

**The University of Manchester**

**Manchester Institute of Education**

**Secondary PGCE**

**Science PGCE Curriculum 2023-24**

|  |  |  |
| --- | --- | --- |
| Curriculum Intent Statement: PGCE Science (Physics, Chemistry, Biology and Physics with Mathematics) The intention of the University of Manchester Science PGCE courses is to train teachers who can provide a high-quality science education to young people in all manner of school and college 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 engaging and relevant teaching. Trainees will understand the Sciences are broad and diverse subjects with their own demands in terms of subject knowledge and practical skills. Science trainees will reflect on teaching and learning 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 know from 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.  Learning will take place in both the University and the placement school settings; classroom practice will be complemented by independent study tasks and the completion of academic assignments. During University sessions, trainees will experience a wide variety of sessions led by UoM tutors. They will also have the opportunity 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 their teaching and the feedback they will receive on this, they will also develop through formal mentor meetings, observations of other teachers, and formal and informal meetings with colleagues. Importantly, trainees will be encouraged to reflect on their progress with their peers.  The Science curriculum aims to support the development of trainees by providing knowledge and reflective practices in Science subject knowledge and its application in the curriculum, Science assessment practices, and Science pedagogy (inc. in subject specialisms). This curriculum has been constructed through personal UoM tutors’ and professional practices, alongside collaboration with serving teachers and subject associations. The following tables detail the Science curriculum for University blocks relating to placement 1, 2 and 3. The curriculum intent is framed as Core questions. Trainees will reflect on these core questions in lecture and seminar formats, rehearse relevant activities in learning groups group, then practice and reflect on these questions in placement. For most core questions, trainees are expected to demonstrate learning through discussion, planning and teaching episodes. | | |
| **Science Curriculum Overview – Key questions**  *All references in the PGCE Secondary Science reading list* [*here*](https://www.readinglists.manchester.ac.uk/leganto/public/44MAN_INST/lists/328581664550001631?auth=CAS) *– search by author name only* | | |
| **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? **(Driver et al, 2015; Royal Society, web)** | How do you communicate the importance of Science to students? **(Dewitt et al, 2011)**  What should a diverse and inclusive Science curriculum look like? Decolonising the curriculum, class and gender in science. **(Mansour, 2013; Aspires, 2016; Barton 1998)** | How do you communicate the relevance of Science to all of our students and their lived experiences?  **(Nunes et al, 2017; Scott, 2011)** |
| How do you foster a positive classroom environment? What is behaviour for learning? (**RSC, web**) | How can you better understand equity in Science education? (Gender, socio-economic status and diversity). **(Nunes et al, 2017; ASPIRES, 2013; Barton, 1998))** | How can you build a more inclusive Science classroom through listening and responding to your pupils? |
| How do you know the content you are required to teach? **(Taber, 2012; Winterbottom, 2021; de Winter, 2021)** | What is a medium-term plan in Science? 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? Why do words matter? How do they guide planning and teaching in Science? **(Mercer et al, 2004; Wellington et al, 2001)** | How can Science teaching develop students’ knowledge and awareness of climate justice? **(Hawkins and Stark, 2016)** | How can you as a Science teacher develop your students’ agency when expressing views on societal issues? **(Nunes et al, 2017; ASPIRES, 2013)** |
| Comparing pedagogy in Biology, Chemistry, and Physics. How and why are they so different? In what ways are they similar? **(Taber, 2012; Winterbottom, 2021; de Winter, 2021)** | How can you develop your subject specific pedagogy? How can you apply these across science subject specialisms? **(Ofsted 2023, 2021)**  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? **(Ofsted, 2021)** |
| How is practical work used to support the development of knowledge and skills? **(Abrahams, 2008; Gatsby)** | Why are demonstrations important? How can you engage students to connect observations to theory? Lab-based **(Sharma, 2014)** | What do minds-on practicals mean in practice? **(Abrahams, 2017)** |
| What is Assessment for Learning? How can you implement it in the classroom? How can you use questioning to explore students’ thinking? **(BEST, web)** | 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? **(Driver et al, 2015; Taber, 2014)** | What is dialogic teaching? How can it support students being proactive learners? **(Scott et al, 2006; Hetherington et al, 2018)** | How can you bring the Science curriculum to life and relate it to your students’ lived experience? **(Hodson, 2014; Aikenhead, 2001, 1996)** |
| 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? **(Blatchford et al, 2006)** |
| How do you model abstract concepts in Science? **(Oh, 2011)** |  | How do 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 different students (empathy for all learners)? | How do you adapt your teaching to support the needs of different students? |
| How do you adapt your science teaching to support the needs of different students (intro)? (eg. students with EAL, SEND, from under-served backgrounds) | As a Science teacher, what does inclusive educational practice mean to you? **(Reynaga-Peña, 2018)** How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds) | As a Science teacher, what does inclusive educational practice mean to you? **(Reynaga-Peña, 2018)** How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds) |
| How can you find support for developing reflective practice in Science? | How can you describe your professional identity? **(Hodson, 2011)** Securing your first role. | How can you identify your individual strengths? How do you share these with colleagues and peers? **(science teacher development, etc)** |
| 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? |

|  |  |  |
| --- | --- | --- |
| **U1/P1: Establishing foundations, developing skills, growing educational awareness** | | |
| The table below shows the Science curriculum intentions for trainees during U1 and P1. This highlights what we consider is important for Science trainees to learn and to have skills in. The second column explains how and where this intention will be implemented using overarching key questions which will be referred to in U1 subject sessions. It is important to remember that trainees will see our intentions also implemented in their P1 schools. For example, we want trainees to understand why Science is important, this will be taught in U1 sessions but will inevitably be referred school Science department meetings too. The final column refers to the impact or observable actions we wish our curriculum to have on the trainee and the pupils they teach. Evidence of impact is recorded in the trainees RoAD, which incorporates lesson observations and weekly mentor meetings. | | |
| **Overview of curriculum links between University sessions and Placement (U1/P1).** | | |
| **What is the intention of the Science curriculum in U1/P1** | **How is the intention implemented in Science University sessions in U1?** | **What should trainees be achieving in P1 to show impact in their Science teaching, therefore making use of U1/P1 learning?** |
