**Primary Curriculum Map (Science)**

***Year 1 Undergraduate***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **University Curriculum – Year 1** | | | | | |
| **Session Sequence** | **Session Content Subject Specific Components/s** | **Learn That**  **(CCF REFs)** | **Learn How**  **(CCF REFs)** | **Links to Research and Reading** | **Formative Assessment mode** |
| **Session 1**  **Lecture – the Nature of Primary Science**  **1 hour** | The aims and principles of science education   * develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics * develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them * are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.   Understand that the science national curriculum provides a programme of study for the knowledge and skills which children learn aged 5-11 and that the spiral structure provides a minimum requirement and enables progression of substantive and disciplinary knowledge.  LT3.1  The national curriculum makes clear the expectations for outcomes at different ages.  LH1.1  Understand that expertise in science is built through developing substantive and disciplinary knowledge. Each should be taught explicitly, in sequence and they should build on prior learning.  An introduction to research underpinning primary science pedagogy -practical work, teacher directed instruction and enquiry-based teaching.  An introduction to research underpinning how children learn in science – schemas, chunking and retrieval | 1.1; 1.2  2.1; 2.2  3.1; 3.2; 3.3; 3.5; 3.7  4.2  5.7 | 3a, 3j | DEPARTMENT of EDUCATION. 2013. The national curriculum in England: key stages 1 and 2 framework document. Available at:  <https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum>  Harlen, W. and Qualter, A., 2018. The Teaching of Science in Primary Schools, London: David Fulton Publishers.    OFSTED 2023. Finding the Optimum. Available from <https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2>  OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:<https://www.gov.uk/government/publications/research-review-series-science>  OFSTED. 2013 Maintaining Curiosity a survey into science education in schools. Department for Education.  Peacock, Sharp, Johnsey, Write and Sewell., 2021. Primary Science Knowledge & Understanding. London: Sage Publications Ltd.  Rosenshine, B. (2012) Principles of Instruction: Research-based strategies that all teachers should know. American Educator, 12–20.https://doi.org/10.1111/j.1467-8535.2005.00507.  Serret and Earle. 2018 ASE: Guide to Primary Science, available**:** <https://www.ase.org.uk/resources/education-science/issue-270/new-ase-guide-primary-science-education>  Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris., 2021. Primary Science Theory & Practice. London: Sage Publications Ltd.  ASE materials. Available**:** <https://www.ase.org.uk/ase-resource-hub>  Plan Resources. Available:<https://www.planassessment.com/>  TAPs Resources: Available:<https://pstt.org.uk/unique-resources/taps/> | Trainee reflection and analysis/ evaluation  Personal tutoring processes  Within taught university sessions through activities and interactions  Key component progress tracker |
| **Session 2**  **Seminar - Snails**  **2 hours** | Understand that the science national curriculum provides a programme of study for the knowledge and skills which children learn aged 5-11 and that the spiral structure provides a minimum requirement and enables progression of substantive and disciplinary knowledge.  LT3.1  Understand that expertise in science is built through developing substantive and disciplinary knowledge. Each should be taught explicitly, in sequence and they should build on prior learning.  Understand that working scientifically is the central spine of the primary science curriculum and covers the understanding of the nature, process and methods of science.  The working scientifically skills and how these support children to find answers to their scientific questions.  The importance of the scientific skill - observation  The importance of first-hand practical experiences to develop substantive knowledge in science.  An introduction to assessment for learning in science. The importance of establishing prior knowledge and assessing children’s learning.  To understand that misconceptions are children’s ideas which are based on their experience (and should be pre-empted during the planning process and tackled in lessons). | 1.1; 1.2; 1.3; 1.4 1.5; 1.6  2.2; 2.6;  3.1; 3.2; 3.3; 3.4; 3.5  4.6; 4.7  5.1; 5.5  6.1 | 1.b; 1e  2d; 2e; 2f  3j; 3l  4n  5c |
