

MANCHESTER
1824



**The University of Manchester
Manchester Institute of Education**

Secondary PGCE

**Mathematics PGCE Trainee Handbook
2021-2022**

The purpose of this handbook

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

This handbook gives you an overview of teaching sessions specific to PGCE Mathematics and outlines the Educational and Professional Studies (EPS) programme. It provides detailed information regarding subject specific reading, subject reading lists and useful social media links to follow to maximize your knowledge of teaching of your subject. It also highlights the expectations of trainees and mentors in your subject area, with a summary of key roles and responsibilities.

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

Contents

| | |
|--|----|
| 1. Welcome to the PGCE Mathematics course at UoM | 3 |
| 2. Aims and overview of the Mathematics Subject Programme..... | 3 |
| 3. The University Of Manchester PGCE Curriculum..... | 4 |
| 4. The PGCE Mathematics Curriculum..... | 5 |
| 5. The ITT Core Content Framework (CCF)..... | 6 |
| 6. The National Teachers' Standards..... | 6 |
| 7. Education Professional Studies (EPS) | 7 |
| 8. Roles and Responsibilities in your PGCE Year. | 7 |
| 9. Your role as a PGCE Mathematics trainee | 9 |
| 10. Guidance for School-based Placements..... | 10 |
| 11. Your Progress and Development..... | 11 |
| | |
| Appendix 1: Reading List | 15 |
| Appendix 2: Guidance For Lesson Observation | 18 |
| Appendix 3: Advice On Using Social Media..... | 19 |
| Appendix 4: The CCF and the UoM Mathematics PGCE | 20 |

1. Welcome to the PGCE Mathematics course at UoM

The University of Manchester Mathematics PGCE Course is designed to ensure you are fully prepared to begin your career in education and to allow you to enter the profession as an Early Career Teacher (ECT). The UoM PGCE programme is recognised as 'Outstanding in all areas' by Ofsted and we are a leading provider for Initial Teacher Education (ITE). Throughout the course you will learn how to apply subject and curriculum knowledge, pedagogy, and assessment techniques to ensure that your students make progress and develop an interest in the subject. During the course you will be asked to engage in wider debates around education which will develop your understanding of education from sociological and political position, allowing you to adapt your practice to a variety of school settings.

Please let us know of any individual needs or disability so we can support you in the best possible way. We will be more than happy to make adjustments to support you. As well as the support from your tutors you can register with the Disability Advisory and Support Service (DASS) at the University of Manchester. You can find further information at www.dass.manchester.ac.uk.

2. Aims and overview of the Mathematics Subject Programme

By the end of the academic year, all trainees work towards achieving Qualified Teacher Status or QTS and the award of a Post Graduate Certificate in Education. You can choose to be awarded a QTS for 11-16 or 11-18. All trainees on teacher training courses gather evidence of meeting The Teacher Standards in order to be awarded QTS, this happens throughout the year.

We have our own aims on the Mathematics PGCE course. These aims will allow you to meet The Teacher Standards and be awarded the academic PGCE, but to go a step further. The Mathematics aims of the course will develop your expertise in the value and importance of school Mathematics. This knowledge then creates an excellent and well-rounded reflective Mathematics teacher.

The aims of the Mathematics PGCE work alongside the programme wide PGCE aims at The University of Manchester. All Mathematics PGCE trainees will work towards meeting the following aims:

1. understand how Mathematics as a subject applies to everyday life, learn its foundations and origins and complexities as a subject to be taught in schools; and learn how to articulate the belief that Mathematics is an exciting and creative subject.
2. understand how Mathematics is learnt by children, through an appreciation of learning theory. They will appreciate how children make sense of Mathematics and demonstrate learning of the subject.
3. learn how to plan, teach, and assess Mathematics learning experiences, which are embedded in mathematical pedagogical knowledge. This will be demonstrated in and out of the classroom. Trainees will learn how to reflect on whether these practices have allowed Mathematics learning to take place.
4. demonstrate a range of pedagogical practices which are suited best for their pupils progression in mathematical knowledge acquisition. They will construct their own understandings through working collaboratively on engaging, challenging tasks, and reflecting on their experience.
5. learn how to support children to investigate mathematics solve problems, make connections, use reasoning and proof, exploit ICT and draw on the historical and cultural roots of mathematics.
6. appreciate that their own subject and pedagogical knowledge is crucial in their own ability to teaching good Mathematics lessons and therefore will complete scholarly activities to keep it present.
7. appreciate the many complex reasons why mathematical attainment varies across certain groups of children regarding race, gender, ability and wealth. Trainees will aim to address these barriers through research informed practice.

The PGCE Mathematics course from The University of Manchester will prepare you for teaching in your training year and beyond. We understand that you will have many questions at the beginning of the course but we will guide you in

becoming an excellent Mathematics teacher. To do this effectively you will need to engage with educational theory as you begin to teach as an intellectual and as a reflective pursuit.

During the course you will explore how Mathematics contributes and enriches a child's education. You will gain an understanding of why Mathematical skills and knowledge are of important value to pupil's education. This makes your role as Mathematics teacher incredibly important and one which is rewarding. Your ideas and beliefs of Mathematics and Mathematics pedagogy will impact on the pupils you teach. We recognise that each of you is unique and brings to the course your own particular values, interests, knowledge and skills. You will have different, but equally valid, reasons for achieving qualified teacher status, and have enthusiasm and expertise within an area of Mathematics. Throughout the PGCE we seek to build on this and encourage you to play a key role in developing each other's wider skills and knowledge. Collaboration and teamwork between trainees, mentors and teachers in schools, and university staff makes that possible. From the start, you are given opportunities to work in collaborative learning groups and to share and reflect together on your developing practice as well as to consider the key issues you will face in the Mathematics classroom.