| **The overarching intention for U1/ P1 Science trainees is to begin to develop their classroom practice and identity. This will occur through university teaching, the observation of colleagues, and trainees’ initial teaching experiences. Within this we will support the students’ reflective and evaluation skills.**  Trainees should appreciate the value of school Science and begin to demonstrate this to their students. They will be able to identify in planning and practice how committed Science teachers can make the subject relevant and engaging to pupils.  They will know how the Science curriculum is constructed, and how schemes of work allow teachers to link subject knowledge and enquiry in their classroom teaching.  They will start planning well-sequenced Science lessons that follow schemes of work, utilise a range of pedagogy ideas, some which have been completed in university sessions or observed by others.  Trainees will understand the different pedagogical requirements of the science subjects, and how practical work and enquiry can enhance learning and progress.  They will begin to adapt their Science lessons to account for pupils’ different learning needs. | Science trainees have all experienced the following University sessions in U1, in a range of input, lectures, seminars, readings, and practice activities that fulfil the aims of each area of focus. In chronological order, U1 key questions are:   1. Why do students learn Science? How do Science teachers model enthusiasm for the subject? 2. How do you foster a positive classroom environment? What is behaviour for learning? 3. How do you know the content you are required to teach? 4. How do you apply your subject knowledge to the KS3 and KS4 curriculums and their assessments? 5. What are Learning Outcomes? How do they guide planning in Science? 6. Comparing pedagogy in Biology, Chemistry, and Physics. Why are they different? Where are they the same? 7. How is practical work used to support the development of knowledge and skills? 8. What is Assessment for Learning? How can you implement it in the classroom? How can you use questioning to explore students’ thinking? 9. What are misconceptions in Science? Why is understanding them important? 10. How do you manage a laboratory environment? How do you keep your students safe? 11. How do you model abstract concepts in Science? 12. How do you adapt your science teaching to support the needs of different students (intro)? (eg. students with EAL, SEND, from under-served backgrounds)? 13. How can we find support for developing reflective practice in Science? 14. How do students learn to be learners? How can cognitive science techniques support our teaching? 15. What is enquiry-based learning? What is its significance in Science lessons? 16. How can you work effectively with colleagues in the Science department? | Science trainees should be able to demonstrate the following areas of impact:  Trainees should begin to see themselves as a member of teaching staff in a Science department, engaging with colleagues, and attending all meetings, such as Science subject meetings, CPD etc. Trainees will recognize the importance of engaging and enthusing students and inspiring them to want to learn science.  All Science trainees should be able to observe experienced Science teachers, reflect on their observation and integrate aspects into their practice, deepening their understanding of school Science in the process. They should begin to understand the need for subject specific pedagogies in Biology, Chemistry and Physics, particularly in terms of modelling challenging concepts. Trainees should begin to explore and practice questioning as a means of identifying pupils’ misconceptions and building understanding of their learning.  They should have access to their placement school’s Science schemes of work and start planning and teaching Science lessons, tailoring and implementing existing resources and developing their own where appropriate.  They should be able to plan activities, including practical activities, to promote enquiry and students thinking and learning for themselves.  Trainees’ Science lessons should show an understanding of curriculum requirements, Big Ideas in Science, and clear relevance and enthusiasm for subject.  Lessons should be planned to facilitate progression and adaptive teaching, drawing on taxonomies such as Bloom. Trainees will be aware of how retrieval practice can secure pupils’ learning. Science trainees in placement will demonstrate awareness of how pupils are making progress within Science lessons. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Curriculum links between U1 and P1- for each area of the UoM Curriculum** | | | |
| The table below shows in more detail how the University of Manchester PGCE Secondary Partnership Curriculum runs through the Science Curriculum. It shows how the Core Areas of the UoM curriculum are reflected in PGCE Science intentions, implementation and impacts during a trainee’s training year. In order to prepare trainees for more practical elements of pedagogy, Intensive Teacher and Practice days are highlighted. You should refer to the PGCE Curriculum Handbook for more information regarding the UoM curriculum as a whole. This table is arranged in order of the sections of the UoM curriculum, not in the order in which trainees will experience it. Evidence of impact is recorded in the trainee’s RoAD, which incorporates lesson observations and weekly subject mentor meetings. | | | |
| **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 1 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) 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.  - 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. |
| **1.2.1 Establish effective routines and expectations**  **1.2.2 Develop a positive, predictable, and safe environment for pupils** | understand that balancing praise, reward, and sanctions is impactful.  understanding schools’ behaviour management systems and implement them consistently in the classroom  learn to establish effective routines in the classroom, and the laboratory. | How do you manage a laboratory environment? How do you keep your students safe?  Understanding the nature and purpose of practical activity to support learning in science.  **(ITAP 14)** How can practical work support the development of knowledge and skills? | Support trainees to develop effective science routines and expectations.  **(ITAP 14) Observe expert colleagues:**  - supporting the development of practical skills (disciplinary knowledge) in science.  **Together with an expert colleague:**  - teach a lesson with a significant focus on the development of skills and disciplinary knowledge. |
| **Core Area 2. Subject and curriculum knowledge**  **2.1 Develop pupils’ ability to express themselves confidently verbally and in writing, and develop students’ reading skills** | understand the importance of the classroom as a safe space for learning Science and help students to communicate their learning and understanding in a variety of different ways (including graphs and diagrams).  build an understanding of the importance of the correct and accurate use of scientific terminology, and the value of key words as a pedagogical device.  learn how scaffolding and modelling can support students in both verbal and written answers.  **(Mercer et al, 2004; Wellington et al, 2001)** | How do you foster a positive classroom environment in Science? What is behaviour for learning?  How do you model abstract concepts in Science?  Comparing pedagogy in Biology, Chemistry, and Physics. Why are they different? Where are they the same?  **(ITAP 1)** How can we teach our specialism in a way that remains accessible to the class?  **(ITAP 6&7)** How do we teach KS3/4 Physics? Parts 1&2 | Trainees learn the importance of establishing clear routines throughout their lessons and how to communicate their expectations. Develop and awareness of schools’ behaviour management systems and their implementation. Develop respectful relationships with students.  Plan for opportunities for students to communicate their learning using a variety of strategies using correct and accurate scientific terminology.  **(ITAP 1) Observe expert colleagues:**  - how subject specialists adapt their teaching to a particular class.  **Together with an expert colleague:**  - teach a short episode in your specialism and deconstruct the challenges you faced in making the material accessible.  **ITAP 6&7) Observe expert colleagues:**  - using the word ‘energy’ in different contexts, and how it is made meaningful in their teaching.  - using simple demonstrations in their teaching, such as the banana.  **Together with an expert colleague:**  - practice a demonstration which supports developing understanding of energy/electricity.  - teach using a particular physical model and then reflect, including the use of language and questions. |
| **2.2 Anticipate, identify and address misconceptions** | recognise the importance of misconceptions and how to anticipate and address them in relation to the Science curriculum. For example, eliciting students’ prior learning of the particle model. | How do you know the content you are required to teach?  What are misconceptions in Science? Why is understanding them important?  Comparing pedagogy in Biology, Chemistry, and Physics. Why are they different? Where are they the same?  **(ITAP 10&12)** What is Assessment for Learning? How can it be planned for and implemented in the classroom? How can you use questioning to explore students’ thinking?  **(ITAP 2&3)** How do we teach KS3/4 Biology? Parts 1&2  Use KS4 exam questions as a basis for identifying areas for development in subject and curriculum knowledge, and building awareness of assessment. | Plan to anticipate, identify, and address misconceptions in lessons.  Focus Science observations on how teachers identify, respond to and correct misconceptions.  **(ITAP 10&12) Observe expert colleagues:**  - using questions or other forms of assessment to establish what pupils already know, and then use this knowledge in the lesson or later.  **Together with an expert colleague:**  - use similar assessment activities, record some responses from pupils, and reflect on the outcome of the activity, receiving expert feedback.  **(ITAP 2&3) Observe expert colleagues:**  - how they teach aspects of Biology with which you are familiar.  **Together with an expert colleague:**  - Teach episodes of lessons (starters, plenaries, practical work, AfL and questioning) and reflect.  Support trainees to link subject and curriculum knowledge and its applications. |