| **Session 3**  **Seminar - Bucket school**  **2 hours** | Understand what is meant by Nature deficit disorder and the key research relating to the impact of this on learners.  Learning outside the classroom (LOtC) is an important and beneficial part of science education. It can impact on children’s academic attainment but also have impacts on their social skills, wellbeing and mental health.  LT3.2  Learn how to use the outdoor environment flexibly to support learning in science.  Introduction to the Bucket School approach and critique of 3 science outdoor learning episodes  An introduction to risk assessment and the importance of managing risk inside and outside the classroom.  Inclusive practice in learning outside the classroom. How to adapt outdoor learning to the needs of pupils with specific educational needs and or disability. | 1.1; 1.2; 1.3; 1.4; 1.5; 1.6;  2.1  3.1; 3.2; 3.7  4.1; 4.6  5.1; 5.2;  6.2;  7.1; 7.7 | 3c  5i; 5j  7e |
| **Session 4**  **Seminar - Working scientifically**  **2 hours** | Understand the Key findings from the Ofsted Research Review: Science document (2021)  Understand that children are required to build up their knowledge and competence in 5 different types of enquiries in primary science. These are: Observation over time, identifying classifying and grouping, comparative and fair testing, pattern seeking, research using secondary sources.  Understand that primary science research indicates best practice to include integration of problem solving in addition to the 5 types of enquiry.  Understand how the use of fair testing planning boards can support children in planning and conducting a fair test enquiry.  Understand the importance of adapting teaching to the needs of learners. SEND and challenge - adaptive approaches to planning and recording science learning. | 1.6  2.6; 2.9  3.2; 3.3; 3.5; 3.6; 3.8  4.4; 4.5; 4.8; 4.9; 4.10  5.1; 5.2; 5.3; 5.5  6.2; 6.3; 6.5  7.2; 7.4; 7.7 | 2a; 2f  3f; 3h; 3n  5i |
| **Session 5**  **Seminar - materials**  **2 hours** | Understand the importance of eliciting children’s ideas and prior knowledge in science.  Understand how to use a range of strategies to establish children’s ideas and prior knowledge of scientific concepts.  Understand that misconceptions are children’s ideas which are based on their experience (and should be pre-empted during the planning process and tackled in lessons).  To be able to identify a range of suitable approaches to elicit children’s ideas and address misconceptions through planning and teaching.  Understand how national curriculum is structured to support progression in substantive knowledge.  To develop the subject and curriculum knowledge required to teach materials effectively.  Understand the importance of context for learning in science  The importance of dovetailing EYFS and KS1 content in science – Materials focus. | 2.2; 2.6; 2.9  3.2; 3.3, 3.4, 3.5; 3.8  4.4; 4.5; 4.6;  5.1; 5.3; 5.5  6.2 | 1c  2a;2e; 2f  3f  4b |
| **Session 6**  **Seminar - plants**  **2 hours** | The importance of dovetailing EYFS and KS1 content in science – plants focus.  To develop the subject and curriculum knowledge required to teach materials effectively.  Revisit the impact of first-hand practical experience on children’s learning.  How to plan, resource and manage a practical science lesson.  Adaptive approaches to recording results of practical work.  Supporting children to build vocabulary in primary science- focus on plants aspects of the national curriculum.  Substantive and disciplinary knowledge | 2.2; 2.3; 2.4; 2.5; 2.6; 2.7  3.2;3.3; 3.7;  4.4; 4.6; 4.7;  5.3; 5.5; 5.7  6.3 | 1c, 1g, 1i  2c  3j, 3l |
| **Session 7**  **Seminar - electricity**  **2 hours** | To know and be able to apply different pedagogies to support learning in science including first-hand experience; modelling; analogies; and simulations.  Use of models and analogies to support children to learn complex and abstract concepts such as electricity.  To know some common misconceptions about current electricity and be able to address them through planning and teaching.  To develop the subject and curriculum knowledge required to teach electricity effectively.  Plan an effective science learning opportunity that integrates substantive and disciplinary knowledge.  Understand that formative strategies are crucial to assess learning in science.  To be able to apply formative assessment strategies including effective questioning to assess learning in science with peer and tutor support. | 2.2; 2.6;  3.2;3.3; 3.5; 3.7;  4.3; 4.8  5.3; 5.5  6.3; 6.4; 6.7 | 2a; 2c; 2e; 2i  6a, 6e |
| **Placement** | | | |
| **Session 8**  **Seminar - sound**  **2 hours** | To develop the subject and curriculum knowledge required to teach sound effectively.  The importance of supporting children to develop connections between science learning – building mastery of science learning.  Planning for the effective use of assessment in science learning.  How to use technology to enhance science learning – for example to measure something quantitatively (e.g. sound in decibels) and recognise that this moves children’s learning on from qualitative descriptions.  To plan and conduct a pattern seeking enquiry with a sound focus.  Strategies to manage behaviour in practical science lessons.  Considering inclusive practice – access to the statutory requirements of the science national curriculum for deaf and hearing-impaired students. | 2.2; 2.6;  3.2; 3.3; 3.4; 3.7  4.3; 4.6; 4.7;  5.3; 5.5  6.2; 6.3  7.1 | 3t  4b; 4o |