3. The University of Manchester PGCE Curriculum

The University of Manchester Initial Teacher Training courses enable you to be an excellent teacher in your chosen subject area. Your subject tutor will introduce and develop theory and practice around subject knowledge, curriculum knowledge, pedagogy and assessment in your chosen subject area, together with wider principles. For the University to recommend your qualified teacher status by the end of the training period you will be assessed against The National Teachers' Standards. The curriculum that you will receive here at the University ensures that you have access to the knowledge and experiences laid out in the ITT Core Content Framework. But our intent is broader: to provide all of our trainee teachers with an inclusive, rich, broad, balanced and challenging curriculum, which is sufficiently flexible and adaptable to meet trainee personal and professional needs whilst also addressing both local and national priorities and needs. So the University of Manchester PGCE curriculum provides trainees with opportunity to develop:

Knowledge of:

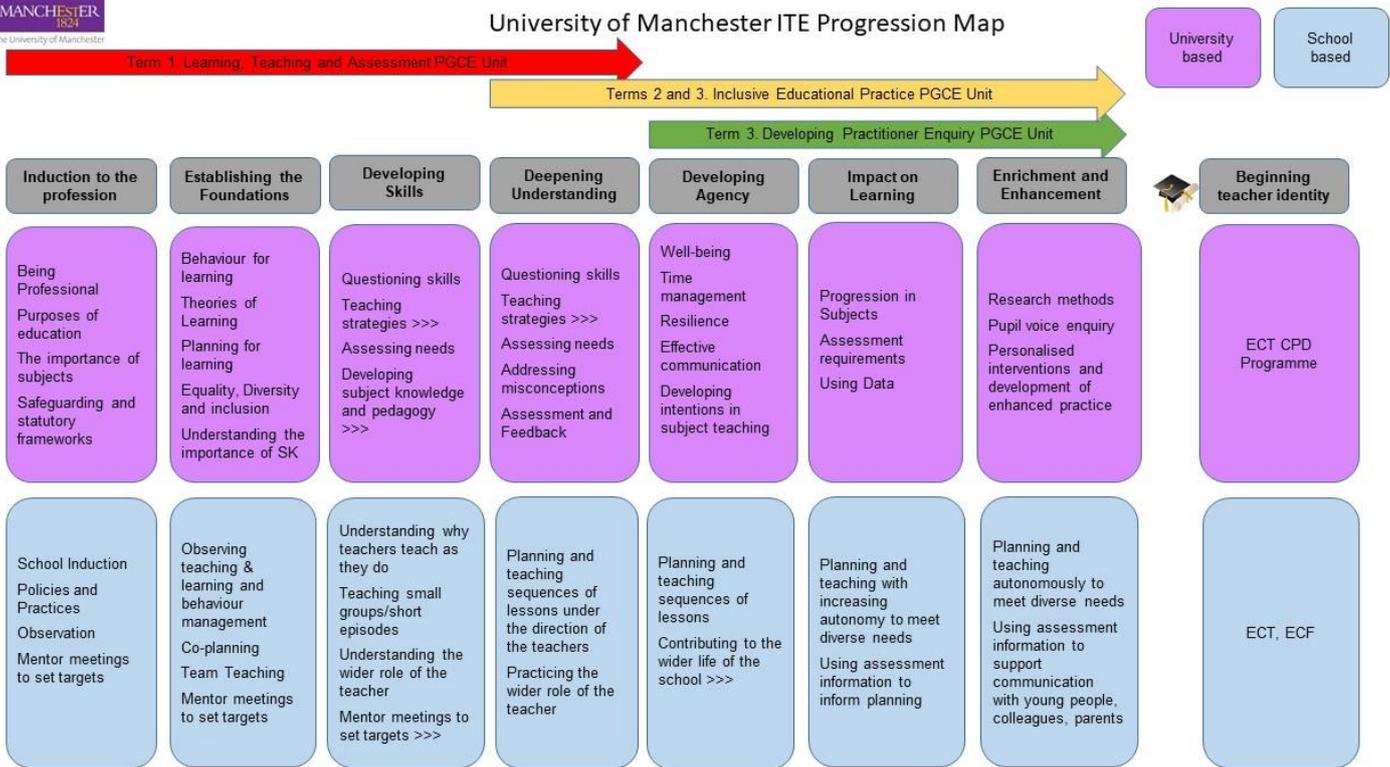
- Secondary and post-16 Curricula and Assessment requirements
- Progression in subjects
- Progression across age phases
- Subject Knowledge
- Knowledge of how children learn
- Pedagogical Knowledge
- Behaviours for Learning
- Theories of teaching and learning
- Inclusion and Diversity
- Statutory Frameworks
- Health and Wellbeing

Skills to:

- Meet the Professional Teachers' Standards (2012)
- Be reflective practitioners
- Undertake scholarly activity
- Teach creatively and innovatively
- Be resilient teachers, whilst managing a workload and work life balance
- Be an effective communicator
- Work collaboratively

To be awarded your QTS recommendation you will be assessed against the Teachers' National Standards at the end of the PGCE. Both school-based mentors and UoM tutors will provide you with feedback throughout the course to allow you to understand the context of these standards, how this can look in the classroom, and how to maximise your progress. To support and guide your development, you will reflect on your own experience in the light of the Standards during the course, using the Progress Matrix. To be awarded the PGCE (the academic qualification) you will also complete three academic assignments. These are detailed in the Graded Assignment Handbook.

