**Primary Curriculum Map (Science)**

***Year 1 Undergraduate***

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| **University Curriculum – Year 1** |
| **Session Sequence****Include details of creative**  | **Session Content** **Subject Specific Components** | **Learn That****(ITTECF reference in numerics e.g. 1.1)** | **Learn How****(ITTECF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment mode** |
| **Seminar 1****The Nature of Science Education** | To know the aims and principles of science educationTo 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. To 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. To know the working scientifically skills and how these support children to find answers to their scientific questions.   | 1.1; 1.22.1; 2.2**3.1**; 3.2; **3.3; 3.5;** 3.74.25.7 | 1c; 1f | 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/> | Q and A group task – aims and principles of science Education and Science National CurriculumQuiz – Working scientifically skills |
| **Seminar 2****The importance of Observation skills - Snails** |   To 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.     To 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.  To know the importance of the scientific skill - observation To understand the importance of first-hand practical experiences to develop substantive knowledge in science.  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). To understand the importance of establishing prior knowledge and assessing children’s learning.     | 1.1; 1.2; 1.4 1.5; 1.6   2.2; 2.7;    3.1; 3.2; 3.3; **3.4;** **3.7**  **4.6**; 4.7   5.1; 5.5   **6.1**  7.9  | **2a****2d****2e**4l5b | Retrieval task - working scientifically skills.Group discussion – importance of first -hand practical experience. |
| **Seminar 3****Developing substantive Knowledge through first hand practical experience - Plants** | To understand the importance of dovetailing EYFS and KS1 content in science – plants focus.To know how to develop the subject and curriculum knowledge required to teach plants effectively. To understand the impact of first-hand practical experience on children’s learning. Specifically, use of first hand practical approaches to build substantive knowledge.To understand the impact of the literacy barrier to science learning - Adaptive approaches to recording results of practical work.To know how to support children to build vocabulary in primary science- focus on plants aspects of the national curriculum. | 2.2; 2.3; 2.4; 2.5; 2.6; **2.7****3.2**;3.3; 3.7; 4.4; 4.6; **4.7**;**5.2; 5.3**; 5.5; 5.76.3  | A first introduction to:2a; 2b; 2e3j | Reflection: The use of first-hand practical experience to build substantive knowledgeDiscussion/ Scenario: Navigating the literacy barrier to access and assess primary science. |
| Seminar 4Importance of Learning Outside the Classroom – Bucket School | To understand what is meant by Nature deficit disorder and the key research relating to the impact of this on learners.To understand that 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. To be able to use the outdoor environment flexibly to support learning in science.To know the Bucket School approach and critique of 3 science outdoor learning episodesTo understand the importance of risk assessment and of managing risk inside and outside the classroom.To be able 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; 1.7; 1.8**2.13.1; 3.2; 3.74.1; 4.6; 4.75.1; 5.2;6.2; 6.57.1; 7.4; 7.7 | 1c; 1e 7a; 7d;  | Reflection: Impact of LOtC on diverse range of learners |
| **Lecture** | To know what is meant by Science Capital and understand it’s importance.* What is science capital and how can it be developed?
* How can we support learners to see themselves as scientists and see how science is relevant to them?
* How can the science capital teaching approach be utilised to address inequalities within the classroom I work?
 | **1.1; 1.2; 1.6; 1.8**7.4; 7.5 |  |
| **Seminar 5****The Types of Enquiry** | To understand the Key findings from the Ofsted Research Review: Science document (2021)To 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. To understand that primary science research indicates best practice to include integration of problem solving in addition to the 5 types of enquiry. To understand how the use of fair testing planning boards can support KS1 and KS2 children in planning and conducting a fair test enquiry.To understand the importance of adapting teaching to the needs of learners. SEND and challenge - adaptive approaches to planning and recording science learning. | 2.7 2.103.2; 3.3; 3.5; **3.6**; **3.8****4.3; 4.4;** **4.5**; 4.8; 4.9; 4.105.1; 5.2; 5.3; 5.56.2; 6.3; 7.2; 7.4; 7.7 | 3f; 3h; 3l | Retrieval: Science CapitalCurriculum Scenarios: Type of enquiry |
| **Seminar 6****Misconceptions** | To understand the importance of eliciting children’s ideas and prior knowledge in science.To understand how to use a range of strategies to elicit children’s ideas and prior knowledge of scientific concepts.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). To be able to identify a range of suitable approaches to elicit children’s ideas and address misconceptions through planning and teaching.  | 2.1; **2.2; 2.7**; 2.10**3.3;** **3.4, 3.8**4.2; 4.6; 4.75.5**6.1** | 2a; 2e; 2f | Planning Task: Addressing misconceptions.Eliciting children’s ideas task |
| **Seminar 7****Science specific pedagogies: first hand practical approaches, models and analogies - Electricity** | To know and be able to apply different pedagogies to support learning in science including first-hand experience; modelling; analogies; and simulations.To understand the importance 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 know how to develop the subject and curriculum knowledge required to teach electricity effectively. To be able to plan an effective science learning opportunity that integrates substantive and disciplinary knowledge. To 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; 2.7; **3.2**; 3.3; **3.4**; 3.7; **4.3;** 4.85.3; 5.56.3; 6.4;  | 2a; 2e; 2g4f; 4h6a, 6e | Critique of science specific pedagogical approaches  |
| **Seminar 8****Connected Learning and schema - Sound** | To know how to develop the subject and curriculum knowledge required to teach sound effectively. To understand the importance of supporting children to develop connections between science learning – building mastery of science learning. To know 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 be able to plan and conduct a pattern seeking enquiry with a sound focus. To be able to apply strategies to manage behaviour in practical science lessons. To understand the importance of 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****4.2; 4.3**; 4.6; 4.7; 5.3; 5.5; **5.7**6.2; 6.37.1 | 3p4b; 4m | Group Planning Task - Enquiry |
| **Seminar 9****Use of models to teach abstract concepts - Rocks** | To understand the value of the use of models when teaching complex and abstract concepts. To know how to develop the subject and curriculum knowledge required to teach rocks effectively. To know the importance of considering the sequence of learning. 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.  | 1.62.2; 2.7; 2.103.2; 3.3; 3.5; **4.3; 4.6; 4.7;** 4.9; 4.105.1; 5.4; 5.56.5; 6.7**7.1; 7.2****8.2**; **8.5** | 4b; 4h; 4ij 4l | Paired Lesson Planning Task |
| **Seminar 10** | **Review Self-assessment and audit information.** Set new targets shared session English, maths, and Science. Reflect on progress and identify next steps. |  |  |  |