| **Session 9**  **Seminar - rocks**  **2 hours** | To consider the challenges of teaching abstract aspects of the subject  Understand the value of using modelling strategies when teaching complex and abstract concepts.  To develop the subject and curriculum knowledge required to teach rocks effectively.  Consider the point in the learning sequence that modelling or practical activity is planned and the impact of this on children’s learning.  To understand that it is important to integrate the work of a diverse range of scientists throughout the curriculum. Including the work of female scientists when teaching about rocks and fossils (Mary Anning)  To understand that representing a diverse range of scientists can impact upon learners’ perceptions of science and who science is for, increase aspirations and provide role models.  To understand that effective classroom, resource and behaviour management in science helps to ensure that pupils learn safely and make good progress  To understand that engagement is important but learning activities are carefully selected in order to also develop deep understanding of the associated concepts. | 1.6  2.2; 2.6; 2.9  3.2; 3.3; 3.5;  4.3;  5.1; 5.4;  6.5; 6.7  7.1  8.2; 8.5 | 4b; 4i; 4n  8d; 8g |
| **Session 10**  **Seminar - space**  **2 hours** | To develop the subject and curriculum knowledge required to teach space effectively.  To use models effectively to teach complex and abstract concepts.  To understand that it is important to integrate the work of a diverse range of scientists throughout the curriculum. Including the work of scientists of colour (Katherine Johnson) and those with disabilities (Stephen Hawking)  To understand that representing a diverse range of scientists can impact upon learners’ perceptions of science and who science is for, increase aspirations and provide role models.  Understand that formative strategies are crucial to assess learning in science.  To be able to apply formative assessment strategies including effective questioning to assess learning in science and make judgements over time. | 1.6  2.2; 2.6; 2.8  3.2; 3.3; 3.5;  4.3;  5.1; 5.4;  6.6  8.2; 8.5 | 4b; 4i  5c;  6c; |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **School Based Curriculum – Year 1** | | | | |
| **Observing:**  Observe how expert colleagues use and deconstruct approaches, in science in at least one lesson throughout school.  **Planning:**  Observe how expert colleagues break tasks down into constituent components, in science, for at least one lesson.  **Teaching:**  Rehearse and refine particular approaches in science for a group/whole class. Deliver group/whole class teaching.  **Assessment:**  Check prior knowledge and understanding during lessons.  **Subject Knowledge:**  Discuss and analyse subject specific components with expert colleagues | | | | |
| **Subject Specific Components/s (know, understand, can do)** | **Learn That**  **(CCF reference in numerics e.g. 1.1)** | **Learn How**  **(CCF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment** |
| By the end of this phase trainees **will know:**   * To know that high-quality teaching and learning in science requires strong teacher subject, pedagogical and curriculum knowledge and where to seek support to develop this further. * To know that effective science lessons integrate substantive and disciplinary knowledge and sequence this clearly for learners. * To know that science learning needs to be planned in a way that is inclusive and challenges all learners including those with SEN/D, EAL and more able learners. | 3.2, 3.5  4.2  5.1, 5.3, 5.7  6.1, 6.3  7.1, 7.9 | 2a, 2c, 2d  5a, 5e  6a  7b | OFSTED 2023. Finding the Optimum. Available from <https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2>  OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:<https://www.gov.uk/government/publications/research-review-series-science>  Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris., 2021. Primary Science Theory & Practice. London: Sage Publications Ltd.  Rosenshine, B. (2012) Principles of Instruction: Research-based strategies that all teachers should know. American Educator, 12–20.https://doi.org/10.1111/j.1467-8535.2005.00507. | Weekly Mentor Meetings  Weekly Development Summary    Lesson Observations  Mentor & Link Tutor Meetings  Additional support for trainee at risk (Cause for Concern) procedures as appropriate |
