in school good time to start the day, at the lasts by the time all staff are expected to be on-site. You should be ready to stay for meetings, parents' evenings, and extracurricular activities when required.

If you are absent

You may have to take some time off school. If you are absent from your placement school or university sessions you must email both your tutor and school subject mentor. If you are absent during your school placement you must set cover work if you can do so, this is the accepted practice for all teachers. Please follow your placement school's absence procedures. When you are ready to return, ensure you contact your subject mentor to discuss when you can resume teaching and where your classes are up to. If you have missed too much school experience then you may be asked to extend school placement to meet the Teachers' Standards.

10. Your Progress and Development

Record of Achievement and Development (RoAD)

The RoAD is the central record of trainees' achievements and progress towards the Qualified Teacher Status and is a good way of tracking your progress over the course of the year. It will be shared with your subject mentor and your tutor, as well as SLOs from UoM (School Liaison Officers) who visit schools to make sure you are being well supported. The RoAD will contain:

- A detailed record weekly meetings with mentors.
- Lesson plans and associated resources
- Your evaluations of your lessons
- Examples of pupil assessment
- Lesson observation reports from your mentor/class teacher/tutor.
- A Progress Report from the trainee's mentor, completed at the end of each placement.
- The Progress Matrix for each placement.
- Your ITAP log.

You will also want to keep a record of other information relevant to your progress and development. For example:

- Information on the school/college
- Schemes of work
- SEN information and learning plans
- Examples of ICT in the classroom
- Formal and informal tests and mark schemes

Mentor Observations and Meetings

Trainees' teaching will be observed formally at least once per week during placements by the subject mentor who will provide written feedback on the UoM pro forma for lesson observations. Additionally, you can expect to receive feedback from teaching colleagues on the other lessons you teach. Trainees will also meet with their mentor once per week to discuss progress and to review and agree targets. This meeting is accompanied by a pro forma that trainees fill in in order to summarise what has been discussed. All related documents can be found in the RoAD file.

Tutor Observations and Feedback

Tutors visit each trainee in school at least once per placement to observe a lesson and give verbal and written feedback. The subject mentor or class teacher will observe the lesson with the tutor. Observations are always accompanied by a pre- and post-observation discussion. The purpose of observations is not to make a sweeping judgement based on one 'high stakes' observation; rather it is a formative process to identify your strengths and areas to develop. You should ensure that lesson plans are available for tutors and mentors in advance of the lesson. Make sure that your RoAD folders are available to be viewed online in advance of the observation.

For you to maximise your progress, feedback from colleagues is vital. Whilst it is encouraging to receive positive feedback, it can be challenging when things have not gone well. Everyone wants you to be successful; hence, we will always be honest. Please remember that if you receive feedback that feels negative it is not personal and is there to help you to improve. If you are unsure of what you can do to develop, ask for clear strategies and how you can implement them in the classroom.

Subject Knowledge Audits

Your knowledge in all three Science specialisms will grow over the course of the year. It is important to be aware of those areas in which you are strong and where there are gaps you need to address. At

the start of the course you will be provided with a document to allow you to audit your subject knowledge and you are expected to update this the year progresses. We will guide you as to the steps you can take to develop your subject knowledge.

The Role of the Subject Mentor

Your relationship with your mentor is one of the most valuable you will have this year on the PGCE. Mentors are experienced teachers who will help and guide you in your first steps in teaching Science. All mentors will have attended mentor training sessions at the University of Manchester, many of them also completed their PGCE with us. It is important to remember that mentors are busy teachers themselves; managing expectations of one another is very important.

The Science mentor's main job is to act as a critical friend during your early steps as a teacher. It is part of their role to support you and to try to ensure that you develop as a teacher. At times it may seem that the feedback you receive is rather negative, this may be the case even if a trainee is doing well. This is perhaps a result of mentors and tutors wanting to support you to reach the potential they can see and forgetting that you may not realise the progress you are making. Working with feedback can be a challenge but how we respond to feedback is often one of the defining factors in career progression and improvement as a teacher. Be open-minded and willing to discuss the feedback you receive.

As well as supporting trainees throughout the placement, we ask mentors to write a Progress Report at the end of each term. This will be used to highlight your strengths and to help you to set targets for your future development. The Progress Report will be based on your whole placement and in you mentor meeting you will have the opportunity to discuss it. Advice about writing reports is given to mentors.

