The LJMU Mentor Guide to the curriculum in Phase 3a Secondary Science

The ITE Curriculum in Phase 3 further extends student teachers' critical engagement with research and practice, within the relevant subject(s) and age phase(s). Most of Phase 3 is school based, as the student teacher completes their final placement, extending their knowledge and skills to achieve a recommendation for Qualified Teacher Status (QTS).

The Phase 3 curriculum (centre based) includes a focus on:

- Subject pedagogies and strategies across the Secondary age range.
- Curriculum design.
- Transition between key stages.
- Statutory assessment.
- Deepening Subject knowledge and curriculum knowledge.
- Adaptive practice.
- Preparing for the ECT year.

School based training:

During Phase 3, the ITE curriculum will be extended and contextualised within school placements.

Training will enable student teachers to successfully demonstrate a range of teaching approaches, appropriate to subject, age, and individual needs, and contribute to the development of curriculum thinking, drawing on evidence from research.

Whilst we expect the ITE curriculum to be increasingly personalised during Phase 3, in order to meet individual areas for development and school priorities, it is likely that student teachers' understanding and experience of working with other adults (including parents), and of assessment and adaptive teaching will need deepening during this final period, supported by expert colleagues.

During Phase 3 student teachers have more independent responsibility for planning and teaching lessons which are well matched to the needs of groups and individuals, and for planning units of work as part of an ambitious curriculum, with a positive impact on pupil progress.

Expected outcomes

Mid-point and end of Phase reviews are completed by ITT Mentors in schools. In Phase 3, these reviews assess progress against the Teachers' Standards. By the end of Phase 3 we expect student teachers to:

- Compile evidence in the placement experience folder and demonstrate achievement of ALL of the teachers standards (including part2).
- Respond constructively to challenge, feedback and critique, and demonstrate a commitment to continuously improve their understanding and practice, reflected in their Career Entry and Development profile.

In Science sessions:

Please see the ITE Curriculum for science for the full programme throughout the year.

The Phase 3a ITE Science Curriculum:

The focus in phase 3a is on developing science disciplinary knowledge and understanding through key practical science experimental work and the use of these to develop pupils' understanding.

In Phase 3, the centre-based curriculum focuses on subject knowledge, pedagogy, adaptive practice, assessment and progress in the subject. We ask you to support students in exploring these further in schools.

Focus of weekly discussions in black. Professional Development Activities for STUDENTS in blue.

Date (LJMU)	**Taught LJMU session**	**School-based focus**	**Mentor curriculum in weekly meeting** and **Professional Development Activities.**
Friday 23 Feb	**Practical Science Teaching - Physics**	Transition between key stage 2 and key stage 3 in science.	Discussion with mentor on retrieval practice activities with Year 7 learners' to baseline learners' science understanding from KS2. Observe a Year 7 lesson. Identify how the teacher builds upon the learning undertaken in KS2 science in topic.
Friday 1 Mar	**Practical Science Teaching - Chemistry**	Deepening disciplinary knowledge in Chemistry with a focus on curriculum design.	Discussion with mentor on sequencing learning. Analyse a unit of work and note how concepts are sequenced to develop learners' schemas.
Friday 8 Mar	**Biology Fieldwork**	Deepening disciplinary knowledge in Biology with a focus on learning outside of the classroom.	Discussion with mentor on incorporating adaptive teaching and learning strategies into planning. Observe a chemistry class. Identify any adaptive strategies built into the lesson.
Friday 15 Mar	**Practical Science Teaching - Chemistry**	Deepening disciplinary knowledge in Chemistry with a focus on adaptive practice.	Discussion with mentor on using out of classroom learning to complement in-classroom learning. Review materials used in the department when taking learners for a visit or on fieldwork
Friday 22 Mar	**Practical Science Teaching - Physics**	Deepening disciplinary knowledge in Physics with a focus on contextual learning.	Discussion with mentor on the use of context to add interest and relevance to learning. Research a context based science course, such as 21st century Science, for lesson ideas.

Guidance for Observation and Target Setting in Secondary Science

National Curriculum Purpose of study:

"A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes."

6 Key Questions to ask when observing Science lessons:

	Question	*Additional Information*
1	Is a demonstration or interesting scenario used at the start of the lesson to stimulate learners' interest in science?	*This may be to excite interest, or to link the lesson content to a real-world context.*
2.	Are learners carrying out relevant practical work (disciplinary knowledge) for which a specific risk assessment been carried out? If practical work is undertaken were learners fully informed about the steps they needed to take to ensure they were working safely. Were those steps emphasised and enforced by the teacher?	*Disciplinary knowledge is the knowledge of the practices of science (working scientifically).* *A risk assessment for the practical activity must be included with the lesson plan. This should identify measures to be taken to minimise risk to students e.g., wearing safety goggles.*
3	Are learners challenged to predict outcomes, and are conclusions made by the end of the lesson?	*Learners should be being challenged to think critically as scientists and demonstrate evidence of working scientifically.*
4	Is there evidence that substantive knowledge (scientific theory) has been carefully sequenced? Are links made between the science content in this lesson and science content in other lessons?	*Substantive knowledge is a knowledge of the products of science. i.e. science content. Content should be sequenced to allow students to develop complex structures in their long-term memory (schemas) that link knowledge and hence create meaning.*
5.	Are learners challenged to construct explanations and arguments, and to make connections by synthesising and summarising key science ideas?	*Learners should be being challenged to think critically as scientists and demonstrate evidence of working scientifically.*
6.	Are learners using and applying new science ideas in a variety of ways and contexts?	*Exploring how science ideas apply in different contexts challenges learners' misconceptions and helps to develop schemas.*

Potential **Science Specific** Targets on Lesson Analysis Forms.

Lesson design and delivery, including sequencing and choice of teaching methods (CCF curriculum & pedagogy) Next Steps:
Make use of a hook at the start of the lesson to excite interest amongst the learners.
Identify the key substantive knowledge you want the learners to know from this lesson.
Model confident, accurate use of specialist vocabulary.
When problem solving, challenge learners to actively engage and contribute.
Use images and analogies to support understanding of difficult concepts.
Gather learners around the front if you are carrying out a demonstration.
Ensure that learners are clear on what to do in a practical activity by asking them to repeat back the steps to follow.
Use predict-observe-explain activities to identify and challenge learner misconceptions.

Pupil progress in this lesson and use of assessment (including questioning) (CCF assessment) Next Steps:
Use cold calling to assess learners' understanding of substantive content.
Ask learners to identify potential hazards and appropriate measure to minimise risk.
Bounce questions around the class to develop detailed answers to open ended questions.
Involve students in demonstrating practical skills.
Challenge learners to construct explanations and arguments based on their substantive knowledge.
Give opportunities for learners to summarise key science ideas in their words.

Comments about student teacher's developing Subject Knowledge and Pedagogy (CCF curriculum & pedagogy) Next Steps
Develop a knowledge of common learner misconceptions associated with the topic.
Practise practical demonstrations to ensure that they work as planned.
Become familiar with all steps in a practical activity to ensure that you can assist learners.
Observe an experienced teacher's use of practical activities to develop learner understanding.
Research real world contexts appropriate to the content and level of topic being taught.
Develop an understanding of potential links between the substantive knowledge of the sequence of learning and the learners' own personal knowledge and experiences.
Develop an awareness of the range of resources available to provide interest and variety to biology/chemistry/physics teaching.

Ofsted research review series: science

https://www.gov.uk/government/publications/research-review-series-science/research-review-series-science

Ofsted subject report series: science

https://www.gov.uk/government/publications/subject-report-series-science/finding-the-optimum-the-science-subject-report--2