| By the end of this phase trainees **will understand:**   * To understand that high-quality teaching in science involves breaking down complex ideas into small steps and sequencing these logically to enable children to learn without overloading their working memory. * To understand that direct teaching, first-hand practical approaches and modelling are approaches which can be used to support children to understand complex ideas and deepen children’s learning in science. * To understand how an experienced mentor manages behaviour in practical science lessons through observation and discussion. * To understand the planning decisions made by experienced colleagues to ensure that science learning is specifically tailored to the needs of the placement class. Including those with SEN/D and/ or EAL where appropriate. |
| By the end of this phase trainees **will be able to:**   * To be able to plan and teach a science lesson that is appropriate to the needs of all learners, including those with SEN/D, EAL and more able learners. * To be able to elicit children’s prior knowledge and build on this to develop children’s substantive and disciplinary knowledge. * To plan for formative assessment opportunities to establish the learning that has taken place. * To be able to manage behaviour and resources effectively to support children to learn in practical science lessons. |

***Year 2 Undergraduate***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **University Curriculum – Year 2** | | | | | |
| **Session Sequence** | **Session Content Subject Specific Components/s** | **Learn That**  **(CCF reference in numerics e.g. 1.1)** | **Learn How**  **(CCF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment mode** |
| **Session 1**  **Lecture - Assessment**  **1 hours** | To know the end of key stage statutory assessment requirements for science.  To understand the process used to establish the end of key stage judgements and the contribution of staff beyond y2 and Y6.  To use a range of evidence to make judgements on pupil attainment in science and use the TAPS assessment resources to support this process.  To understand the role of moderation in ensuring parity when making summative judgements on pupils’ attainment in science. | 6.1; 6.3; 6.4; 6.5; 6.6; 6.7 | 6b, 6.c; 6m; | DEPARTMENT of EDUCATION. 2013. The national curriculum in England: key stages 1 and 2 framework document. Available at:  <https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum>  Harlen, W. and Qualter, A., 2018. The Teaching of Science in Primary Schools, London: David Fulton Publishers.    OFSTED 2023. Finding the Optimum. Available from <https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2>  OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:<https://www.gov.uk/government/publications/research-review-series-science>  OFSTED. 2013 Maintaining Curiosity a survey into science education in schools. Department for Education.  Peacock, Sharp, Johnsey, Write and Sewell., 2021. Primary Science Knowledge & Understanding. London: Sage Publications Ltd.  Rosenshine, B. (2012) Principles of Instruction: Research-based strategies that all teachers should know. American Educator, 12–20.https://doi.org/10.1111/j.1467-8535.2005.00507.  Serret and Earle. 2018 ASE: Guide to Primary Science, available**:** <https://www.ase.org.uk/resources/education-science/issue-270/new-ase-guide-primary-science-education>  Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris., 2021. Primary Science Theory & Practice. London: Sage Publications Ltd.  ASE materials. Available**:** <https://www.ase.org.uk/ase-resource-hub>  Plan Resources. Available:<https://www.planassessment.com/>  TAPs Resources: Available:<https://pstt.org.uk/unique-resources/taps/>  Wellcome Trust. 2017 State of the nation report of UK primary science education. Available: <https://wellcome.org/sites/default/files/state-of-the-nation-report-of-uk-science-education.pdf>  Education Endowment Foundation (2015) Making Best Use of Teaching Assistants Guidance Report. [Online] Accessible from: <https://educationendowmentfoundation.org.uk/tools/guidance-reports/>  EEF. [Special Educational Needs in Mainstream Schools. Available:](https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/send)  <https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/send?utm_source=/education-evidence/guidance-reports/send&utm_medium=search&utm_campaign=site_searchh&search_term>  EEF: Teacher feedback to enhance children’s learning. Available here <https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/feedback> |  |
| **Session 2**  **Seminar – States of matter**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach states of matter with confidence.  Planning with the needs of children with SEN/D from the outset is effective in supporting all learners to make progress towards their end goals in science.  How to adapt teaching in science to ensure access and progress for children with EAL | 3.2; 3.3  5.1; 5.3; 5.4; 5.5 | 5e; 5g; 5h; 5i |