| **2.3 Help pupils apply knowledge and skills to other contexts** | know how the Science curriculum is constructed with concepts built upon from year to year, and how schemes of work allow teachers to link concepts between topics.  build practical science activities into meaningful learning sequences.  recognise the transferable skills within Science learning and where these can be applied to and from other curriculum areas, such as graphing skills. | How do you apply your subject knowledge to the KS3 and KS4 curriculums and their assessments?  How is practical work used to support the development of knowledge and skills?  Build awareness of Big Ideas in science and their relevance to the entire science curriculum. | Encourage students to use and apply their knowledge and skills to new contexts.  Encourage trainees to employ practical work to support students’ learning and to evaluate the success of this.  Use the Big Ideas in Science to support trainees’ understanding of how the curriculum is interrelated. |
| **Core Area 3. Planning and Teaching**  **3.1.1 Plan effective and well-resourced lessons** | planning well-sequenced Science lessons that follow schemes of work, with clear learning outcomes, using a range of pedagogical approaches including enquiry-based approaches. | What are Learning Outcomes? How do they guide planning in Science?  What are misconceptions in Science? Why is understanding them important?  What is enquiry-based learning? What is its significance in Science lessons?  **(ITAP 10&12)** What is Assessment for Learning? How can it be planned for and implemented in the classroom? How can you use questioning to explore students’ thinking? | Support trainees’ development of planning skills by co-planning and providing targeted feedback. Focus on implementation of existing school resources, tailoring these as appropriate.  Encourage trainees to promote enquiry amongst their students.  **(ITAP 10&12) Observe expert colleagues:**  - using questions or other forms of assessment to establish what pupils already know, and then use this knowledge in the lesson or later.  **Together with an expert colleague:**  - use similar assessment activities, record some responses from pupils, and reflect on the outcome of the activity, receiving expert feedback. |
| **3.2.1 Manage cognitive load through planning** | understand how learning outcomes appropriate for age and stage will help to focus a lesson.  understand how well-sequenced activities including practical work and enquiry can enhance learning and progress.  begin to appreciate the different pedagogical requirements of the Science subjects (Biology, Chemistry, and Physics). | How do you adapt your science teaching to support the needs of different students (intro)? (eg. students with EAL, SEND, from under-served backgrounds)?  Comparing pedagogy in Biology, Chemistry, and Physics. Why are they different? Where are they the same?  **(ITAP 9)** How do young people learn?  **(ITAP 15)** How is enquiry-based learning used to support the development of skills and disciplinary knowledge in science? | Managing cognitive load in practice.    **(ITAP 9) Observe expert colleagues:**  - Teach different phases of a lesson, then together discuss these in relation to learning theories.  **Together with an expert colleague:**  - Practice designing and delivering activities such as starter or plenary, with the aim of managing cognitive load, and receive feedback on this.  **(ITAP 15) Observe expert colleagues:**  - facilitating pupils asking questions and developing elements of enquiry.  **Together with an expert colleague:**  - plan and teach a section of a lesson which supports pupils’ curiosity and ability to frame testable questions. |
| **3.2.2 Create opportunities for learning through interaction and regular practice** | learn the importance of regular practice in Science, including opportunities for consolidation with clear reference to Scientific concepts and skills and learn core activities that exemplify Science.  begin to understand the significance of collaborative learning opportunities through e.g., group work and whole class discussion | How do students learn to be learners? How can cognitive science techniques support our teaching?  Introduction to questioning in science, and the significance of classroom discussion as an example of the social construction of concepts. | Encourage trainees to link theories of learning to practice. Employ cognitive science approaches to plan and sequence and to manage cognitive load.  Encourage trainees plan and manage opportunities for pupils to learn together and from each other. |
| **3.3.1 Develop an understanding of different pupil strengths and needs** | understand how to assess Scientific understanding and learn about the different needs that students may have.  learn how to adapt their practice and adapt their planning accordingly.  begin to adapt their Science lessons to account for pupils’ different learning needs. | How do you adapt your teaching to support the needs of different students (intro)?  Introduction to AfL including diagnostic questions and misconceptions.  Introduction to adaptive teaching in science, ensuring familiarity with the language of differentiation | Develop trainees’ awareness of the different learning needs of their students and approaches to support/challenge students as appropriate.  Encourage trainees to plan and deliver activities which are clearly adapted to the needs of the class or specific pupils. Refer to strategies delivered in subject sessions. |
| **Core Area 4. Assessment**  **4.1 Check prior knowledge and understanding during lessons** | understand the importance of identifying and addressing misconceptions through questioning and other approaches  employ a range of AfL techniques to maintain awareness of student progress in lessons. | What is Assessment for Learning? How can you implement it in the Science classroom? How can you use questioning to explore students’ thinking?  **(ITAP 10&12)** What is Assessment for Learning? How can it be planned for and implemented in the classroom? How can you use questioning to explore students’ thinking? | Encourage trainee to research students’ likely prior knowledge and develop approaches to formatively assess this in lessons.  Use a range of AfL approaches to gauge students’ progress in lessons and respond appropriately. Use robust knowledge of progress to inform future planning.  **(ITAP 10&12) Observe expert colleagues:**  - using questions or other forms of assessment to establish what pupils already know, and then use this knowledge in the lesson or later.  **Together with an expert colleague:**  - use similar assessment activities, record some responses from pupils, and reflect on the outcome of the activity, receiving expert feedback. |
| **4.2 Use assessment to inform decisions and to challenge assumptions about young people** | learn to take decisions within lessons to consolidate learning  learn to separate assessment of behaviour and attitude from assessment of progress and learning | What is Assessment for Learning? How can you implement it in the Science classroom? How can you use questioning to explore students’ thinking?  Use KS4 exam questions as a basis for identifying areas for development in subject and curriculum knowledge, and building awareness of assessment.  Understanding the role of student data to inform short- and medium-term planning, and to challenge assumed knowledge of students. | Develop awareness of assessment practices across the key stages and how to monitor student progress.  Use student data to inform short- and medium-term planning. |
| **Core Area 5. Professional behaviours**  **5.1 Develop as a professional through critical, reflective practice, including reading** | understand what it means to be professional in a school/educational context, becoming aware of expectations of the professional learning environment of schools, and the specific expectations associated with the teaching of Science. | How can you find support for developing reflective practice in Science?  Working on the Learning, Teaching and Assessment assignment: critical reflection on pedagogical approaches linked to learning theories in the context of three lessons  Understand the process of applying for teaching posts in science and how to reflect their progress in applications. | Encourage trainee to participate in departmental and staff meetings.  Contribute to wider life of school, e.g., Parents’ evenings and extra-curricular activities.  Encourage trainees to reflect critically on their progress and to evaluate their teaching to inform development. |
