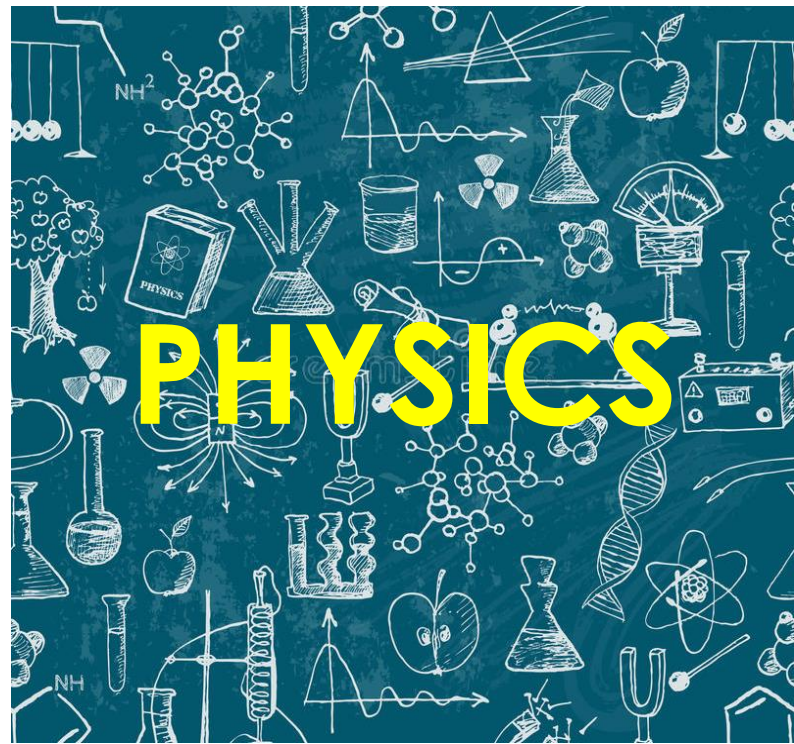
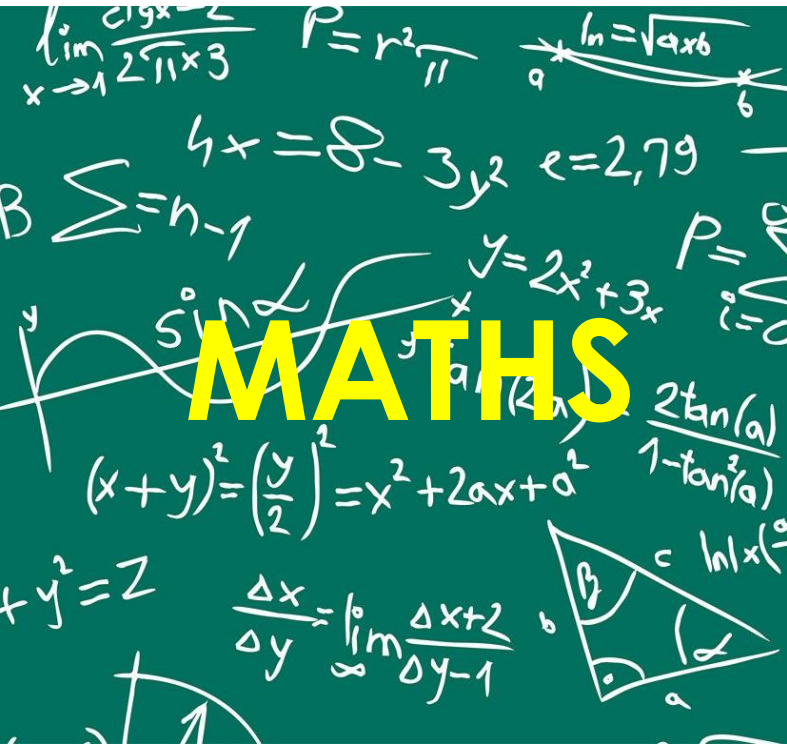