| **Session 3**  **Seminar – Forces**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach forces (including magnets, gravity, air and water resistance and friction) with confidence.  Science is more accessible when taught through real world contexts. Practical strategies for teaching and learning and resourcing science using stimulating context in forces aspects of national curriculum. This aspect is also revisited through other seminars in the context of teeth and the digestive system; evolution, inheritance and selection; particle theory; changes and properties of materials; reversible and irreversible reactions; electricity; and light.  The importance of sequencing components of substantive and disciplinary knowledge carefully to ensure progression within a lesson and across a sequence of lessons and avoid cognitive overload of working memory.  To select appropriate disciplinary knowledge to be taught through substantive content. | 2.2; 2.3; 2.4; 2.5; 2.6; 2.7; 2.8  3.2; 3.3; 3.4; 3.6  4.2; 4.6  5.3; 5.5  6.4; 6.5 | 2d  4n  6a |
| **Session 4**  **Seminar – Light**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach light with confidence.  That models help pupils understand new processes and ideas; good models make abstract ideas concrete and accessible and experience its application to a range of concepts.  How to adapt teaching in science to ensure access to the statutory light aspect of the national curriculum for learners who are blind or visually impaired. | 3.2; 3.3  4.3  5.1; 5.3; 5.4; 5.5 | 2c; 2d  3d; 3e  4c; 4d  5a; 5e; |
| **Session 5**  **Seminar – Evolution**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach evolution with confidence.  Draw on research to develop a range of teaching approaches which can be used to tackle controversial issues and contemporary challenges within science.  That teaching controversial topics can present a challenge, why this might be and how to overcome this  Develop knowledge of KS3 approaches to teaching science and use this to support pupils transition from KS2 to KS3. | 1.1; 1.5  3.2; 3.3  8.1 |  |
| **Session 6**  **Seminar – Properties of materials**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach properties of materials with confidence.  That new knowledge in science should be connected with what children have previously learned. That pupils should be supported to make connections between different concepts to build connected knowledge of science – mastery.   * That retrieval activities and repeated practice can be used in science to embed learning in long term memory * That hinge questions can be used to inform the direction of science session in response to pupil feedback * That anticipating misconceptions in science is an important part of curriculum knowledge and that misconceptions can be more likely to develop when progression is too fast and prior learning insecure. | 2.2; 2.6; 2.7; 2.8: 2.9  3.2; 3.4; 3.7  6.1; 6.5 | 2d; 2e  3d  4n  6a |
| **Session 7**  **Seminar – Teeth and digestion**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach teeth and digestion with confidence.  That models help pupils understand new processes and ideas; good models make abstract ideas concrete and accessible and experience its application to a range of concepts.  The impact of creative science teaching approaches on pupil engagement. The importance of ensuring concepts are learned and understood when learning in a creative way.  There are a range of ways that additional adults can support children’s learning in science beyond scaffolding lower attaining pupils. The role of teaching assistants in supporting assessment and progress within practical science.  Planning with the needs of children with SEN/D from the outset is effective in supporting all learners to make progress towards their end goals in science.  That talented scientists are not always the most able mathematicians and writers. That it is important to remove literacy and mathematical barriers in order for talented scientists to be appropriately challenged within the subject.  How to adapt teaching in science to ensure progress for all including children with SEN/D, EAL and those who require stretch and challenge | 3.2: 3.3  4.3; 4.  5.1; 5.3; 5.4; 5.5  8.5 | 2c; 2d  3t; 3u  4b; 4i; 4j  5e; 5g |
| **Session 8**  **Seminar – Living things**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach living things with confidence.  Revisit types of enquiry. Explore progression in classifying and grouping through grouping animals: visual characteristics, vertebrates and invertebrates; classes.  Explore the National curriculum expectations relating to lifecycles and reproduction in plants and animals.  Explore links with RSE curriculum when teaching animal reproduction. Discuss and tackle challenges of teaching this aspect in schools. | 1.6.  3.1; 3.2; 3.3  4.8; 4.9; 4.10  5.3; 5.5 | 5j; 5k; 5l  6e; 6f; 6g  7d; 7e |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **School Based Curriculum – Year 2** | | | | |