Weekly mentor meeting

You should expect to have a timetabled weekly meeting with your mentor that lasts approximately one hour. This will provide you with the time each week to review and discuss your progress. Trainees are asked to let us know immediately if they are not getting this. You are expected to keep a record of this meeting by completing the 'mentor meeting form' in the RoAD file. We feel that it is important that this meeting has some structure that is set out or agreed at the outset, otherwise it is easy to fill the time focusing on the detail of teaching particular classes or even individual students without considering your overall progress. An important question trainees should continually be asking is, "What can I learn in general from my experiences and how can I apply this across all of my teaching?"

An example of some good discussion topics for mentor meetings is given below:

- Review how your teaching is developing over the last week.
- Discuss any successes and challenges you are facing with some of your classes.
- Discuss what you will be teaching next week and be aware of subject knowledge and resources you will need.
- Discuss any university assignments you need to complete which your mentor might be able to help you with.

- Ask about opportunities for getting involved in whole school/extracurricular activities.
- Set the focus of your next observation, what do you both agree should be the focus for example, subject knowledge, pace, timings, assessment etc.
- Discuss which strategies are promising for specific topic areas or classes.
- Paired reading activities or discussion of an article relevant to Science teaching.

Your University Tutor

Guiding your development into a teacher is the most important role your University tutor has. You and your tutor will develop a strong relationship throughout the year and in most cases remain in contact after you have qualified. Your tutor will act as a mentor, friend, assessor, and lecturer and will have a variety of responsibilities over the year to aid your teaching and development. Some of the roles your University tutor has include:

- Arrange placements and train mentors for your school experience
- Plan and deliver University subject sessions and EPS sessions
- Complete tutorials on a termly basis
- Go through assignments with you and make sure you are progressing well on the academic course
- Visit trainees in schools and complete observations to ensure you developing well
- Review your evidence of teaching and assess it again the Teachers' Standards at the end of the programme
- Mark and assess any academic work
- Answering emails and questions from trainees
- Monitor wellbeing and provide pastoral support

Addressing Problems

The University of Manchester PGCE is a collegiate course but sometimes problems and differences in opinion do occur. Although it may not seem so at the time, these events are also developmental and from our experiences most problems are easily resolved through clear communication. If school/college-based problems arise, the first point of contact is your subject mentor. However, depending upon the nature of the issue, trainees may feel more comfortable talking with their University tutor or professional mentor. For university-based issues, trainees should first discuss with their tutor. If problems remain unresolved, trainees should discuss with the secondary PGCE course leader.

As all University of Manchester trainees are entitled to additional support for coping with variety of matters. Links can be found here: https://www.studentsupport.manchester.ac.uk/

If you feel that an issue is starting to overwhelm you or causing you to worry, please talk to someone about it immediately. We will provide support and assistance to alleviate the immediate stress, as well as helping you to plan to address the issues where appropriate.

Appendix 1: Reading List

We have created a reading list that is hosted on the UoM Library website. This list comprises core texts relating to science teaching and secondary teaching in general. You will also find texts relating to your subject specialism, misconceptions in science, theories of learning, environmental education, and diversity in science education. You will also find texts exploring and discussing significant issues within science education.

The list can be accessed here:
https://www.readinglists.manchester.ac.uk/leganto/public/44MAN_INST/lists/328581664550001631?auth=CAS

Appendix 2: Guidance for Lesson Observation

Observing other teachers

This is a key part of a trainee's on-going professional development. It is not an opportunity to be critical of the teaching of other members of staff. *Be appreciative, but please keep your opinions to yourself.*

Trainees should aim to observe staff both within and outside of the department. Who to observe might be best advised by the trainee's mentor or Professional Mentor.

Trainees should think about how their activities align with the University of Manchester Curriculum. These are listed under the key curriculum areas for PGCE practice:

Planning, Teaching and Learning

- Love of learning- how do teachers enthuse their students?
- High expectations- what evidence is there of this in the classroom? In teacher comments to learners? What evidence is there that teachers have high expectations of themselves? Is this done via Churchillian oratory or more subtly?
- Learning goals - what are they and how are they communicated to students?
- Lesson structure - how long does each aspect of the lesson last? How does one aspect link to another?
- Knowledge of students- how does the teacher use evidence on current progress, achievement, home circumstances and multiple intelligences to inform planning?
- Inclusion- what adjustments are made for students with a learning difficulty/disability? Do classroom examples reflect the diversity of the group, e.g. in terms of social class, religion and ethnicity?
- Pace of the lesson- how quickly do the students and teacher get through activities. Is this too slow/too fast or about right for learning to take place? How do you know?
- Questioning- how is this used to differentiate? Does the teacher use open or closed questions? How does the teacher ensure most of the talking is done by the students?
- Maintaining interest- what methods does the teacher use to stimulate and engage learners?
- Scaffolding and consolidation- how do later activities in the lesson build on what it began with? Is there a recap of the previous session and a review of the learning goals?
- Secure learning environment- what does the teacher do to ensure students all feel comfortable to make contributions? How does this link to classroom discipline?
- Behaviour management- what strategies does the teacher employ? How ordered and structured are the tasks? How does differentiation inform this? What evidence is there that the teacher 'knows their students'?