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| **School Based Curriculum – Year 1** |
| **Observing:** Observe how expert colleagues plan for the needs of all learners while maintaining high expectations, providing targeted support and promote an inclusive and equitable learning environment.**Planning:** Observe how expert colleagues adapt content, approaches, and environments to support all learners especially those with an additional need, for at least one lesson.**Teaching:** Rehearse and refine approaches to adaptive teaching to meet the needs of all learners. Deliver group/whole class teaching.**Assessment:** Rehearse and refine how to adapt assessment to enable and support children to demonstrate what they know, remember, and understand using a range of assessment strategies.**Subject Knowledge:** Demonstrate the ability to work within the key legislation and policies that underpin adaptive teaching and inclusive practice for all children including those with Special Educational Needs/Disability.Discuss and analyse specific components with expert colleagues. |
| **Subject Specific Components/s (know, understand, can do)** | **Learn That****(ITTECF ref)** | **Learn How****(ITTECF ref)** | **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.

By the end of this phase trainees **will 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.
* that direct teaching, first-hand practical approaches and use of models are approaches which can be used to support children to understand complex ideas and deepen children’s learning in science.
* 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:*** plan and teach a science lesson that has considered science specific pedagogy, elicits and builds on children’s prior knowledge, pre-empts and addresses misconceptions and covers aspects of both substantive and disciplinary knowledge.
* plan for a range of formative assessment opportunities to establish the learning that has taken place.
* manage behaviour and resources effectively to support children to learn in practical science lessons.
 | 1.1; 1.2; 1.32.2; 2.7 3.2; 3.4; 3.5; 3.64.2; 4.4; 4.6; 4.105.1;5.2; 5.3; 5.56.1; 6.37.1; 7.9   | 1a2a, 2b, 2c, 2d , 2e3e4f, 4l5a, 5b, 5g, 5i, 5l6a, 6e, 6h 7a, 7c,7d, 7h 8e, 8j, 8p   | 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 MeetingsWeekly Development Summary Lesson ObservationsMentor & Link Tutor MeetingsAdditional support for trainee at risk (Cause for Concern) procedures as appropriate  |