Teacher Subject Specialism Training 2019-2020



Course Handbook






Teacher Subject Specialism Training (TSST) Course Handbook 2019-2020

Contents

Tutors	3
Design of the Course	4
Summary of Assessment	5
Reading and Research	5
Two-Day Conference Overview	6
Two-Day Conference Mathematics Modules	7
Two-Day Conference Physics Modules	8
Two-Day Conference Programme Booking Format	9
Twilight Sessions Mathematics Topics	10
Twilight Sessions Physics Topics	11
Twilight Sessions Dates and Booking Format	12
Expectations of Participants and Participants' Schools	13
Recommended Reading and Research	14
Personal Learning Log Example	15
Two-Day Conference Detailed Programme for Day One.....	16
Two-Day Conference Detailed Programme for Day Two	17
Lesson Observation Sheet Example	18

Tutors

<p>Course Leader and Mathematics Tutor</p>	<p>Mark Williams MWilliams@educ.somerset.gov.uk</p>	
<p>Mathematics Tutor</p>	<p>Jenny Owens JOwens1@educ.somerset.gov.uk</p>	
<p>Physics Tutor</p>	<p>Andy Shaw AShaw1@educ.somerset.gov.uk</p>	

Design of the Course

The course is comprised of an initial two-day conference (**15th and 16th October 2019**) followed by three, half-day training sessions (**14th January, 4th March and 17th June 2020**) and one twilight, final presentation session (**30th June 2020**).

There are four areas of subject knowledge from which each teacher will identify their areas of strength and development. It is expected and acknowledged that an area of strength may still need development – just at a higher level. For this reason, each subject-specific module has a Part I and a Part II making eight in total in the first instance. More will be added for twilight sessions.

Teachers will be asked to complete a subject knowledge audit at the start of the course at the two-day conference. This will take the form of a questionnaire with a range of methods for self-assessment including opportunities to rate your confidence levels, with straight forward test questions in a GCSE style and questions which require some comment on a student's worked example. The audit will help to identify areas of strength and development. It will also inform the topics selected for the three half-day training sessions in 2020.

Throughout the course teachers will work on their areas of strength and areas for development and record their progress using a Personal Learning Log. (An example is provided.) Teachers can formulate their own versions if they wish – it is simply asked that:

- lesson 'Reflections' are used
- formal and informal lesson observation feedback forms are included
- there is evidence of having observed another maths/physics teacher at work and reflected on the lesson observed
- data is gathered on a chosen class or classes which aims to evidence impact on students' achievement (perhaps by showing progress towards targets, or progress from a baseline, or progress across a series of tests)

There will also be 'Knowledge Tests' at various points throughout the course. These will always cover the subject knowledge modules and are designed to form part of the subject knowledge reviews that will 'feed forward' to a teacher's continued development.

Summary of Assessment

The course will be assessed using a 3-stage process: The Autumn, Spring and Summer stages.

Each stage (term) will include:

- observation by an in-house or visiting specialist
- work scrutiny to evidence student progress
- data analysis
- review of delegate's lesson evaluations
- two training sessions
- one practical subject knowledge test

For the final accreditation there will be a day of presentations. Delegates share their evidence with a panel made up of their peers and external assessors.

For those wishing to earn Masters Credits through Exeter University there will be a final assignment to present which will require teachers to have studied some 'think pieces' which will usually be articles or texts recommended by the University. Teachers will need to make explicit reference to these texts and link their reading and research to their Personal Learning Log.

Reading and Research

There is no core text or any compulsory reading material. It is not proposed that teachers will all come out with the same teaching styles, rather that teachers gain the confidence, tools and enhanced subject knowledge to teach Mathematics or Physics in their own way. It must be acknowledged however that the pedagogical content of the course design does draw upon the work of Dylan William and Paul Black, as well as some of the teaching methods from Paul Ginnis and the Kagan Cooperative Learning Approaches. These and other influences are fully acknowledged and referenced at the end of this course handbook.