University of Manchester ITE Progression Map



4. The PGCE Mathematics Curriculum.

Mathematics Tutors

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

| | | |
|----------------|-------|--|
| Rosa Archer | B4.5 | rosa.archer@manchester.ac.uk |
| Siân Morgan | B4.13 | sian.morgan@manchester.ac.uk |
| David Swanson | B4.10 | david.swanson@manchester.ac.uk |
| Simon Mazumder | | SMazumder@aggs.bfet.uk |
| Mark Williams | | mark.williams-6@manchester.ac.uk |

The mathematics subject team have carefully structured a curriculum that allows you to engage and experience the full richness of teaching your subject. Courses have been structured so that you understand learning theory, pedagogy, curriculum and assessment from a subject angle formed by expert subject knowledge, personal experience and professional subject associations. You will learn a huge amount through mentor meetings, informal meetings and observations and of course by learning from your course mates. In these sessions you'll experience opportunities to gather evidence towards the Teachers' Standards, with assignment advice and placement information. The Mathematics curriculum has been constructed with aid of Mathematics subject associations, Mathematics subject mentors, exam boards and experts in the field to make sure you will be prepared for teaching Mathematics. Your subject tutor is likely to change the course timetable, based on what is needed at that time, for example responding to any changes in the teaching of your subject.

The course aims to complete the following outcomes below and to provide a balance between subject knowledge and skills, independent study and initiative. The course begins with the broad questions as to what education is and what Mathematics is and you have an opportunity to explore your values as a teacher. We then move towards the concepts of

what curriculum is before moving to planning, teaching, differentiation and assessment. Sometimes we will adapt the course in order to respond to what your needs are and what you need help with.

Over the course of the year we'll discuss many topic areas and subject content. We do not attempt to cover every area of Mathematics. Like any school Mathematics department we will analyse what content to use, what pupils need to learn, when should we teach it, how do we teach it, what content do we include and practically are there resources available and where do we find them? We'll also answer these questions:

1. What is Education and what is Mathematics?
2. What should we teach? How do we create/follow a curriculum? What should be included? What is the Mathematics Curriculum?
3. How do children learn Mathematics? Theories of psychology and child development; identifying what progression means when pupils learn Mathematics.
4. How do we plan for and teach Mathematics? Writing learning objectives/intentions. Different methods employed in Mathematics including problems solving and investigations, didactic instruction, instruction, demonstration, modelling, discussion, debate, enquiry, videos, animations, and modern communication platforms and technologies.
5. What does assessment mean? Use of baseline, formative and summative assessment, including the role of examinations; informal and formal assessment; assessment techniques including structured questioning, open questioning, Socratic questioning, multiple choice, etc.
6. A detailed look at the Mathematics curriculum. What knowledge, skills and values to teach? How and when to teach them?: problem solving, rich tasks, use of manipulatives including algebra tiles, use of models including the bar model, Teaching for Mastery and variation theory.
7. Broader discussion in Mathematics education: assessment/accountability; curriculum reform/government policy; environmentalism and Mathematics; inclusion; technological change; citizenship and social justice; literacy and numeracy; key skills; values in education; current affairs and the curriculum; motivation.

- All the above are underpinned by theory and most sessions will be supported through a link to an academic article or online lecture/multimedia . We value the importance of research that supports the practical elements of teaching in the Mathematics classroom.

5. The ITT Core Content Framework (CCF)

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

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974307/ITT_core_content_framework .pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974307/ITT_core_content_framework.pdf)

The University of Manchester PGCE course has been carefully structured so that all trainees can experience the activities detailed in ITT Core Content Framework in a sequence that will support you as a trainee to succeed in the classroom. As a trainee, your subject tutor has designed the course so that you can experience the ITT Core Content Framework requirements in University sessions, In school practice, University EPS sessions and through academic assignments. You will find that your PGCE will go well beyond the minimum expectation of the ITT Core Content Framework and provide a curriculum that encourages research, criticality of theory, and demonstrates expert practice in teaching your subject. See appendix 4 for further details.

6. The National Teachers' Standards

The Teachers' Standards outline the core competences, skills, and behaviours expected of all teachers. In order to gain

your QTS you will need to gather evidence to show that you meet or exceed each of the Teachers' Standards. During your PGCE year you will have three assessment points at the end of each of your teaching placements. The UoM PGCE curriculum is designed to facilitate you achieving QTS at the end of the PGCE, if there are any standards you are struggling to meet you will be supported in this. You will gain increasing familiarity with the expectations of the Teachers' Standards over the course of the year by using your Progress Matrix in the RoAD file. Feedback from your subject tutor and school subject mentor will guide you towards meeting the Standards by the end of your training year. The Progress Matrix is designed in a way such that trainees are asked to reflect on and you should make brief notes to summarise activities which relate to the development of your practice and progress in each Core Area. Your University Tutor will explain this to you in greater detail.