| **5.2 Build effective working relationships to support teamwork and professional learning** | develop teaching practice through engaging with Science subject bodies and associations for best practice advice. They will be encouraged to join subject bodies and school colleagues to form a community of best practice. | How can you work effectively with colleagues in the Science department?  Consider joining a subject association and attending a meeting. What can you contribute, and how does this support your understanding of teaching Science or your specialism? | Engage with wider support staff, e.g., science technician, IT, reprographics.  Encourage engagement with science teaching support networks.  Involve trainees in departmental and whole school CPD. |

|  |
| --- |
| **U2/P2: Deepening understanding and impact on learning, developing agency** |
| The table below shows the Science curriculum intentions for trainees during U2 and P2. This provides a contrasting school or college experience and a greater focus on themes including adapting teaching, assessment, job seeking and equality, diversity and inclusion in their teaching subject. As the placement progresses, trainees develop planning with a focus on the medium term and use this to develop understanding of curriculum design in Science.  This table below highlights what we consider important for Science trainees to learn and develop. The second column explains how and where this intention will be implemented using overarching key questions which form the context for U2 subject sessions. Trainees will also see our intentions implemented in their P2 placement. For example, we want trainees to understand in greater depth how students learn Science and how all students can make progress. These themes delivered in U2 university sessions are supported by mentors and supplemented through department CPD and meetings. The final column refers to the impact or observable actions we wish our curriculum to have on the skills and knowledge of the trainee and the students they teach. Evidence of impact is recorded in the RoAD, which incorporates lesson observations and weekly mentor meetings. |

|  |  |  |
| --- | --- | --- |
| **Overview of curriculum links between University sessions and Placement (U2/P2).** | | |
| **What is the intention of the Science curriculum in U2/P2** | **How is the intention implemented in Science University sessions in U2?** | **What should trainees be achieving in P2 to show impact in their Science teaching, therefore making use of U2/P2 learning?** |
| **The overarching intention for U2/ P2 Science trainees is to further develop their classroom practice and identity.  This will occur through university teaching, the observation of colleagues, and teaching experiences in contrasting schools.  Within this we will support the students’ reflective and evaluation skills.**  Trainees should recognise the importance of school Science and communicate this to their students. They will demonstrate through planning and practice how committed Science teachers can make the subject relevant and engaging to pupils.  They will begin to use medium-term planning to sequence Science lessons within existing schemes of work, and further develop their pedagogical practices.  Trainees will continue to develop their understanding of the pedagogical requirements of the science subjects, and how these can be adapted across science specialisms.  Trainees will develop their skills in leading and demonstrating practical work to promote learning and progress.  Trainees will employ dialogic teaching approaches to deepen the participation of students with the curriculum.  Trainees will understand the importance of addressing different learning needs and introduce approaches to differentiation in their teaching. | Science trainees will have all experienced the following University sessions in U2.  This explicitly delivers our Science intention for P2. Trainees have experienced a range of input, lectures, seminars, readings, and practice activities that fulfil the aims of each area of focus. In chronological order, U2 focus areas are:   1. How do you communicate the importance of Science to students? 2. What should a diverse and inclusive Science curriculum look like? Decolonising the curriculum and gender in science. 3. How can you better understand equity in Science education? (Gender and diversity). 4. What is a medium-term Science curriculum? How do you sequence lessons to deliver a topic? 5. How can you develop your subject specific pedagogy? How can we apply these across science subject specialisms? 6. How do you manage subject knowledge and its application in post-16 teaching? 7. How can Science teaching develop students’ awareness of climate justice? 8. How can specialist subject bodies support your teaching and students’ learning? 9. Why are demonstrations important? How can you engage students to connect observations to theory? Lab-based (Jan day) 10. What is student data? How can it support your teaching? 11. What is dialogic teaching? How can it support students being proactive learners? 12. How do you adapt your teaching to support the needs of different students (empathy for all learners)? 13. As a Science teacher, what does inclusive educational practice mean to you? How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds) 14. How can you describe your professional identity? Securing your first role. 15. How do you implement theories of learning in the Science classroom? 16. How can you develop effective ways of collaborating with colleagues and establish a collegial working environment? | Science trainees should be able to demonstrate the following areas of impact:  Trainees should work as members of teaching staff in a Science department.  They should fully engage with more experienced colleagues, attending all meetings, CPD and parents’ evenings. Trainees will appreciate the diversity of students in their classroom and the importance of recognising this in their teaching.  Trainees will endeavour to inspire students by demonstrating the relevance of science to their lived experiences and to global issues such as climate justice.  All Science trainees should continue to observe experienced Science teachers, reflect on their observations, and integrate aspects into their teaching, enhancing their understanding of inclusive practices in school Science and how they may be applied in their classrooms.  They should develop subject specific pedagogies in Biology, Chemistry and Physics, and recognise where they are applicable across the science curriculum and key stages.  Trainees should develop their questioning and dialogic teaching as a means of identifying students’ misconceptions, developing students’ thinking and understanding and starting to develop their students’ identity as scientists.  They should have access to Science schemes of work to allow them to plan medium-term and individual Science lessons, tailoring and implementing existing resources and developing their own where appropriate.  They should be able to plan engaging and meaningful practical activities, to promote enquiry and students thinking and learning for themselves.  Trainees’ Science lessons apply their understanding of curriculum requirements, Big Ideas in Science.  Lessons should be planned to facilitate progression and adaptive teaching. Trainees will apply cognitive learning and constructivist learning theories to secure pupils’ learning. Science trainees in placement will know the progress their students are making in lessons and give evidence for this.  Trainees will develop their understanding of how the curriculum is assessed through terminal examinations and support their students in developing their exam preparation and practice.  Trainees will understand the recruitment process and be supported in applying for their first role. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Curriculum links between U2 and P2 - for each area of the UoM Curriculum** | | | |