Assessment

- Checks for understanding - how regular are these within the session and how do they take place? Questioning? Reading written answers? Peer assessment?
- Methods of assessment- which ones are used in class and why?
- Feedback and measures to secure progress- how is 'precise praise' ensured and how do students know they are making progress?
- How does the class teacher know pupils are making progress?

- How does s/he use the assessment evidence gained in class to help make this decision and how does this influence future planning?
- Are students of all abilities making progress?

Appendix 3: Advice on Using Social Media

Students of all ages are increasingly engaged with the internet world; however, they are not always sure of procedures to ensure they are safe online. Many schools use web filters and audits to ascertain what their learners are looking at and pastoral programmes cover topics such as cyber bullying. Some schools and colleges make active use of platforms such as Facebook to communicate with students and parents, and encourage learners to engage this way. Other institutions ban social media completely. You should make it a priority to check what the school or college's policy is and follow it.

We ask that all trainees are wary of their own use of social media and consider their security and privacy settings very carefully. You can be sure some students will be trying to find your online presence. Schools and colleges increasingly do similar searches as part of the recruitment process for new teachers. When posting on social media, ask yourself if you would be happy for your students or potential employers to see it.

Before engaging with any social media in class, trainees should check the Safeguarding policy at the institution and speak to their mentor about any institution-specific protocols. Stay Safe Online is of value to teachers as well as students.

Appendix 4: The UoM Science PGCE Core Questions

Science Curriculum Intent U1/P1	Science Curriculum Intent U2/P2	Science Curriculum Intent U3/P3
Why do students learn Science? How do Science teachers model enthusiasm for the subject?	How do you communicate the importance of Science to students? What should a diverse and inclusive Science curriculum look like? Decolonising the curriculum and gender in science.	How do you communicate the relevance of Science to all of our students and their lived experiences? CA1.2
How do you foster a positive classroom environment? What is behaviour for learning?	How can you better understand equity in Science education? (Gender and diversity).	How can you build a more inclusive Science classroom through listening and responding to our pupils?
How do you know the content you are required to teach?	What is a medium-term Science curriculum? How do you sequence lessons to deliver a topic?	How can you integrate your medium-term planning into an efficient and effective planning cycle to enhance your ECT practice?
How do you apply your subject knowledge to the KS3 and KS4 curriculum and its assessments?	How do you manage subject knowledge and its application in post-16 teaching?	How will you continue to develop your subject knowledge with a view to your first teaching post?
What are Learning Outcomes? How do they guide planning in Science?	How can Science teaching develop students' awareness of climate justice?	How can you as a Science teacher develop your students' agency when expressing views on societal issues?
Comparing pedagogy in Biology, Chemistry, and Physics. Why are they different? Where are they the same?	How can you develop our subject specific pedagogy? How can you apply these across science subject specialisms? How can specialist subject bodies support your teaching and students' learning?	How can you develop subject-specific pedagogy through the use of practical work/required practicals?
How is practical work used to support the development of knowledge and skills?	Why are demonstrations important? How can you engage students to connect observations to theory? Lab-based (Jan day)	What do minds-on practicals mean in practice?
What is Assessment for Learning? How can you implement it in the classroom? How can you use questioning to explore students' thinking?	What is student data? How can it support your teaching?	How can you integrate student data and AfL to inform your planning and teaching?
What are misconceptions in Science? Why is understanding them important?	What is dialogic teaching? How can it support students being proactive learners?	How can you bring the Science curriculum to life and relate it to your students' lived experience.
How do you manage a laboratory environment? How do you keep your students safe?		How can you employ pupil groupings to enhance the effectiveness of practical work?
How do you model abstract concepts in Science?		How you promote learning outside of the classroom and illustrate the application of theory in the real world?
How do you adapt your teaching to support the needs of	How do you adapt your teaching to support the needs of	How do you adapt your teaching to support the needs

different students (intro)?	different students (empathy for all learners)?	of different students?
	As a Science teacher, what does inclusive educational practice mean to you?	As a Science teacher, what does inclusive educational practice mean to you?
How can you find support for developing reflective practice in Science?	How can you describe your professional identity? Securing your first role.	How can you identify your individual strengths? How do you share these with colleagues and peers?
How do students learn to be learners? (Theories of Learning) How can cognitive science techniques support our teaching?	How do you implement theories of learning in the Science classroom?	How do communicate research findings to an audience of education professionals?
What is enquiry-based learning? What is its significance in Science lessons?		How can you plan and implement enquiry-based learning into your practice both within and across lessons?
How can you work effectively with colleagues in the Science department?	How can you develop effective ways of collaborating with colleagues and establish a collegial working environment?	What is the focus of your development going forward. How will you prepare for your ECT years and beyond?