7. Education Professional Studies (EPS)

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

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

8. Roles and Responsibilities in your PGCE year.

The PGCE course at The University of Manchester uses a wealth of experience from range of experienced individuals. In University sessions you'll get to know your subject tutor, PGCE leader and EPS tutors. You'll also get to know the Professional Support team (PS) really well and they are crucial in you navigating the requirements of the course. The table below outlines the titles and roles of all the people you will be working alongside at University and on school placements this year.

| Who? | Key roles |
|-----------------------|---|
| Headteacher | Provide overall commitment and structure to facilitate effective ITE in school or college |
| Professional mentor * | Ensure the key aspects of the partnership agreement are adhered to Oversee trainee placements and work with the university to resolve any issues should they emerge Select mentors who are experienced and able to give the trainee support and mentoring Ensure subject mentors attend mentor training Offer moderation observations, support and guidance where needed to both subject mentors and trainees |

| | |
|--------------------|--|
| Subject mentor * | Attend mentor training in order to be prepared for and complete the expectations and requirement of the placement Offer time and support to the trainee to assist them in making progress across the placement including modelling good practice, agreeing clear targets and checking planning, with a strong subject specific element Model good practice and work collaboratively with the trainee to mentor and coach their development |
| Other school staff | Be willing to be approached by the trainee if they have a subject or specific leadership role that may support the trainee's progress or subject knowledge Model good practice and encourage the trainee to learn from their experience and/or expertise |

We are committed to a reciprocal and collaborative partnership with partnership schools and this is built upon clear systems and communication. This is essential in ensuring trainees receive the best support, training and outcomes as they enter the profession. The course directors and partnership lead will maintain a broad overview of trainees' progress and the course impact as a whole.

| Who? | Key roles |
|-------------------------------|--|
| Programme Director | Oversee the trainee cohort and ensure that all course compliance aspects are adhered to in order for trainees to be complete the course and be recommended for QTS Meet with trainees who are experiencing significant difficulties or are at risk of not completing the course or school placement, using the warning system where necessary Liaise with SLOs, Professional Mentors and others around any issues emerging from specific trainees, schools or mentors |
| School Liaison Officer (Team) | Oversee the partnership as a whole and support the current cohort of trainees to meet the school placement and course requirements Monitor and QA the partnership, report back to programme director, advisory boards and, where necessary, specific school partners Contribute to Partnership Committee in order to share appropriate updates and developments with partner schools in order to maintain the collaborative partnership Support schools, professional tutors, mentors and trainees to resolve any issues that may be a barrier to a trainee making successful progress |
| Subject tutor | To be the main point of contact for their trainees and their placement schools, and be involved with the placing of trainees to ensure they meet the placement requirements Support schools, mentor and trainees during school placements including regular visits, moderation observations, file checks and meetings with mentors/trainees Support trainees and/or mentors experiencing difficulty or barriers to progress in order to resolve issues and improve trainee outcomes, through setting up and agreeing action plans Oversee the assessment of trainees in line with UoM and Teachers' Standards |
| Trainee * | Meet the expectations outlined in the Secondary handbook and subject handbook, in terms of professionalism, teaching and record keeping To be responsive to feedback and open to being mentored in order to improve their professional skills Represent the university and the expectations of the course to a high standard. |

| | |
|----------------------------|---|
| Professional Support Staff | Support trainees in all compliance and registration checks Communicate notices from The University of Manchester to trainees, such Blackboard notifications Deal with day-to-day enquiries Help with assignment submissions. The PS staff are a vital component of the successful running of this course. |
|----------------------------|---|

9. Your role as a PGCE Mathematics trainee

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

Trainees are expected to:

- Attend all University seminars and lectures, informing your University Tutor of unavoidable absence.
- Make constructive contributions to all University sessions.
- Be punctual to all University sessions and in all school experiences including teaching, meetings, professional development sessions and to report your absence following professional procedures
- Set a good example in the way you present yourself, be that appearance or manner in a professional environment
- Carry out, in a professional manner, tasks required by the headteacher, mentor and the University
- Maintain confidentiality exercising tact at all times and respecting the confidentiality of both children and teachers
- Establish professional and effective relationships with staff, parents, carers and pupils and other agencies responsible for the education and welfare of pupils
- Plan and prepare lessons and resources in advance, to a good standard and in close liaison with the mentor. We expect trainees to share lesson plans and resources with the host class teacher 48 hours before the lesson.
- Mark work promptly in accordance with school policy and quickly seeking advice when needed
- Understand their pastoral responsibilities including the health and safety of pupils and dealing with bullying, safeguarding or equal opportunities issues as they arise
- Become involved in the general and corporate life of the school attending staff meetings and school events by invitation, including parents' evenings
- Maintain the RoAD in an up to date fashion, and establish and maintain a school file. Have both available in school at all times
- Listen to constructive advice and act upon it to the best of their ability
- Take responsibility for their own professional development
- Seek to further their experiences, respond to professional targets and evaluate their own performance honestly
- Demonstrate, and collect evidence of, achievement of the standards for QTS by completing relevant sections of the RoAD
- Return any resources or materials belonging to the school at the end of the professional placement
- Be aware of the wider context of education and that learning takes place both in and out of school
- Be expected to willingly display the attributes of wanting to complete the PGCE training year
- Be involved in wider Mathematics associations, independently seeking to broaden your experience of debates around Mathematics education

10. Guidance for School-based Placements

Your school experience is crucial in your training to be a good Mathematics teacher. You will use what you have learnt in University sessions and apply them to your school setting. You will also learn exactly how Mathematics departments teach, what resources they have and experience what a career in teaching will look like. It is immensely rewarding. This is what you can expect from your Mathematics school experiences to be that for 1, 2 and 3.