| **Observing:** Observe how expert colleagues use and deconstruct approaches, in science, in at least 4 lessons throughout school.  **Planning:** Observe how expert colleagues break tasks down into constituent components over a sequence of lessons. Plan, as appropriate, for a sequence of lessons in science lessons.  Plan, as appropriate, how science is interwoven through other subject/curriculum areas.  **Teaching:** Rehearse and refine particular approaches in science lessons.  **Assessment:** Draw conclusions about what pupils have learnt by looking at patterns of performance over a number of assessments with support and scaffolding from expert colleagues  **Subject Knowledge:**  Discuss and analyse subject specific components with expert colleagues | | | | |
| **Subject Specific Components/s (know, understand, can do)** | **Learn That**  **(CCF reference in numerics e.g. 1.1)** | **Learn How**  **(CCF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment** |
| **By the end of this phase trainees will know:**   * To know that high-quality teaching and learning in science requires strong teacher subject, pedagogical and curriculum knowledge and where to seek support to develop this further. * To know that children hold misconceptions about science and that these should be directly addressed through teaching.   **By the end of this phase trainees will understand:**   * To understand that substantive and disciplinary elements of science should be connected and ordered over a sequence of science learning. * To understand how to use medium term plans to sequence science learning over a period of time. * To understand the impact an additional adult can have on science learning (consider use of additional adults beyond scaffolding children who need additional support) * To understand that children’s science learning is assessed over a sequence of science lessons and that this knowledge can be used to inform judgements about their attainment.   **By the end of this phase trainees will be able to:**   * To be able to plan and teach a sequence of science lessons that is appropriate to the needs of all learners, including those with SEN/D, EAL and more able learners. * To be able to plan a sequence of science lessons that integrates a range of effective pedagogies and approaches to support science learning (approaches might include first hand practical approaches, modelling, analogies, simulations and direct instruction). * To be able to use formative assessment approaches to identify establish what children have learned and identify misconceptions. To be able to use this information to inform planning and teaching. * To be able to plan effectively for additional adults within the classroom linked to the needs of the learners within the class and the science content delivered. * To be able to manage behaviour and resources effectively to support children to learn in practical science lessons. | 2. 1  3.2, 3.5, 3.7, 3.9  4.2  5.1, 5.3, 5.7  6.1, 6.3  7.1 | 1  3a, 3b, 3c  4a  5.a, 5.d, 5.e, 5.f  6.a, 6.c, 6.d, 6.f, 6.g, 6.n, 6.p  7.p | OFSTED 2023. Finding the Optimum. Available from <https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2>  OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:<https://www.gov.uk/government/publications/research-review-series-science>  Plan Resources. Available:<https://www.planassessment.com/>  TAPs Resources: Available:<https://pstt.org.uk/unique-resources/taps/> | Weekly Mentor Meetings  Weekly Development Summary    Lesson Observations  Mentor & Link Tutor Meetings  Additional support for trainee at risk (Cause for Concern) procedures as appropriate |

***Year 3 Undergraduate***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **University Curriculum – Year 3** | | | | | |
| **Session Sequence** | **Session Content Subject Specific Components/s** | **Learn That**  **(CCF reference in numerics e.g. 1.1)** | **Learn How**  **(CCF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment mode** |
| **Lecture**  **1 hour: Issues in Primary Science Education** | Understand the key contemporary issues facing teachers delivering primary science in schools.  Consider how these issues could be addressed at different scales.  Engaging in current primary science research can support ongoing development in their practice.  There are challenges in leading primary science, including teacher subject knowledge, funding for resources and staff training, State of the Nation report findings regarding status of science in primary schools and assessment of primary science. | 1.1; 1.6  3.1  8.7 |  | DEPARTMENT of EDUCATION. 2013. The national curriculum in England: key stages 1 and 2 framework document. Available at:  <https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum>  Harlen, W. and Qualter, A., 2018. The Teaching of Science in Primary Schools, London: David Fulton Publishers.    OFSTED 2023. Finding the Optimum. Available from <https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2>  OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:<https://www.gov.uk/government/publications/research-review-series-science>  OFSTED. 2013 Maintaining Curiosity a survey into science education in schools. Department for Education.  