Reference will also be made to materials offered by:

- National Centre for Excellence in the Teaching of Mathematics
- The Further Mathematics Support Programme
- Plymouth University Subject Knowledge Enhancement course
- Jurassic Coast Teaching Schools' Alliance
- Exeter University MA course
- Institute of Physics

Two-Day Conference Overview (The Blue School, Wells)

Dates: Tuesday 15th and Wednesday 16th October 2019

Day One:

Tuesday 15th October, 9am-4:30pm

	Mathematics	Physics
Session 1 9:00 – 10:40	Welcome and introductions	
	Diagnostic/Self-Assessment of Subject Knowledge	Diagnostic/Self-Assessment of Subject Knowledge
Break - 10:40-11am		
Session 2 11:00 – 12:00	Course Outline Modes of study Review Subject Knowledge Audit	
Lunch - 12-1pm		
Session 3 1:00 – 2:30	Workshop 1 'M' Modules	Workshop 1 'P' Modules
Break - 2:30-2:45pm		
Session 4 2:45 – 4:15	Workshop 2 'M' Modules	Workshop 2 'P' Modules
4:15 – 4:30	Plenary / Refreshments	

Day Two:

Wednesday 16th October, 9am-4:30pm

	Mathematics	Physics
Session 1 9:00 – 10:40	Workshop 3 'M' Modules	Workshop 3 'P' Modules
Break - 10:40-11am		
Session 2 11:00 – 12:00	Workshop 4 Using ICT and professional organisations to support teaching in maths and physics	
Lunch - 12-1pm		
Session 3 1:00 – 2:30	Workshop 5 'M' Modules	Workshop 5 'P' Modules
Break - 2:30-2:45pm		
Session 4 2:45 – 4:15	Revisit Subject Audit / Plan for Twilight Sessions	
4:15 – 4:30	Plenary / Refreshments	

Two-Day Conference Mathematics Modules

Topic Heading	Part i Aimed at becoming better at imparting this knowledge	Tick	Part ii Aimed at enhancing your own knowledge	Tick
M1. <ul style="list-style-type: none"> • Fundamentals of maths teaching 	Language of mathematics Key facts How to use a Scientific Calculator Common misconceptions			
M2. <ul style="list-style-type: none"> • Probability 	(i) Probability of two or more events		(ii) Conditional Probability	
M3. <ul style="list-style-type: none"> • Gradients and Straight Lines 	(i) Line equations		(ii) Equations of tangents to circles	
M4 <ul style="list-style-type: none"> • Using ICT 	Using ICT and professional organisations to support teaching			
M5. <ul style="list-style-type: none"> • Surds 	(i) Manipulation – Simplifying/rationalising the denominator		(ii) Applications – trigonometrical functions, geometric series and Pythagoras	

Mathematics Modules

- **M1.** Fundamentals of maths teaching: Language; Key facts, How to use a Scientific Calculator; Common misconceptions (NEW)
- **M2.** Conditional probability
- **M3.** Teaching the gradients of perpendicular lines, line equations and equations of tangents to circles
- **M4.** Using ICT
- **M5.** Manipulation of surds, particularly in the use of common trigonometric values and as a common ratio in geometric progressions

Modules are often adjusted according to the needs of participants.