What Key stages will I get to teach and qualify in?

All Mathematics trainees will gain an overview of Key Stage 2 in Primary School Placement (PSP). During secondary school/college placements, they will gain experience of teaching Key Stage 3 and Key Stage 4 classes. Key stage 5 experience will be gained either whilst on placement, or if this has not been possible by attending a short separate placement at a school or a Sixth Form college, as a minimum you need to evidence a minimum of 6 hours A-level planning, teaching and assessment across your placements. Most UoM PGCE Mathematics trainees will qualify with the 11-19 track for QTS, however you can choose to follow an 11–16 teaching track.

Placements and School Experience

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

Transition Placement

Near the end of the course, trainees spend four days in their employing school (if they have secured a teaching post by that time). Alternative placements to address specific areas of interest may be discussed with tutors closer to the time. The transition placement is a great way to prepare for your ECT year and to orientate yourself within the department you will be working in.

Your School Timetables

There will be a gradual build-up of teaching load, and you should start with some team teaching. There should be provision for you to observe lessons throughout the placement both within Mathematics and in other curriculum areas. This allows you to focus on your emerging targets/areas for development.

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

Planning Expectations

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

If you are absent

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

11. Your Progress and Development

Record of Achievement and Development (RoAD)

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

- Mentor/class teacher observation notes for each lesson observed.
- Notes on weekly meetings with mentors.
- Tutor observation notes for each lesson observed.
- A Progress Report from the trainee's mentor, completed at the end of each placement.
- The Progress Matrix for each placement.

School Experience File

This is typically a collection of sub-folders, stored within one larger folder, that acts as a portfolio and which contains various pieces of evidence demonstrating your engagement and development in relation to the ITE curriculum. Rather than compiling physical documents it is much better and more efficient to do this electronically, and we ask that you locate it, or link to it, from within your online RoAD. Trainees should keep a School Experience File each placement. This should contain:

- Schemes of learning for each class or topic taught.
- A lesson plan for each lesson taught, as well as lesson evaluations and resources.
- Examples of pupils' work including evidence of formative assessment.
- A record of work that you have assessed, including a mark book where applicable.
- Notes from your school/college-based professional studies sessions.
- Details of your pastoral responsibilities.
- Details of your extracurricular activities.
- Background information about the school or college.
- Copies of key policy documents.
- Background information about your department.

Attendance and Punctuality

Trainees are expected to attend for the whole of each school or college day. Trainees should arrive in good time and they should be ready to stay for meetings, parents' evenings, and extracurricular activities when required.

Mentor Observations and Meetings

Trainees' teaching will normally be observed formally at least once per week during placements by the subject mentor who will provide a written feedback on the UoM pro forma for lesson observations. Additionally, you can expect to

receive feedback from teaching colleagues on the other lessons you teach. Trainees will also meet with their mentor once per week to discuss progress and to review and agree targets. This meeting is accompanied by a pro forma that trainees fill in in order to summarise what has been discussed. All related documents can be found in the RoAD file.

Tutor Observations and Feedback

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

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

Subject knowledge Audits

Your Mathematics subject knowledge will grow over the course of this year. It is important to be aware of those areas in which you are strong and where there are gaps you need to address. At the start of the course you will be provided with a document to allow you to audit your subject knowledge and you are expected to update this as the year progresses. We will guide you as to the steps you can take to develop your subject knowledge.

The Role of the Subject Mentor

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

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

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

Weekly mentor meeting

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

general from my experiences and how can I apply this across all of my teaching?”

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

- Review how your teaching is developing over the last week against your targets.
- Discuss any successes and challenges you are facing with some of your classes.
- Discuss what you will be teaching next week and be aware of subject knowledge and resources you'll need.
- Discuss any university assignments you need to complete which your mentor might be able to help you with.
- Ask about any whole school activities that may disrupt your teaching such as fieldtrips or exams
- Set the focus of your next observation, what do you both agree should be the focus for example, Mathematics subject knowledge, pace, timings, assessment etc.
- Ask about opportunities for getting involved in whole school/extracurricular activities.

Your University Tutor

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

Some of the roles your University tutor has:

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

Rosa Archer Secondary PGCE Lecturer in Mathematics s PGCE (PhD, MSc, BSc (Mathematics and Physics), QTS.)
rosa.archer@manchester.ac.uk

Rosa has many years teaching experience in both the secondary and sixth form sector and was graded outstanding on two occasions by Ofsted. Rosa graduated in Mathematics and Physics from the university of Rome. She completed a PhD in Pure Mathematics, Algebraic Topology at the University of Warwick. Before taking a post as a PGCE lecturer at St Mary's University in Twickenham Rosa was a head of department in a sixth form college in Reading. On this occasion Rosa guided the department to move from an Ofsted grade 4 to grade 2 in the space of two years. Rosa moved to Manchester in 2011 where she took the post of Team Leader for the Secondary Mathematics PGCE, she also teaches a year 3 course in the school of mathematics and on the Subject Knowledge Enhancement Course.

Rosa is passionate about mathematics and about teaching. All of her research is aimed at making the learning experience a good one for young people as well as teachers.

Currently Rosa is researching Lesson Study (a professional development technique for teachers) in the context of Initial Teacher Education.

She has also worked with an international team researching issues related to subject knowledge for mathematics teaching.