Peacock, Sharp, Johnsey, Write and Sewell., 2021. Primary Science Knowledge & Understanding. London: Sage Publications Ltd.  Rosenshine, B. (2012) Principles of Instruction: Research-based strategies that all teachers should know. American Educator, 12–20.https://doi.org/10.1111/j.1467-8535.2005.00507.  Serret and Earle. 2018 ASE: Guide to Primary Science, available**:** <https://www.ase.org.uk/resources/education-science/issue-270/new-ase-guide-primary-science-education>  Sharp, Peacock, Johnsey, Simon, Smith, Cross and Harris., 2021. Primary Science Theory & Practice. London: Sage Publications Ltd.  ASE materials. Available**:** <https://www.ase.org.uk/ase-resource-hub>  Plan Resources. Available:<https://www.planassessment.com/>  TAPs Resources: Available:<https://pstt.org.uk/unique-resources/taps/>  Wellcome Trust. 2017 State of the nation report of UK primary science education. Available: <https://wellcome.org/sites/default/files/state-of-the-nation-report-of-uk-science-education.pdf>  Archer 2021. Primary Science Capital Teaching approach materials approach. Available: <https://discovery.ucl.ac.uk/id/eprint/10136335/14/9746%20UCL%20PSCTA%20Teachers%20science%20pack%20Interactive%202022%20AW1.pdf>  Bianchi, Whittaker and Poole, 2021. The 10 Key Issues with Children’s Learning in Science. Available: <https://www.scienceacrossthecity.co.uk/wp-content/uploads/2021/03/3634_Childrens_Learning_in_Primary_Science_Report_2020_v8.pdf>  Bianchi, L. and Turford, B. 2022 [Shining a light on inclusive science teaching and learning (7-14 years)](https://docs.google.com/forms/d/e/1FAIpQLSc9bISakjU6NnetqE8oDa51C8CtcAcQkIGKMUA3Lldy8-DxTQ/viewform)  Turner, J. Bianchi, L. Earle, S. 2023 [A response to the Ofsted Finding the Optimum report](https://docs.google.com/forms/d/e/1FAIpQLSfC0fdl8An2cjGpeb7wa_friV0hE7_eNQdYYDvAp7Q0bWiDOA/viewform)  Education Endowment Foundation (2017) Metacognition and Self-regulated learning Guidance Report. [Online] Accessible from: <https://educationendowmentfoundation.org.uk/tools/guidance-reports/>    Harlen, W. 2015. Towards big ideas of science education. School Science Review, 97 (359). |  |
| **Session 1**  **Seminar – Outdoor learning in KS2. Adaptive approaches to LOtC**  **2 hours** | Understand what is meant by Nature deficit disorder and the key research relating to the impact of this on learners.  Learning outside the classroom (LOtC) is an important and beneficial part of science education. It can impact on children’s academic attainment but also have impacts on their social skills, wellbeing and mental health.  Learning outside the classroom opportunities tailored to the KS2 living things curriculum.  Inclusive practice in learning outside the classroom. How to adapt outdoor learning to the needs of pupils with specific educational needs and or disability. | 1.1; 1.2; 1.3; 1.4; 1.5; 1.6;  2.1  3.1; 3.2; 3.7  4.1; 4.6  5.1; 5.2;  6.2; | 3c  5i; 5j  7e |
| **Session 2**  **Seminar – Talk for science.**  **2 hours** | The importance of planning for talk in supporting children to use and apply new vocabulary and share ideas.  Talk enables children to share their ideas, progress their scientific vocabulary and develop conceptual understanding.  the importance of key vocabulary, use of images, video, and first-hand practical experience. That is important for all learners, but particularly important for learners with SEN/D and/ or EAL.  That talk can support children to build conceptual knowledge. To use planned talk to support children to share their ideas, progress their scientific vocabulary and develop conceptual understanding. | 3.6; 3.7; 3.10  4.7  6.5; | 3t; 3u |
| **Session 3**  **Seminar – Muscular, skeletal, and circulatory system**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach animals including humans with confidence.  That Covid-19 has impacted upon children’s health and access to practical science and that there are long term implications to consider as a teacher.  The current issues related to children’s health as a result of Covid-19 and begin to consider the implications of this for the role of the class teacher  Thematic teaching can engage and motivate children, sparking their curiosity for learning and that is also important to maintain focus on the subject specific learning within this approach.  To identify purposeful links between science and PE  Support children to select variables when conducting a pattern seeking enquiry. To select appropriate variables depending on the graphing skills they are supporting the children to develop.  The role of parents and carers in supporting children’s development in science. | 1.1; 1.6  3.2; 3.3; 3.8  4.11 |  |
| **Session 4**  **Seminar – Forces – Levers, pulleys and gears**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach forces – levers, pulleys and gears with confidence.  Science planning at different levels act to ensure coverage and quality of provision.  Curriculum as progression: Understand progression within specific strands of science. Understand how progression is built on foundations set in EYFS and supports children to transition to KS3. | 3.1; 3.2; 3.3  4.1; 4.2, |  |