Curriculum Themes

As a summary, our science curriculum will cover the following. These are overarching and recurrent themes that you will revisit many times throughout the course:

The importance and relevance of science education. We will consider why we teach science and why students should study it. You will develop an understanding of the key components of a good Science lesson and how you can employ these to become an effective science teacher. Importantly, we will consider how can we develop students' Science Capital, help them to understand the relevance of STEM subjects to their experiences, and where science can be found in their lives and local communities. We will explore how through the teaching of science you can promote social justice and environmental sustainability.

Science Pedagogy. Science Pedagogy is concerned with the method and practice of teaching science. We will consider aspects of teaching which are common to all Science subjects and also those areas which are particular to each specialism. These sessions are designed to demonstrate different techniques which you will be able to apply in your classroom practice and you will be encouraged to consider how different learning theories can be applied in a subject-specific way. There are many challenging and abstract concepts in Science, we will explore how different approaches such as modelling, enquiry-based learning, and practical work can be employed to deliver engaging lessons which promote your students to be active learners. Pedagogy sessions will also support you in developing strategies to effectively manage the practical aspects of Science teaching.

Behaviour for Learning. Our ethos is that children want to learn (they just do not always know it). Throughout the PGCE course you will be encouraged to use approaches which promote and support positive behaviour and collaborative learning. Our focus is to allow you to develop in a way that is proactive rather than reactive; however, we will also help you to understand how to address and deal with negative classroom behaviours and disruption.

Planning for Learning. In a 60-minute Science lesson you will be expected to engage and stimulate groups of up to 30 students, while also ensuring they make progress towards subject-specific outcomes and assessing their progress towards these! You will learn how to design, structure, and sequence, activities to allow you to plan coherent lessons which support student engagement and progress. We recognise that this is daunting, but planning lessons is a learning process which develops over time. You are encouraged to begin by planning lessons jointly with your mentors who will help you to integrate and adapt existing school resources into you teaching. Planning with your peers is also an excellent way of developing skills and sharing ideas. As you progress you will plan independently; however, always be prepared to ask your more experienced teaching colleagues for advice. Remember, you will not know what works until you try it! As the course progresses you will learn how individual lessons fit together to form a coherent medium-term plan.

Questioning and misconceptions. Understanding the ideas that pupils bring to science lessons and developing thinking through cognitive questions and discussion is a key feature of good teaching. You will learn how to question students (as classes, groups, and individuals) to assess their knowledge and understanding. We will discuss the importance of being aware of the misconceptions students may hold and, importantly, how to address these.

Theories of Learning. It is important that you develop an understanding of the theories that underpin different teaching strategies. This will allow you to make informed choices about the approaches you employ in the classroom. You will be encouraged to develop your knowledge of key theories of learning and aspects of cognitive science; we will support you in understanding how, why, and when these can be integrated into your teaching.

Assessment. Assessment for Learning (AfL) in the Science classroom is about far more than tests and examinations; it is concerned with informing both teacher and student about current and future progress. You will learn about multiple approaches to gauge the progress of your students and how you can use formative feedback to guide their learning. We will consider the similarities and differences in assessment practices as KS3, KS4, and post-16.

Adaptive teaching and barriers to learning. In the Science classroom you will work with students who have many different learning needs. You will develop your understanding in identifying and supporting vulnerable groups, breaking down the barriers to learning for SEND in Science, strategies to support EAL in Science, and how to challenge the most able students.

Representative Science. We believe that the Science curriculum should be inclusive and represent the students we teach. Hence, we will explore areas such as women in Science, decolonising the Science curriculum, LGBTQ+ representation in Science. You will learn the importance of making Science relevant to your students and helping them to understand where it can be found in their lives and local communities.

In addition to the themes above, you will also have sessions centred around some of the 'generic competences' (as opposed to subject specific input) looking at issues and strategies including: behaviour management; creating a good climate for learning; managing workload; applying for jobs; personal and professional conduct; preparation for teaching placements; the Early Career Framework and Progression beyond the ECT [Early Career Teacher] phase; the Core Content Framework for ITE.