Two-Day Conference Physics Modules

Topic Heading	Part i Aimed at teaching these concepts	Part ii Aimed at applying these concepts when stretching the more able students
P1 <ul style="list-style-type: none"> • Conceptual understanding of DC Circuits • Ohms Law • Power equations • The use of transformers in power distribution 	(i) Understanding Current, Voltage and Resistance ideas to help pass this onto students	(ii) Models and analogies to understand Current, Voltage and Resistance. Using units to derive equations. Linking equations to practical uses
P2 <ul style="list-style-type: none"> • Radioactive decay and half-life 	(i) Confidence demonstrating radioactive samples and linking the properties of radiation to their uses	(ii) Analogies to show exponential decay. The processes involved in α , β , and γ emission
P3 <ul style="list-style-type: none"> • Use of equations and ideas relating to conservation of energy and momentum 	(i) Helping students deal with simple and more complex equations.	(ii) Deriving equations for KE and GPE. Questions involving multiple stages
P4. <ul style="list-style-type: none"> • Digital Resources 	Digital resources used in Physics	
P5 <ul style="list-style-type: none"> • The Motor Effect and Electromagnetic Induction 	(i) Demonstrations and theory to help students understand the principles of electromagnetic induction	(ii) How electric and magnetic fields interact and equations relating to this

Physics Modules

- **P1.** Conceptual understanding of DC circuits, Ohm's Law, power equations and the use of transformers in power distribution
- **P2.** Radioactive decay and half-life
- **P3.** Use of equations and ideas relating to conservation of energy and momentum
- **P4.** Digital resources used in Physics
- **P5.** The Motor Effect and Electromagnetic Induction

Two-Day Conference Programme Booking Format

Name: _____

Programme of Workshops for Maths

This form should be filled in on **Day One** of the two-day conference. Time has been allowed for you to reflect on your audit and use the information to inform your choices. You are NOT expected to fill this in before you arrive.

	Choice of Workshop
Day One: Workshop 1	M1
Day One: Workshop 2	M2i M3ii <i>Please circle one choice</i>
Day Two: Workshop 3	M2ii M3i <i>Please circle one choice</i>
Day Two: Workshop 4	M4
Day Two: Workshop 5	M5i M5ii <i>Please circle one choice</i>

Half-Day Sessions Mathematics Topics

It is anticipated that as the course progresses, topics and areas for study will be proposed by the participants. As such, the first half-day session will be planned from the following topics; the remainder will be finalised once the subject audits have taken place.

Mathematics

Topic Heading	Part i Aimed at becoming better at imparting this knowledge	Tick	Part ii Aimed at enhancing your own knowledge	Tick
M1. • Probability	(i) Probability of two or more events		(ii) Conditional Probability	
M2. • Gradients and Straight Lines	(i) Line equations		(ii) Equations of tangents to circles	
M3. • Surds	(i) Manipulation – Simplifying/rationalising the denominator		(ii) Applications – trigonometrical functions, geometric series and Pythagoras	
M4. • Functions	(i) Inputs/Outputs Inverse functions		(ii) Composite and inverse functions	

Half-Day Sessions Physics Topics

As with Mathematics, it is anticipated that as the course progresses, Physics areas of study will be proposed by the participants. The first half-day session will be planned from the following topics; the remainder will be finalised once the subject audits have taken place.

Physics

Topic Heading	Part i Aimed at teaching these concepts	Part ii Aimed at applying these concepts when stretching the more able
P1. <ul style="list-style-type: none"> DC Circuits, Ohms Law, power equations, transformers 	(i) Understanding Current, Voltage and Resistance ideas to help pass this onto students.	(ii) Models and analogies to understand Current, Voltage and Resistance. Using units to derive equations. Linking equations to practical uses.
P2. <ul style="list-style-type: none"> Radioactive decay and half-life 	(i) Confidence demonstrating radioactive samples and linking the properties of radiation to their uses.	(ii) Analogies to show exponential decay. The processes involved in a β and γ emission.
P3. <ul style="list-style-type: none"> Use of equations and ideas relating to conservation of energy and momentum 	(i) Helping students deal with simple and more complex equations.	(ii) Deriving equations for KE and GPE. Questions involving multiple stages.
P4. <ul style="list-style-type: none"> The Motor Effect and Electromagnetic Induction 	(i) Demonstrations and theory to help students understand the principles of electromagnetic induction.	(ii) How electric and magnetic fields interact and equations relating to this.