***Year 2 Undergraduate***

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| **University Curriculum – Year 2** |
| **Overview of Content** |
| **Session Sequence**  | **Session Content** **Subject Specific Components/s**  | **Learn That** **(ITTECF reference in numerics e.g. 1.1)** | **Learn How** **(ITTECF reference bullets alphabetically e.g. 1c)** | **Links to Research and Reading** | **Formative Assessment mode**  |
| **Lecture – Assessment and Reporting****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 | 6a; 6b, 6c, 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>  |  |
| **Seminar 1:****Planning for sequences of learning****2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach electricity 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  | **2.7**3.2; 3.35.2; 5.4;  | **2a; 2b; 2e; 2f**3a5g; **5h**; 5i6a |
| **Seminar 2:****Integrating disciplinary knowledge over time (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. 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; 2.93.2; 3.3; 3.4; **3.5;** 3.6; 3.74.2; **4.4;** 4.65.3; **5.5**6.4; 6.5 | **2f****3b; 3e**5b6a |
| **Seminar 3:****Adaptive approaches (light)****2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach light with confidence. How to adapt teaching in science including, to ensure access to the statutory light aspect of the national curriculum for learners who are blind or visually impaired.  | 3.2; 3.34.35.1; **5.2; 5.3**; 5.5; **5.7; 5.8** | 2b; 2f3b; **3e; 3g;** **5a; 5e;**  |
| **Seminar 4****Transition across key stages (Evolution and classification)****2 hours** | High quality teaching in science requires strong subject and curriculum knowledge. The subject knowledge required to teach evolution with confidence. 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; 1.53.2; 3.38.1 |  |  |
| **Seminar 5:****Practical assessment and problem solving (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. Planning for practical assessment opportunities requires careful consideration of the required building blocks of substantive and disciplinary knowledge.  | 2.2; 2.6; 2.7; 2.8: 2.93.2; 3.4; 3.6; 3.76.1; 6.5 | 2d; 2f3a4l6a |  |
| **Seminar 6:** **Use of models and planning for impactful practical work** **(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.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; 4.6**5.1; 5.3; 5.4; 5.5**8.5** | 2c; 2d3t; 3u4b; **4i; 4j****5e**; 5g |  |
| **Seminar 7:** **Science Capital Teaching Approach****2 hours** | A review of Science Capital and its importance.How can we develop children’s science capital?How can we plan to ensure learners see themselves as scientists and see how science is relevant to them?How can the science capital teaching approach be utilised to address inequalities within science education? | **1.1; 1.2; 1.6; 1.8**7.4; 7.5 |  |  |

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| **School Based Curriculum – Year 2** |
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| **Observing:** Observe how expert colleagues use distributed and spaced learning in at least 4 lessons throughout school.Observe how expert practitioners use motivation and build self-esteem of all learners.**Planning:** Plan for opportunities to increase cultural capital.Plan for the effective use of additional adults Discuss with expert practitioners how they embed adaptive approaches into planning.With the support of expert practitioners, capture and incorporate the voice of the child for example through a one-page profile.**Teaching:** Rehearse and refine chunking, scaffolding, and fading in lesson planning over a sequence of lessons. Plan, teach and evaluate a series of lessons incorporating adaptive approaches to enable all children to access a rich curriculum.**Assessment:** Use peer and self-assessment to aid and support independent learning.**Subject Knowledge:** Discuss and analyse with expert practitioners how to implement and review flexible groupings and use groupings to support learning and promote inclusion. |
| **Subject Specific Components/s (know, understand, can do)** | **Learn That****(ITTECF reference in numerics e.g. 1.1)** | **Learn How****(ITTECF 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 a range of 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, groupings and resources effectively to support children to learn in practical science lessons. | 1:1; 1:2; 1.82. 1; 2.2; 2.7 3.2, 3.4; 3.5, 3.7, 4.2 5.1, 5.2, 5.3, 5.7 6.1, 6.2, 6.3 7.1  | 1b; 2c 2e, 2i, 2h; 2j, 2k3a, 3b, 3e, 3f  4a, 4e 5a, 5b, 5e, 5g, 5h, 5i, 5l 6a, 6b, 6c, 6d, 6f, 6g, 6n, 6q 7p 8b | 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 MeetingsWeekly Development Summary Lesson ObservationsMentor & Link Tutor MeetingsAdditional support for trainee at risk (Cause for Concern) procedures as appropriate  |