| **Session 5**  **Seminar – Living things, classification and keys.**  **2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach living things with confidence.  Explore the links to the computing curriculum and consider how to make effective use of curriculum time whilst maintaining the integrity of the subject curriculum. | 2.2; 2.6; 2.7; 2.8  3.1; 3.2; 3.3; 3.6; 3.10  4.7; 4.8;  5.1; 5.2  6.7 | 5g; 5j  6o; 6p  7j |
| **Session 6**  **Seminar –**  **Problem solving**  **2 hours** | The role of problem solving in supporting pupils to make connections between different aspects of their science learning and apply knowledge in new and real-world contexts.  Problem solving as an active assessment opportunity.  How metacognitive strategies can be integrated into science teaching and learning to support children development.  Revisiting the importance of carefully considering the timing of first-hand practical experiences and problem solving to consider the prior learning required to be successful.  The Primary Science capital teaching approach and its impact on children’s perceptions of science and themselves as scientists. | 2.2; 2.6  3.2; 3.3; 3.4; 3.6  4.5; 4.7; 4.9; 4.10  5.5; 5.7  6.5; 6.7  7.4 | 3n  4a; 4c; 4n  6n |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **School Based Curriculum – Year 3** | | | | |
| **Observing:** Observe how expert colleagues use and deconstruct approaches, in science, in a sequence of lessons throughout school.  **Planning:** Plan a sequence of lessons in science and identify other opportunities for developing these skills in other areas of the curriculum.  **Teaching:** Rehearse and refine particular approaches in all science lessons.  **Assessment:** Discuss with expert colleagues’ summative assessment, reporting and how data is used.  **Subject Knowledge:**  Discuss and analyse subject specific components with expert colleagues | | | | |
| **Subject Specific Components/s (know, understand, can do)** | **Learn That**  **(CCF reference in numerics e.g. 1.1)** | **Learn How**  **(CCF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment** |
| By the end of this phase trainees **will know:**   * To know the features of effective teaching and learning in science including research informed best practice and how this is translated to different contexts.   By the end of this phase trainees **will understand:**   * To understand the bigger picture-issues surrounding primary science education that directly impact on classroom teaching and the role of the science subject leader in ensuring high quality provision.   By the end of this phase trainees **will be able to:**   * To be able to plan and teach an effective sequence of science learning which is informed by assessment of prior learning, uses science specific pedagogies to facilitate progression in subject knowledge and enquiry skills, integrates formative assessment and is inclusive, appropriate and flexible to the needs of all learners including those with SEN/D, EAL and talented scientists. * To be able to assess children’s learning over a sequence of science lessons and use this knowledge to inform judgements about their attainment in relation to expectations with the support of an experienced colleague. * To be able to draw conclusions about what pupils have learnt by looking at patterns of performance over a number of assessments with support and scaffolding from expert colleagues. * To take science learning beyond the national curriculum where appropriate. | 2.1, 2.2, 2.6  3.1, 3.3, 3.5, 3.7  4.2, 4.8, 4.10  5.2, 5.7  6.1, 6.7  7.1, 7.4  8.5 | 2.a, 2.c, 2.d, 2.e, 2.h  3.a, 3.b, 3.c, 3.d, 3.f, 3.g  4.b  5.a, 5.b, 5.c  6a  7.d, 7.e, 7.g, 7.h  8.l, 8.2 | OFSTED 2023. Finding the Optimum. Available from <https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2>  OFSTED, 2021. Research Review Series: Science.GOV.UK [online]. Available from:<https://www.gov.uk/government/publications/research-review-series-science>  Archer 2021. Primary Science Capital Teaching approach materials approach. Available: <https://discovery.ucl.ac.uk/id/eprint/10136335/14/9746%20UCL%20PSCTA%20Teachers%20science%20pack%20Interactive%202022%20AW1.pdf>  Bianchi, Whittaker and Poole, 2021. The 10 Key Issues with Children’s Learning in Science. Available: <https://www.scienceacrossthecity.co.uk/wp-content/uploads/2021/03/3634_Childrens_Learning_in_Primary_Science_Report_2020_v8.pdf>  Turner, J. Bianchi, L. Earle, S. 2023 [A response to the Ofsted Finding the Optimum report](https://docs.google.com/forms/d/e/1FAIpQLSfC0fdl8An2cjGpeb7wa_friV0hE7_eNQdYYDvAp7Q0bWiDOA/viewform) | Weekly Mentor Meetings  Weekly Development Summary    Lesson Observations  Mentor & Link Tutor Meetings  Additional support for trainee at risk (Cause for Concern) procedures as appropriate |