Teacher Subject Specialism Training: 3x Half-Day Sessions and Final Presentation

Towards the end of the two-day conference, time has been allowed for you to reflect on your training and use the information to inform your choices for later in the year.

Below is an outline of the likely topics that will be covered in the half-day training sessions, other topics will be negotiated with participants so that the course can be personalised as far as possible. Depending on the location of participants the venues could potentially be negotiated to enable a fair share of travel. Therefore, please be aware this page might be updated.

Twilight Sessions	Choice of Workshop
Workshop 6 Tuesday 14th January, 2-6pm Venue - The Blue School	Maths: KS3 Number / KS4 Number Maths: KS3 Algebra / Sequences & Vectors Physics: Forces, Vectors and Archimedes Principle Physics: Wave behaviour, (Lenses) and Colour
Workshop 7 Wednesday 4th March, 2-6pm Venue - The Blue School	Maths: KS3 Geometry & Construction / Angle Geometry & Circles Maths: Trig Basics / Trig Advanced Physics: Moments and Circular Motion Physics: Electric Fields and Static (application of)
Workshop 8 Wednesday 17th June, 2-6pm Venue - The Blue School	Maths: KS4 Algebra Algebraic Manipulation / Functions and Graphs Physics: Kinetic Theory and Gas Laws
Final Presentations Tuesday 30th June, 4-6pm Venue - The Blue School	Presentations

Expectations of Participants

A Teacher Subject Specialism Training participant should:

- Be familiar with all the requirements of the course as outlined in the Course Handbook;
- Attend all scheduled sessions and complete all subject knowledge audits as requested by the course tutor;
- Complete all evaluation forms and 'impact' analyses.
- Be willing to be observed 3 times during the process and understand that this observation does not form any part of their own school's Performance Management Processes;
- Be willing to complete the prescribed reading and research set by Exeter University and to comply with their rules and regulations if they are seeking Masters Credits.

Expectations of Participants' Schools

A Teacher Subject Specialism Training participant's school should:

- Provide a mentor for the TSST participant who is already trained in Physics or Mathematics and who is willing to be observed and undertake observations
- Provide non-contact time to TSST participants so that they can undertake observations, complete reading and research and prepare for monitoring visits
- Provide the necessary release time for TSST participants to attend all training sessions, including an early departure for half-days and importantly, also the final twilight presentation session if the journey time to the venue requires it
- Be willing and able to accommodate visiting tutors and representatives who may from time to time wish to quality assure the programme, or provide external verification of a TSST participant's progress

Recommended Reading and Research

The following texts either underpin the ideas behind the workshops or are simply recommended as useful/enjoyable by the tutors:

Teaching and Learning

Ginnis, P. *The Teacher's Toolkit: Raise Classroom Achievement with Strategies for Every Learner*

Smith, J. *The Lazy Teacher's Handbook: How your students learn more when you teach less* (Independent Thinking Series)

Cohen, L. *Research Methods in Education*

Shulman, L.S. *The Wisdom of Practice-Collected Essays of Lee Shulman: Vol 1*

Hattie, J. *Visible Learning and the Science of How We Learn*

William, D. *Embedded Formative Assessment*

William, D. *Inside the Black Box: Raising Standards Through Classroom Assessment: 1*

Kagan, S. *Cooperative Learning*

Povey, T. *Professor Povey's Perplexing Problems: Pre-University Physics and Maths Puzzles with Solutions*

Mathematics

Chambers, P. *Teaching Mathematics in the Secondary School (Developing as a Reflective Secondary Teacher)*

Hodgen, J. *Maths Inside the Black Box*

Maor, E. *To Infinity and Beyond: A Cultural History of the Infinite* (Princeton Paperbacks)

Physics

Lockett, K. *Physics in the Real World*

Susskind, L. *The Theoretical Minimum: What You Need to Know to Start Doing Physics*

by David Sang *Teaching Secondary Physics 2nd Edition* (Ase Science Practice)