| **Overarching Intention of our UoM curriculum for U2/P2 – Standard across all subjects** | **Link to UoM Science intention U2/P2**.  It is our intention that trainees in Science: | **How is this addressed in Science University 2 (U2)?**  These intentions will be realised as Science trainees address the following key questions, and through related Intensive Teacher and Practice (ITAP) days. | **How is impact developed in Science Placement 2 (P2)?**  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**  **1.2.2 Demonstrate consistently high expectations of attitudes, values, behaviour, and progress** | recognise the importance of school Science and communicate this to their students.  practice effective classroom routines and positive behaviour management to promote high expectations and student progress.  demonstrate through planning and practice how committed Science teachers can make the subject relevant and engaging to pupils. | How do you communicate the importance of Science to students?  **(ITAP 16)** How can we develop subject knowledge and its application in post-16 teaching? | How are all students included in science lessons and inspired to learn science?  Further develop classroom management practices in contrasting schools. Observe and apply a range of behaviour management practices. Observe more experienced teachers with more challenging groups and adapt their approaches  Ensure that trainees are aware of the diversity in their classrooms and are reflecting this in their planning and teaching.  **(ITAP 16) Observe expert colleagues:**  - using their curriculum knowledge to select, set and then utilise exam questions to support relevant subject knowledge.  **Together with an expert colleague:**  - select an exam question and plan to use it with a class. |
| **1.2.3 Build strong pedagogical relationships with young people** | further develop their understanding of the individual needs of students in their classes.  continue to tailor their practice and planning to meet the needs of their classes and their individual students.  recognise the importance of including all students and addressing their learning needs. | How can you better understand equity in Science education? (Gender and diversity).  As a Science teacher, what does inclusive educational practice mean to you? How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds)  Inclusive Educational Practice assignment: critical reflection on practice relating to the inclusion of young people in Science and in the school more generally. | Ensure that trainees are aware of the range of needs of students in their classrooms and are accounting for this in their planning and teaching.  Support trainees in understanding the techniques and approaches they can employ in their classroom.  Encourage observations both within and outside the department of how experienced colleagues respond to diversity in the classroom. |
| **1.2.4 Support pupils to develop effective behaviour for learning, including metacognitive strategies** | understand the importance of the consistent implementation of schools’ behaviour management systems  communicate to their students their expectations and the importance of positive classroom behaviour.  effectively balance rewards with sanctions focusing on rewards. Utilise frequent verbal praise.  understand the importance of managing cognitive load to support student engagement and progression. | How do you implement theories of learning in the Science classroom?  How do you adapt our teaching to support the needs of different students (empathy for all learners)? | Modelling, discussing, and explaining implementation of the school’s behaviour management system.  Encourage trainees to develop effective science routines in line with school procedures.  Support trainees in understanding the level their classes are working at an incorporate this in their planning and teaching including explicit approaches to manage cognitive load. |
| **Core Area 2. Subject and curriculum knowledge**  **2.4 Deliver a carefully sequenced and coherent curriculum** | understand the importance of the classroom as a safe and dialogic space for learning Science, helping all students to communicate their learning and understanding in a variety of different ways.  demonstrate understanding of the importance of further developing subject-specific pedagogy  employ scaffolding and modelling to support students’ use of language in both verbal and written answers.  **(Mercer et al, 2004)** | What is a medium-term Science curriculum? How do you sequence lessons to deliver a topic?  How can you develop your subject specific pedagogy? How can you apply these across science subject specialism?  What should a diverse and inclusive Science curriculum look like? Decolonising the curriculum and gender in science.  How do trainees manage subject knowledge and its application in post-16 teaching?  **(ITAP 16)** How can we develop subject knowledge and its application in post-16 teaching? | Trainees use SOW to sequence and plan lessons to create coherent medium-term plans for use during this placement.  How do trainees use their medium-term plan to address inclusive practices such as decolonisation, gender, and climate justice, and provide opportunities for student enquiry.  Trainees will teach a broad curriculum and identify approaches specific to specialisms and where they can be applied more broadly  Where applicable, trainees should develop their practice at post-16 level.  **(ITAP 16) Observe expert colleagues:**  - using their curriculum knowledge to select, set and then utilise exam questions to support relevant subject knowledge.  **Together with an expert colleague:**  - select an exam question and plan to use it with a class. |
| **2.5 Support pupils to think critically and challenge them to construct a deeper level of understanding and skills** | develop and use understanding of students’ misconceptions to plan to address these in teaching.  learn about and employ dialogic teaching approaches to better understand students’ learning and promote their contributions to classroom discussion. | What is dialogic teaching? How can it support students being proactive learners?  How can Science teaching develop students’ awareness of climate justice?  **(ITAP 18)** How can Science teaching develop students’ knowledge and awareness of questions of climate justice? | Continue to plan to anticipate, identify, and address misconceptions in lessons.  Focus Science observations on how teachers use dialogic approaches to uncover and address misconceptions and encourage student participation.  Trainees will employ practical work to support students to elaborate their learning.  Support trainees to link subject and curriculum knowledge and its applications.  Trainees should aim to teach a lesson in school with reference to climate justice.  **(ITAP 18) Observe expert colleagues:**  - teaching lessons or extra-curricular environmental or climate actions with young people.  **Together with an expert colleague:**  - prepare and teach a science lesson which extends young people’s knowledge and awareness of climate justice. |
| **Core Area 3. Planning and Teaching**  **3.1.3 Model processes, ideas, and concepts effectively** | deepen their understanding of how schemes of work allow teachers to link concepts within and between topics.  continue to build practical science activities into meaningful learning sequences.  teach and promote transferable skills within Science learning and where these can be applied to and from other curriculum areas including literacy and numeracy. | Why are demonstrations important? How can you engage students to connect observations to theory?  **(ITAP 17)** Demonstrations that matter: How can we engage students to connect observations to theory? | Students will continue to develop their knowledge and skills through application in different contexts within the school/college.  Encourage trainees to develop their understanding of the interrelated nature of the science curriculum and ensure this is explicit to their students.  Continue to support a range of observations including in other subject areas.  **(ITAP 17) Observe expert colleagues:**  - using a demonstration as a central tool in developing subject knowledge.  **Together with an expert colleague:**  - plan a short demonstration and use it as a central element in a lesson, eliciting pupils’ learning. |
| **3.1.4 Stimulate pupil thinking and checking for understanding** | learn about and employ dialogic teaching approaches to better understand their students learning and promote their contributions to classroom discussion.  use enquiry-based learning to support students to think about their learning and to question their understanding. | What is dialogic teaching? How can it support students being proactive learners? | Support trainees’ development of planning skills by co-planning and providing targeted feedback, with a focus on pupil activity and active learning.  Encourage trainees to promote enquiry amongst their students and use questioning to uncover and address students’ misconceptions. |
| **3.2.3 Assess and build on pupils’ prior knowledge** | set learning outcomes which utilise authoritative and dialogic teaching effectively and manage cognitive load  understand how students’ practical skills and knowledge can be progressed over time.  implement the different pedagogical requirements of the Science subjects (Biology, Chemistry, and Physics). | How do you adapt your teaching to support the needs of different students (empathy for all learners)?  How can you develop our subject specific pedagogy? How can you apply these across science subject specialisms?  **(ITAP 17)** Demonstrations that matter: How can we engage students to connect observations to theory? | Ensure that learning outcomes are achievable and balance demand. Utilise cognitive science approaches to plan and sequence and to manage cognitive load.  Trainees will take every opportunity to deepen their understanding in specialisms and generically.  **(ITAP 17) Observe expert colleagues:**  - using a demonstration as a central tool in developing subject knowledge.  **Together with an expert colleague:**  - plan a short demonstration and use it as a central element in a lesson, eliciting pupils’ learning. |