Siân Morgan, Secondary PGCE Lecturer in Mathematics and Team Leader. (MSc in Educational Research, PGCE, BSc (Hons) in Mathematics) sian.morgan@manchester.ac.uk

Siân taught for several years in various secondary schools across Greater Manchester. Following this, she continued to share her passion for mathematics teaching as a mathematics consultant for a local authority. Since 2011, Siân has been part of the secondary mathematics tutor team at the University of Manchester and currently leads the Educational

Professional Studies (EPS) element of the course. In 2015 she was awarded an MSc in Educational Research with lesson study as the main research focus.

Her current research interests continue to involve lesson study, but also professional development and mathematical pedagogy. She is also a CPD trainer and facilitator who works closely with the NW1 Maths Hub (having previously worked at the school). She supports colleagues in school and has delivered courses, in addition to NW1 Maths Hub, to NCETM and the Prince's Teaching Institute (PTI).

David Swanson, Secondary PGCE Lecturer in Mathematics (PhD in Educational Research, PGCE, MA and MSc in Mathematics). david.swanson@manchester.ac.uk

Following an MA in Mathematics and an MSc in the Mathematics of Non-Linear Models, David completed his PGCE in Secondary Mathematics at The University of Manchester. He taught mathematics for 15 years in further education before returning to the University, gaining his PhD and joining the PGCE course as a tutor.

Alongside his work on the PGCE he is heavily involved in developing and delivering professional development courses for mathematics teachers with the NW1 Mathematics Hub, alongside work on research projects at the University. Projects he has been involved with include; Teleprism, The Royal Society Vision project, NCETM's Multiplicative reasoning project, an ESRC IAA Q-Step/Core Maths, and a project on mathematics anxiety for the British Academy.

His main research interests are in the theory and practice of mathematical concept development and pedagogy using a Vygotskian framework; lesson study; and social issues in mathematics education from a critical perspective. As well as publishing on these themes he tries to bring the understanding developed through his research into the PGCE course in forms that are practical for the classroom.

Addressing Problems

The University of Manchester PGCE is a collegiate course, but sometimes problems and differences in opinion do occur. Although it may not seem so at the time, these events are also developmental and from our experiences most problems are easily resolved through clear communication. The following advice is not set in stone, for Mathematics trainees, speak to whoever you feel most comfortable with.

If problems do occur, try talking to other Mathematics trainees to get their opinion on the matter, they may interpret the issue a different way to how you see it. If school/college-based problems arise, the first point of contact is your subject mentor. However, depending upon the nature of the issue, trainees may feel more comfortable talking with their University tutor or professional mentor. For university-based issues, trainees should first discuss with their tutor. If problems remain unresolved, trainees should discuss with the secondary PGCE course leader.

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

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

Appendix 1: Reading List

Some of these are available online and can be found in the University library but having personal copies of some books is essential. The core texts for the course will be:

Chambers, P. 2013 *Teaching Mathematics: Developing as a Reflective Secondary Teacher*, London: Sage

Archer, R., Morgan, S., Swanson, D. 2020, *Understanding lesson study: A Practical Guide for Improving Teaching and Learning*, London: Routledge

The first book is a very good initial reading, it is very clearly written and is easy to read. Consider it as a starting point for reflection; however, this is not a research book and should not be relied upon too heavily when writing the assignments.

Please note that during the course it is an expectation that you will carry out a considerable amount of independent reading (of both books and academic papers). In most of your assessed assignments you will be required to provide a number of academic references to support your statements and assertions. During the weeks in university we will provide you with several articles that we feel are relevant to the university sessions.

Below is a selection of books you might find useful.

Initial Teacher Education

Johnston-Wilder, S, Johnston-Wilder, P, Pimm, D and Westwell, J (2005) *Learning to Teach Mathematics in the Secondary School* (Second Edition), London: Routledge

Lee, C.S., Johnston-Wilder, S. and Ward-Penny, R. eds., 2013. *A Practical Guide to Teaching Mathematics in the Secondary School*. Routledge.

Teaching and Learning Mathematics

Brown, L. and Coles, A., (2008). *Hearing silence: Steps to teaching mathematics*. Black Apollo

Burton, L (1995) *Thinking Things Through: Problem Solving in Mathematics*, Oxford: Nash Pollock

Chinn, S (2012) *The trouble with maths: a practical guide to helping learners with numeracy difficulties*, London: David Fulton

Coles, A., (2015). *Engaging in Mathematics in the Classroom: Symbols and Experiences*. Routledge.

Coles, A., Barwell, R., Cotton, T., Winter J., Brown, L., (2013) *Teaching Secondary Mathematics as if the Planet Matters*. Routledge

French, D (2005) *Teaching and Learning Algebra*, London: Continuum

Graham, A (2006) *Developing Thinking in Statistics*, London: Sage Publications

Hyde, R., Edwards J_A., *Mentoring Mathematics Teachers Supporting and inspiring pre-service and newly qualified teachers*, Routledge

Johnston-Wilder, S and Mason, J (eds.) (2005) *Developing Thinking in Geometry*, London: Sage

Lee, C (2006) *Language for learning mathematics*, Buckingham: OUP

Mason, J (1985) *Thinking Mathematically*, Harlow: Addison Wesley

Nelson, D, Joseph, GG and Williams, J (1993) *Multicultural Mathematics*, Oxford: OUP

Ollerton, M and Watson, A. (2001) *Inclusive Mathematics 11-18*, London: Continuum

Polya, G (2004) *How to Solve it: A New Aspect of Mathematical Method*, Princeton University Press

Prestage, S and Perks, P (2001) *Adapting and Extending Secondary Mathematics Activities: New Tasks for Old*, London: David Fulton

Ryan, J and Williams, J (2007) *Children's Mathematics 4-15: Learning from Errors and Misconceptions*, Buckingham: Open University Press
Shan, S-J and Bailey, P (1991) *Multiple Factors: Classroom Mathematics for Equality and Justice*, Stoke on Trent: Trentham Books

Skemp, R (1993) *The Psychology of Learning Mathematics*, London: Penguin

Wright, D., and Taverner, S. *Thinking Through Mathematics*. Chris Kington, 2008.