Personal Learning Log Example

Date	Activity Undertaken	Notes/Reflections/Actions
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	
	<input type="checkbox"/> Observe another teacher <input type="checkbox"/> Observation of my teaching <input type="checkbox"/> Lesson reflection <input type="checkbox"/> Reading and research <input type="checkbox"/> Online study <input type="checkbox"/> Data analysis <input type="checkbox"/> Other	

TSST Two-Day Conference - Day One

- 8:45am** **Please report to The Blue School Reception in the middle of the School Refreshments on arrival** Venue: K1-5
- 9:00am** **Welcome and introductions**
- 9:10am** **Session 1: Subject Knowledge Audit**
In this session there are a series of self-test documents which cover the subject based units to be offered over the two days.
- 10:10am** **Discussion and completion of The Audit Front-sheet** (to be passed to tutors)
- 10.40am** **Break** Venue: Bailey Hall
- 11:00am** **Course outline and modes of study** Venue: K1-5
- During this session the key tenets of the Department for Education requirement will be outlined, but there will be an opportunity to discuss how that may be made workable for you.
- The rationale for the organisation of the two-day training will be explained, as well as the intended outcomes. There will be an opportunity for you to feed in your expectations and for us to flex the programme accordingly.
- 11:30am** Outcomes of the audit
Divide into smaller Mathematics groups (in K1-5) and Physics groups (in K117)
Sign up for workshops
- 12:00pm** **Lunch** Venue: Bailey Hall
- 1:00pm** **Workshop 1:**
Mathematics: **M1** in K1-5
Physics: **P1** in K117
- 2:30pm** **Break** Venue: Bailey Hall
- 2:45pm** **Workshop 2:**
Mathematics: **M2i or M3ii** in K1-5 or K1-4
Physics: **P2** in K117
- 4:15pm** **Plenary/Refreshments/Depart** Venue: K1-5
- 4:30pm** **Depart**

TSST Two-Day Conference - Day Two

- 8:45am** **Refreshments on arrival** Venue: K1-5
- 9:00am** **Workshop 3**
 Mathematics : **M2ii** or **M3i** in K1-5 or K1-4
 Physics : **P3** in K117
- 10:40am** **Break** Venue: Bailey Hall
- 11:00am** **Workshop 4**
 Using ICT and professional organisations to support teaching in maths and physics
 Mathematics : **M4** in K1-5
 Physics : **P4** in K117
- 12:00pm** **Lunch** Venue: Bailey Hall
- 1:00pm** **Workshop 5**
 Mathematics : **M5i** or **M5ii** in K1-5 or in K1-4
 Physic : **P5** in K117
- 2:30pm** **Break** Venue: Bailey Hall
- 2:45pm** **Revisit Subject Audit / Prepare for Twilights**
 This session is designed to give reflection time and see if you find you can approach the original audit with more confidence. In discussion with subject tutors you will negotiate the content for the half-day sessions and book in to the relevant workshops.
- 4:15pm** **Plenary/Refreshments/Depart** Venue: K1-5
- 4:30pm** **Depart**

Lesson Observation Sheet Example

Date	Topic	KS
How well is the topic introduced and developed?		
What does the teacher do?		
What do the students do?		
What are the key strengths of the approach?		
What are the weaknesses of the approach?		



Teacher Subject Specialism Training



Heathfield Community School
School Road, Monkton Heathfield, Taunton, Somerset, TA2 8PD
Tel: 01823 428918 :: tauntonteachingalliance.co.uk



The Blue School

Kennion Road, Wells, Somerset, BA5 2NR
Tel: 01749 678799 :: theblueschoolwells.co.uk



Department
for Education

This Course Handbook may be revised as new information becomes available.
Designed and written by Rachael Fraser and updated for 2019-20 by Mark Williams.