| **3.3.2 Provide opportunity for all pupils to experience success through task design and careful grouping** | learn the importance of effectively selecting, introducing, managing, and consolidating tasks.  effectively use collaborative learning opportunities through e.g., group work and whole class discussion. | How do you adapt your teaching to support the needs of different students (empathy for all learners)?  What does inclusive educational practice mean to you? How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds)  Inclusive Educational Practice assignment: critical reflection on practice relating to the inclusion of young people in Science and in the school more generally. | Share with trainees how tasks are selected, introduced, managed, and consolidated, and encourage trainees to explain and reflect on their own thinking in planning and teaching.  Encourage trainees to observe how collaborative learning opportunities are employed by teachers in their school and then to use this in their own practice. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Core Area 4. Assessment**  **4.3 Provide high-quality, timely and formative feedback which pupils can act on** | employ AfL techniques effectively and consistently to inform themselves of student progress during lessons.  communicate this progress to students and encourage them to use feedback to reflect on their learning and to respond appropriately.  use school data systems to inform themselves of the levels to which students could be working at. | What is student data? How can it support your teaching?  What is dialogic teaching? How can it support students being proactive learners?  Student Data activity. Understanding the role of student data to inform short- and medium-term planning, and to challenge assumed knowledge of students.  **(ITAP 16)** How can we develop subject knowledge and its application in post-16 teaching? | Support trainees to use a range of AfL approaches to inform themselves of students’ progress in lessons and respond appropriately. Observe modelling of effective AfL by experienced teachers.  Encourage the trainee to use the school’s data management systems to inform themselves of their students’ prior learning and future targets, and to use their assessment of progress to inform future planning.  **(ITAP 16) Observe expert colleagues:**  - using their curriculum knowledge to select, set and then utilise exam questions to support relevant subject knowledge.  **Together with an expert colleague:**  - select an exam question and plan to use it with a class. |
| **4.4 Adopt marking practices which are effective and efficient** | provide meaningful written feedback in line with the school’s policy.  rigorously separate assessment of behaviour and attitude from assessment of progress and learning  adopt efficient approaches to providing meaningful feedback including during lesson time and encourage students to respond. | What is student data? How can it support your teaching?  What is dialogic teaching? How can it support students being proactive learners?  **(ITAP 16)** How can we develop subject knowledge and its application in post-16 teaching? | Model the school’s assessment practices from across the key stages and how to monitor student progress. Ensure trainees mark books in line with school policies.  Encourage trainees to develop efficient marking approaches in the classroom appropriate to the teaching group.    Use student data to inform short- and medium-term planning.  **(ITAP 16) Observe expert colleagues:**  - using their curriculum knowledge to select, set and then utilise exam questions to support relevant subject knowledge.  **Together with an expert colleague:**  - select an exam question and plan to use it with a class. |
| **Core Area 5. Professional behaviours**  **5.3 Manage workload and wellbeing** | understand the need for both a good work ethic and a work-life balance.  continue to develop ways to support and benefit from collaboration with colleagues in, for example, planning, resourcing lessons.  establish professional and collegial ways of managing the emotional demands of teaching. | How can you find support for developing reflective practice in Science?  How can you develop effective ways of collaborating with colleagues and establish a collegial working environment? | Model balanced working practices.  Encourage trainee to participate in departmental and staff meetings.  Contribute to wider life of school, e.g., Parents’ evenings and extra-curricular activities.  Encourage trainees to reflect critically on their progress and to evaluate their teaching. |
| **5.4 Seek opportunities for effective collaboration with other professionals, and for collaborative enquiry** | engage with Science specific subject bodies and associations (IoP, ASE, RSC) and with school colleagues to participate in a learning community.  work collaboratively with members of their department and pastoral teams to develop awareness of the whole school role of teacher. | How can specialist subject bodies support your teaching and our students’ learning?  How would you describe your professional identity? Securing your first role.  Workshops and feedback on letters of application and mock interviews. Understand the process of applying for teaching posts in science and how to reflect their progress in applications.  Think about joining a subject association and attending a meeting. What can you contribute, and how does this better your understanding of teaching Science? | Encourage trainee to fully engage with school support staff, e.g., science technician, IT, reprographics, and to utilise their support.  Encourage engagement with science teaching support networks.  Involve trainees in departmental development and whole school CPD. |

|  |
| --- |
| **U3/P3: Deepening impact, enriching practice, joining the profession** |

|  |
| --- |
| The section below shows the Science curriculum intentions for trainees to learn in U3 and P3. U3 and P3 are positioned to provide trainees with an opportunity to return to Placement 1 schools and colleges, to use what they have learnt to deepen their teaching practice with an increased timetable. The focus for U3 and P3 is to support trainees in developing agency, impacting on practice, and developing curriculum building. In addition to this, adaptive teaching and engaging in educational research are also foci. U3 and P3 culminate with reflection on enrichment and enhancement, joining the profession [professional orientation and teacher identity] and a consideration of specific areas of practice and pedagogy that can be extended. Trainees have a greater focus on pupil voice and experience of school as their final academic assignment. The table below follows the same format as previous, showing overarching intention, Science curriculum intention, how it is addressed in University (U3) and what the desired impact is for Placement 3 (P3). Evidence of impact is recorded in the RoAD, which incorporates lesson observations and weekly mentor meetings. |

|  |  |  |
| --- | --- | --- |
| **Overview of curriculum links between University sessions and Placement (U3/P3).** | | |
| **What is the intention of the Science curriculum in U3/P3** | **How is the intention implemented in Science University sessions in U3?** | **What should trainees be achieving in P3 to show impact in their Science teaching, therefore making use of U3/P3 learning?** |