Southall, E., 2017. *Yes, but why? Teaching for understanding in mathematics*. SAGE.

Ideas for the classroom

Bills, C. (2004) *Thinkers*, Derby: ATM

Lucas, V., (2004) *Mathematical Team Games: Enjoyable Activities to Enhance the Curriculum*, Tarquin

Lucas, V., *Mathematical treasure hunts*, Tarquin

Lucas, V., (2004) *Mathematical Merry-go-round: Whole Class Oral Activities to Enhance the Curriculum*,

Tower of Hanoi: Martin Gardner's First Book of Mathematical Puzzles and Games, Cambridge: Cambridge University Press

Watson, A and Mason J (1998) *Questions and Prompts for Mathematical Thinking*, Derby: ATM

Whieldon, J., (2014) *Mini mathematical murder mysteries*, Tarquin

Using ICT in Teaching Mathematics

Johnston-Wilder, S and Pimm, D (2004) *Teaching Secondary Mathematics with ICT (Learning and Teaching with ICT)*, Buckingham: Open University Press

Oldknow, A, Taylor, R and Tetlow, L (2010) *Teaching Mathematics using ICT*, London: Continuum

Popular mathematics books; for recreation, history and inspiration!

Abbot, EA (2002) *Flatland: A romance in many dimensions*, Oxford: Perseus Press

Barrow, JD (1992) *Pi in the sky*, Oxford: Clarendon Press

Bellos, A (2010) *Alex's Adventures in Numberland*, London: Bloomsbury

Derbyshire, J (2004) *Prime Obsession: Bernhard Riemann and the Greatest Unsolved*

Problem in Mathematics, Washington: Joseph Henry Press

Devlin, K (2001) *The Maths Gene: Why Everyone Has It, But Most People Don't Use It*, Phoenix

Devlin, K (2003) *The Millennium Problems: The Seven Greatest Unsolved Mathematical Puzzles of Our Time*, Basic Books

Maor, E (2009) *e: The Story of a Number*, Princeton University Press

Paulos, JA (1990) *Innumeracy: Mathematical Illiteracy and Its Consequences* London: Penguin

Singh, S (2002) *Fermat's Last Theorem: The Story of a Riddle That Confounded the World's Greatest Minds for 358 Years*, London: Random House

Singh, S (2002) *The Code Book: The Secret History of Codes and Code-breaking*, London: Fourth Estate

Stewart, I (2001) *Flatterland*, London: MacMillan

Tahan, M. *The man who counted: a collection of mathematical adventures*, Edinburgh: Canongate Press

Wells, D (1986) *The penguin dictionary of curious and interesting numbers*, London: Penguin

Wells, D (1991) *The penguin dictionary of curious and interesting geometry*, London: Penguin

Journals:

Mathematics Teaching (a journal of the Association of Teachers of Mathematics)

Mathematics in School (a journal of the Mathematical Association)

Educational Studies in Mathematics

Journal for Research in Mathematics Education

Websites

Association of Teachers of Mathematics. Here you will find resources ideas and easy to read articles. www.atm.org.uk

British Society for Research in learning Mathematics. Has research papers in mathematics education. www.bsrlm.org.uk

National Centre for Excellence in Teaching Mathematics. This is the government funded CPD provider for mathematics. You will find lots of ideas and articles as well as support for teachers. www.ncetm.org.uk/home

NRICH. You will find many excellent activities to support learners in developing deep mathematical understanding. No worksheets here (an this is a good thing!) www.nrich.maths.org

Nuffield. They aim to improve social well-being through education, research and innovation www.nuffieldfoundation.org

Bowland maths. You will find many excellent activities and engaging projects to support learners in developing deep mathematical understanding www.bowlandmaths.org.uk

National STEM centre. Anything that has ever been written about mathematics education can be found here. www.nationalstemcentre.org.uk/elibrary/maths/

Maths careers www.mathscareers.org.uk

Maths Genie. For GCSE and A-levels revision ideas, including past papers. <https://www.mathsgenie.co.uk/gcse.html>

Corbett Maths. Lot of videos explain maths topics and worksheets. <https://corbettmaths.com>

Underground maths. You will find here many excellent activities to support A level and Core maths learners in developing deep mathematical understanding <https://undergroundmathematics.org>

Variation theory. Ideas about intelligent practice. <https://variationtheory.com>

Appendix 2: Guidance for Lesson Observation

Observing other teachers

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

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

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

Planning, Teaching and Learning

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

Assessment

- Checks for understanding - how regular are these within the session and how do they take place? Questioning? Reading written answers? Peer assessment?
- Methods of assessment- which ones are used in class and why?
- Feedback and measures to secure progress- how is 'precise praise' ensured and how do students know they are making progress?
- How does the class teacher know pupils are making progress?
- How does s/he use the assessment evidence gained in class to help make this decision and how does this influence future planning?
- Are students of all attainment making progress?