***Year 3 Undergraduate***

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| **University Curriculum – Year 3** |
| **Overview of Content** |
| **Session Sequence**  | **Session Content** **Subject Specific Components/s**  | **Learn That** **(ITTECF reference in numerics e.g. 1.1)** | **Learn How** **(ITTECF 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; 1.62.13.18.1, 8.2, 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.The Primary Science capital teaching approach and its impact on children’s perceptions of science and themselves as scientists.The role of SENDCO in supporting children’s access to learning and the importance of communication. | 1.1; 1.2; 1.3; 1.4; 1.5; 1.6;2.13.1; 3.2; 3.7**4.1; 4.6****5.1; 5.2; 5.3**6.2;7.1; 7.2; 7.78.6 | 3f**5l**7d |
| **Seminar 2:****Childrens health and the science curriculum****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. Contributions to the wider life of the school – science specific and whole school priorities linked to children’s health.  | 1.1; 1.63.2; 3.3; **3.5,** **3.6,** 3.8**4.4; 4.7; 4.8**8.3; 8.4  | 1b, 1c2e, 2i, 2j |  |
| **Seminar 3:****Teaching tricky topics - 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; 3.34.1; 4.2, |  |  |
| **Seminar 4: 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; 2.7; 2.8; 2.9**3.1; 3.2; 3.3; 3.6; 3.10**4.8; 4.95.1; 5.26.7 | 5i; 5l6o; 6q |  |
| **Seminar 5:****Effective integration of working scientifically skills and problem solving** | Integrating disciplinary knowledge over time. Strategies to monitor, track and develop working scientifically skills over long term planning.Formative assessment approaches to assess working scientifically skills. | **3.1****6.1; 6.2; 6.3; 6.4; 6.6** | **3l****4l** |  |
| **Seminar 6:****Science Capital Teaching Approach****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.  | 2.2; 2.73.2; 3.3; 3.4; 3.6**4.5**; 4.9; 4.105.5; 5.76.5; 6.77.4; 7.5; 7.6 | 3l**4a; 4b; 4l**6n8b |  |

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| **School Based Curriculum – Year 3** |
| **Observing:** Observe how expert colleagues identify and implement reasonable adjustments for children with identified Special Educational Needs **Planning:** Work closely with other teachers, SENco and members of the staff team to implement reasonable adjustments within and beyond the classroom.Plan for children who may need adaptations beyond the classroom to support their social inclusion.**Teaching:** Observe and implement reasonable adjustments for children with identified special Educational Needs and Disability **Assessment:** Discuss with expert colleagues’ summative assessment, reporting and how data is used.**Subject Knowledge:** Acknowledge and identify when their own social, emotional and mental health needs to be supported.Identify and access sources of support for their own wellbeing where appropriate. |
| **Subject Specific Components/s (know, understand, can do)** | **Learn That****(ITTECF reference in numerics e.g. 1.1)** | **Learn How****(ITTECF 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.
 | 1:1; 1:2; 1.82. 1; 2.2; 2.7 3.1; 3.2, 3.3, 3.4; 3.5, 3.7, 4.2, 4.8, 4.10 5.1, 5.2, 5.3, 5.7 6.1, 6.2, 6.3, 6.77.1, 7.4  | 1b; 2c 2e, 2i, 2h; 2j, 2k3a, 3b, 3e, 3f  4a, 4e 5a, 5b, 5e, 5g, 5h, 5i, 5l 6a, 6b, 6c, 6d, 6f, 6g, 6n, 6q 7p 8b | 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 MeetingsWeekly Development Summary Lesson ObservationsMentor & Link Tutor MeetingsAdditional support for trainee at risk (Cause for Concern) procedures as appropriate  |