| **The overarching intention for U3/P3 Science trainees is to consolidate and enhance their classroom practice and identity. This will occur through university teaching, the observation of colleagues, and teaching experiences. Within this, students will continue to develop their reflective and evaluation skills.**  Trainees should demonstrate the relevance of school Science. They will demonstrate through planning and practice how committed Science teachers can make the subject relevant and engaging to pupils.  They will use medium-term planning to sequence Science lessons within existing schemes of work, and further develop their pedagogical practices.  Trainees will work with the pedagogical requirements of the science subjects, and continue to adapt these across science specialisms.  Trainees will consolidate their skills in leading and demonstrating practical work to promote learning and progress.  Trainees will employ dialogic teaching approaches to deepen the participation of students with the curriculum.  Trainees will address different learning needs and practise approaches to differentiation in their teaching. | Science trainees will have all experienced the following University sessions in U3.  Trainees will experience a range of input, lectures, seminars, readings, and practice activities that fulfil the aims of each area of focus. In chronological order, U3 key questions are:   1. What is your approach to communicating the relevance of Science to all of your students and clearly relating it to their lived experiences? 2. How can you build a more inclusive Science classroom through listening and responding to our pupils? 3. How can you integrate your medium-term planning into an efficient and effective planning cycle to enhance your ECT practice? 4. How will you continue to develop your subject knowledge with a view to your first teaching post? 5. How can you as a Science teacher develop your students’ agency when expressing views on societal issues? 6. How can you develop subject-specific pedagogy through the use of practical work/required practicals? 7. What do minds-on practicals mean in practice? 8. How can you integrate student data and AfL to inform your planning and teaching? 9. How can you employ pupil groupings to enhance the effectiveness of practical work? 10. How you promote learning outside of the classroom and illustrate the application of theory in the real world? 11. How do we adapt our teaching to support the needs of different students? 12. What does inclusive educational practice mean to you? How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds)? 13. How can you identify your individual strengths? How do you share these with colleagues and peers? 14. How do communicate research findings to an audience of education professionals? 15. How can you plan and implement enquiry-based learning into your practice both within and across lessons? 16. What is the focus of your development going forward. How will you prepare for your ECT years and beyond? | Science trainees should be able to demonstrate the following areas of impact:  Trainees should work as members of teaching staff in a Science department. They should fully engage with more experienced colleagues, attending all meetings, CPD and parents’ evenings. Trainees will recognise and respond to the diversity of students in their classroom. Trainees will seek to inspire students by demonstrating the relevance of science to their lived experiences and to societal issues such as climate justice and social inequality.  All Science trainees should continue to observe experienced Science teachers, reflect on their observations, and integrate aspects into their teaching.  They should continue to develop subject specific pedagogies in Biology, Chemistry and Physics, and recognise where they are applicable across the science curriculum and key stages.  Trainees should continue to develop their questioning and dialogic teaching as a means of enhancing their students’ identity as scientists.  They should have access to Science schemes of work to allow them to practice medium term planning and to efficiently manage their workload. They should work collaboratively with the department, tailoring and developing resources for use by colleagues.  They should be able to plan engaging and meaningful practical activities, to promote enquiry and students’ thinking and learning for themselves.  Lessons should be planned using data and AfL to facilitate progression and adaptive teaching.  Trainees will support their students through exam preparation and practice and in required practical work  Trainees will understand the recruitment process and be supported in applying for their first role. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Curriculum links between U3 and P3 - for each area of the UoM Curriculum** | | | |
| **Overarching Intention of our UoM curriculum for U3/P3 – Standard across all subjects** | **Link to UoM Science intention U3/P3**.  It is our intention that trainees in Science: | **How is this addressed in Science University 2 (U3)?**  These intentions will be realised as Science trainees address the following key questions, and through related Intensive Teacher and Practice (ITAP) days. | **How is impact developed in Science Placement 3 (P3)?**  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 3 school or college. |
| **Core Area 1. Teacher Expectations**  **1.1.2 Demonstrate consistently high expectations of attitudes, values, behaviour and progress** | demonstrate the importance of school Science and communicate the relevance of this to their students.  consistently maintain effective classroom routines and positive behaviour management, appropriate to the context, to promote high expectations and student progress.  demonstrate consistently through planning and practice how committed Science teachers can make the subject relevant and engaging to pupils. | What is your approach to communicating the relevance of Science to all of your students and clearly relating it to their lived experiences?  How can you build a more inclusive Science classroom through listening and responding to your pupils? | Trainees will seek to inspire students by demonstrating the relevance of science to their lived experiences and to societal issues such as climate justice and social inequality.  Consolidate and further develop the ability to use classroom management practices appropriate to the setting. Continue to observe more experienced teachers and adapt their approaches.  Trainees will recognise and respond to the diversity of students in their classrooms. |
| **1.2.3 Build strong pedagogical relationships with young people** | recognise and adapt to the individual needs of students in their classes.  continue to tailor their practice and planning to meet the needs of their classes and their individual students.  develop their teacher identity so that students recognise and have confidence in them as teachers. | What does inclusive educational practice mean to you? How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds)  How can you build a more inclusive Science classroom through listening and responding to our pupils?  How can you plan and implement enquiry-based learning into your practice both within and across lessons? | Trainees should continue to develop their questioning and dialogic teaching as a means of enhancing their students’ identity as scientists.  Ensure that trainees are aware of the range of needs of students in their classrooms and are addressing this in their planning and teaching.  Encourage observations both within and outside the department of how experienced colleagues respond to diversity in the classroom. |
| **1.2.4 Support pupils to develop effective behaviour for learning, including metacognitive strategies** | consistently implement the schools’ behaviour management systems using their knowledge of individual students.  be consistent in their expectations for positive behaviour and communicate this to their students.  effectively balance specific and meaningful rewards with appropriate sanctions.  manage cognitive load to support student engagement and progression.  encourage students to reflect on and evaluate their own learning. | How can you build a more inclusive Science classroom through listening and responding to our pupils?  How can you plan and implement enquiry-based learning into your practice both within and across lessons?  How do we adapt our teaching to support the needs of different students? | Support trainees in the reflective application of the school’s behaviour management systems.  Discuss with trainees the level their classes are working and support them in addressing this in their planning and teaching.  Trainees should be able to plan engaging and meaningful practical activities, to promote enquiry and students’ thinking and learning for themselves. |
| **Core Area 2. Subject and curriculum knowledge**  **2.4 Deliver a carefully sequenced and coherent curriculum** | demonstrate the ability to plan lessons with a logical and coherent sequence appropriate to the wider school curriculum  employ subject-specific pedagogy to promote learning  employ scaffolding and modelling to support students in both verbal and written answers. | How can you integrate your medium-term planning into an efficient and effective planning cycle to enhance your ECT practice?  How can you develop subject-specific pedagogy through the use of practical work/required practicals?  How can you build a more inclusive Science classroom through listening and responding to your pupils?  How will you continue to develop your subject knowledge with a view to your first teaching post? | Trainees should have access to Science schemes of work to allow them to practice medium term planning and to efficiently manage their workload. They should work collaboratively with the department, tailoring and developing planning approaches and resources.    Trainees should use their medium-term plan to demonstrate the relevance of science to students’ lived experiences and to societal issues such as climate justice and social inequality.  Trainees will teach a broad curriculum and identify approaches specific to specialisms and where they can be applied more broadly  Where applicable, trainees should develop their practice at post-16 level. |