Appendix 3: Advice on Using Social Media

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

We ask that trainees are wary of their own use of social media and consider their security settings carefully- trainees can be sure some savvy students will be trying to find their online presence. Schools and Colleges increasingly do similar searches as part of the recruitment process for new teachers.

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

Increasingly, teachers are making use of social media in the classroom as a teaching tool and as a means of extending learning, for instance.

Twitter: a useful vehicle to send weblinks/videos to students. Trainees can set up a 'group' of students to do so and manage security settings so that this is not visible outside. Some teachers tweet homework reminders and demand that students follow them at school as they tweet links to articles and videos. Others use it to tweet questions or make points during lessons, to store revision topics, take and tweet pictures of students' work and more.

Appendix 4: The CCF and The UoM Science PGCE

Examples of how the CCF is integrated into Mathematics PGCE course is given below. Remember the CCF is woven into your training experience in both school and University sessions and through your own research and planning activities.

UoM Mathematics curriculum relating to CCF: Set high expectations:

| High Expectations | |
|--|---|
| You will learn in Mathematics University sessions, through school experience and EPS: | Learn that |
| <p>How to communicate clear instruction in your teaching using Mathematics subject specific language that would allow your pupils to succeed.</p> <p>How to speak to pupils so that you always see the potential in all pupils, be that in form time, Mathematics lessons and when interacting with guardians and report writing.</p> <p>To reward pupils in Mathematics lessons where a culture of positivity is used as a way of learning for example in the use of Mathematics games, investigations and competition. You will learn how to motivate all pupils in Mathematics through lesson design especially those who could be classed as disengaged.</p> <p>To set work for pupils that encourage participation of parents and guardians. You'll undertake assignments that allow you to understand the pupils view of Mathematics and then create actions based on that.</p> <p>Identify what high expectations look like within mathematics, this could be through observation of mentors and other experienced teachers, language used, activity design and professionalism of the Mathematics teacher.</p> <p>How to differentiate activities so that all pupils can make progress no matter what their ability is. You'll practice Mathematics lesson observations and identify what high expectations look like from mentors and teachers.</p> <p>Experience research and discourse around what high quality of Mathematics teaching is, what it should include and how it can be assessed, so that all pupils get a high-quality Mathematics experience.</p> <p>Reflect on how and if you are 'setting high expectations' and communicate this during lesson feedback</p> | <ol style="list-style-type: none"> 1. Teachers have the ability to affect and improve the wellbeing, motivation and behaviour of their pupils. 2. Teachers are key role models, who can influence the attitudes, values and behaviours of their pupils. 3. Teacher expectations can affect pupil outcomes; setting goals that challenge and stretch pupils is essential. 4. Setting clear expectations can help communicate shared values that improve classroom and school culture. 5. A culture of mutual trust and respect supports effective relationships. 6. High-quality teaching has a long-term positive effect on pupils' life chances, particularly for children from disadvantaged backgrounds. |

UoM Mathematics curriculum relating to CCF - Promote good progress:

| How Pupils Learn: 'Promote good progress' | |
|--|---|
| You will learn in Mathematics PGCE sessions, through school experience and EPS and personal academic work | Learn that |
| <p>Why learning is important to the pupil's knowledge of world and their future opportunities</p> <p>How to plan teaching sessions sequentially that build on students' prior knowledge through a range of activities. You will receive planning advice on how learning theories are used to plan your lessons.</p> <p>How to plan Mathematics lessons that gradually progress so not to overwhelm the pupils, for example gradual steps and modelling techniques. This also plan to limit distractions.</p> <p>The importance of planning sequences of work that build on knowledge learnt in prior lessons and earlier years, developing and using pupils' working memory and long-term memory.</p> <p>When pupils have not been challenged enough or have become overwhelmed and learn how to plan better Mathematics lessons.</p> <p>How to recognise pupils misconceptions around Mathematics and how to plan for better Mathematics lessons.</p> <p>Reflect on lesson planning in Mathematics so that planning takes into account of what pupils already know and what they should achieve by the end of the lesson or longer planning. You'll be shown activities such as retrieval, repetition and Mathematics skills which is a useful way to assess progress.</p> <p>In the Mathematics PGCE you will constantly be asked to plan for pupil progression in Mathematics, shown how to use a variety of ways to differentiate encompassing knowing your pupils well, learning about timing, providing frameworks, range of learning styles and most importantly when to take differentiation away.</p> | <p>Learning involves a lasting change in pupils' capabilities or understanding.</p> <p>Prior knowledge plays an important role in how pupils learn; committing some key facts to their long-term memory is likely to help pupils learn more complex ideas.</p> <p>An important factor in learning is memory, which can be thought of as comprising two elements: working memory and long-term memory.</p> <p>Working memory is where information that is being actively processed is held, but its capacity is limited and can be overloaded.</p> <p>Long-term memory can be considered as a store of knowledge that changes as pupils learn by integrating new ideas with existing knowledge.</p> <p>Where prior knowledge is weak, pupils are more likely to develop misconceptions, particularly if new ideas are introduced too quickly.</p> <p>Regular purposeful practice of what has previously been taught can help consolidate material and help pupils remember what they have learned.</p> <p>Requiring pupils to retrieve information from memory, and spacing practice so that pupils revisit ideas after a gap are also likely to strengthen recall.</p> <p>Worked examples that take pupils through each step of a new process are also likely to support pupils to learn.</p> |