| **2.5 Support pupils to think critically and challenge them to construct a deeper level of understanding and skills** | use awareness of students’ misconceptions to plan to address these in teaching.  employ dialogic teaching approaches to connect students’ experiences. | How can you bring the Science curriculum to life and relate it to your students’ lived experience?  How can you as a Science teacher develop your students’ agency when expressing views on societal issues?  How will you continue to develop your subject knowledge with a view to your first teaching post? | Trainees should continue to develop their questioning and dialogic teaching as a means of enhancing their students’ identity as scientists.  Trainees should continue to develop subject specific pedagogies in Biology, Chemistry and Physics, and recognise where they are applicable across the science curriculum and key stages.  Trainees will seek to inspire students by demonstrating the relevance of science to their lived experiences and to societal issues such as climate justice and social inequality. |
| **Core Area 3. Planning and Teaching**  **3.1.3 Model processes, ideas and concepts effectively** | use schemes of work to link concepts within and between topics, including Big Ideas.  employ practical science activities to develop skills and to connect observations to theory.  teach and promote transferable the scientific skills so that students see themselves as scientists. | What do minds-on practicals mean in practice?  How can you develop subject-specific pedagogy through the use of practical work/required practicals?  How can you bring the Science curriculum to life and relate it to your students’ lived experience?  How can you plan and implement enquiry-based learning into your practice both within and across lessons? | Trainees should be able to plan engaging and meaningful practical activities, to promote enquiry and students’ thinking and learning for themselves.  Observe teachers developing scientific skills and apply this in their own lessons.  Observe teachers approaches to connecting the science curriculum including Big Ideas to students’ lived experiences and practice this in their own lessons. |
| **3.1.4 Stimulate pupil thinking and checking for understanding** | employ dialogic teaching approaches to better understand their students learning and promote their contributions to classroom discussion.  use enquiry-based learning to support students to think about their learning and to question their understanding. | How can you bring the Science curriculum to life and relate it to your students’ lived experience?  How can you develop subject-specific pedagogy through the use of practical work/required practicals?  How can you employ pupil groupings to enhance the effectiveness of practical work?  How can you plan and implement enquiry-based learning into your practice both within and across lessons? | Support trainees’ development of planning skills by co-planning and providing targeted feedback, with a focus on active and independent learning.  Encourage trainees to promote enquiry amongst their students and use questioning to uncover and address students’ misconceptions. |
| **3.2.3 Assess and build on pupils’ prior knowledge** | set learning outcomes which promote collaborative learning to utilise students as a resource and to manage cognitive load  promote the development of students’ practical skills and knowledge.  implement the different pedagogical requirements of the Science subjects (Biology, Chemistry, and Physics). | How do you adapt your teaching to support the needs of different students?  What does inclusive educational practice mean to you? How do you adapt your science teaching to support the needs of students with EAL, SEND, from under-served backgrounds)  How can you develop subject-specific pedagogy through the use of practical work/required practicals?  How can you bring the Science curriculum to life and relate it to your students’ lived experience? | Trainees will use lesson activities to promote collaborative learning opportunities.  Use cognitive science approaches to plan and sequence and to manage cognitive load. |
| **3.3.2 Provide opportunity for all pupils to experience success through task design and careful grouping** | plan, utilise and manage pupil grouping to effectively promote dialogic and collaborative learning.  use assessment to identify the needs of individual pupils to inform forward planning. | How do we adapt our teaching to support the needs of different students?  How can you integrate student data and AfL to inform your planning and teaching?  How can you employ pupil groupings to enhance the effectiveness of practical work? | Share approaches to group work and grouping of students to effectively promote learning for all.  Trainees should observe how collaborative learning opportunities are employed by teachers in their school and then to use this in their own practice. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Core Area 4. Assessment**  **4.3 Provide high-quality, timely and formative feedback which pupils can act on** | use AfL to inform themselves of student progress during lessons and respond appropriately.  facilitate students to use feedback to reflect on their learning and to respond appropriately.  use school data systems to inform themselves of the levels to which students could be working at. | How can you integrate student data and AfL to inform your planning and teaching?  How can you develop subject-specific pedagogy through the use of practical work/required practicals?  How can you build a more inclusive Science classroom through listening and responding to our pupils? | Lessons should be planned using data and AfL to facilitate progression and adaptive teaching.  Share with trainees how AfL is used to inform and adapt lessons for students’ progress.  Trainees should continue to develop their questioning and dialogic teaching as a means of enhancing their students’ identity as scientists. |
| **4.4 Adopt marking practices which are effective and efficient** | provide efficient meaningful written and verbal feedback in line with the school’s policy.  continue to separate assessment of behaviour and attitude from assessment of progress and learning.  Provide feedback on the development of students’ skills and scientific practices. | How can you integrate student data and AfL to inform your planning and teaching?  How can you plan and implement enquiry-based learning into your practice both within and across lessons? | Trainees will use the schools’ marking policy to provide efficient and meaningful written and verbal feedback.  Share with trainees efficient marking and feedback practices. |
| **Core Area 5. Professional behaviours**  **5.3 Manage workload and wellbeing** | develop strategies to maintain both a good work ethic and a work-life balance.  collaborate with colleagues in, for example, planning, resourcing lessons.  maintain professional and collegial ways of managing the emotional demands of teaching. | How can you identify your individual strengths? How do you share these with colleagues and peers?  What is the focus of your development going forward. How will you prepare for your ECT years and beyond? | Model balanced working practices.  Trainees should participate in and contribute to departmental and staff meetings.  Trainees should continue to contribute to wider life of school, e.g., Parents’ evenings and extra-curricular activities.  Trainees should continue to reflect critically on their progress and to evaluate their teaching. |
| **5.4 Seek opportunities for effective collaboration with other professionals, and for collaborative enquiry** | continue to engage with school colleagues to participate in a learning community.  work collaboratively with members of their department and pastoral teams to develop their whole school teaching role. | How do communicate research findings to an audience of education professionals?  What is the focus of your development going forward. How will you prepare for your ECT years and beyond?  How can you identify your individual strengths? How do you share these with colleagues and peers?  How do you see your developing identity as a science teacher? What are your educational values and priorities? | Support trainees to understand the recruitment process and in applying for their first role.  Trainees should fully engage with school support staff, e.g., science technician, IT, reprographics, and utilise their support.  Encourage engagement with science teaching support networks and learning communities. |