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**TSST COURSE AUDIT FORM**

**This form is designed to allow community based panels of teachers to evaluate each other's course, facilitated by the Institute of Physics.**

**Courses which meet the required standard will be deemed to have received IOP-enabled community approval.**

**Evaluators will be primarily looking at consistency between course objectives/outcomes and mode of delivery. The audit form is designed to test the coherence of the course as described. Individual courses may vary in length and it is for individual participants to decide which advertised length suits their needs best.**

**However, based on community feedback, it was felt that it would be helpful to provide some guidance as to specific aspects. Most specific recommendations are given in the Notes columns. In addition it was felt that a TSST course securing IOP approval would normally be expected to take 30-50 hours to complete, excluding unmonitored independent learning time. Please note that a course submitted for auditing will not be penalised if it does not meet a stated guideline. However, the approval panel will expect to see some justification.**

**Institute of Physics will publish details of all community approved courses on the IOP website.**

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| **Name of lead school** | Comberton Village College |
| **Lead contact** | Mark Soames |
| **Date submitted** | September 2018 |

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| **Course summary** | **Notes** |
| We run a popular ten-day course throughout the year, led by Alan Denton. The full course is for any teachers wishing to be more confident and skilled at teaching physics at KS3, KS4 and KS5. In the first seven days, we look primarily at KS3/KS4 content (36 hours face-to-face time). In June, we have three further optional days (18 hours face-to-face time) to cover more advanced content, suitable for the single science GCSE or sixth-form; this also paves the way for a smoother transition for students going from GCSE to KS5. The content is responsive to the teachers’ requirements, but covers: force and acceleration, motion, electricity and magnetism, waves, radioactivity, energy, heat and temperature, earth and space. The subject knowledge will be complemented by the teaching of the subject skills, including mathematical and practical requirements.To improve sustainability students are given full access to:- all materials (worksheets, PowerPoints, card-sorts, etc.) used on the course- a bespoke illustrated 220-page course commentary- gap extension tasks with online video answers. | Short description of the course (e.g. objectives and expected outcomes) |

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|   | **Subject area (indicate number of hours)** |
| **Mode of delivery** | Energy\* | Motion & Forces | Waves | Electricity & electromagnetism | Matter & Space | Other, if any, specified below: |
| Face to Face (Presentations, lectures, guided group tutorial work with tutor present) | 1 | 3 / 2 | 2 / 2 | 3/ 2 | 5 / 1 |    |
| Practical (Hands on use of apparatus working individually or small groups. Observation of demonstrations is not deemed to be practical work) |  1 | 6 / 4 | 3 / 2 | 7 / 4 |  5 / 1 |    |
| Coaching/ Mentoring (One to one or small group sessions involving coaching, mentoring or allied techniques led by an experienced practitioner.) |   |   |   |   |   |  Participants (particularly returners) may ask to spend some time in the physics department.  |
| Monitored independent learning (e.g. online tutorial work) |   |  5 + | 2 +  | 5 +  | 3 +  | Note: the independent learning is not mandatory, but participants must complete it if they want full certification at the end.  |
| Other modes (please specify below) |   |   |   |   |   |    |
| **First seven days:** face-to-facehome learning**First seven days:** face-to-facehome learning**Total:** face-to-facehome learning | 2**2** | 9461**14****5** | 5141**9****2** | 10362**15****5** | 10221**12****3** | **First seven days**: 36 hours face-to-face12 hours supported learning**Extension three days**: 18 hours face-to-face3 hours supported learning**Total**: 54 hours face-to-face15+ hours supported learning |

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| **Please provide further *brief* detail on the following aspects of the course** | **Notes** |
| **Practical Work** | Specify what nature is – e.g. embedded in related session/standalone/skills focussed, work in pairs/groups. Also include Health and Safety measures in place.  |
| Throughout the full course participants will undertake over 200 distinct activities, and the course is structured around these. Most of these are ‘classical’ physics experiments, but there are scores of other hands-on activities, such as labelling force diagrams, or a terminal velocity card-sort. A full-range of grouping learners is used, with participants sometimes completing activities individually, in pairs, groups of three or four, and occasionally as a demo.Participants will undertake all ‘required practicals’ from the 2016 GCSE specifications from OCR, AQA and Edexcel. The focus during the experiments will change, depending on the experiment. For example:- when participants plot V-I graphs for ohmic/non-ohmic resistors they will develop their table-drawing and graph-drawing skills- during the Specific Heat Capacity experiment participants also learn about how it can be effectively differentiated.Where it is particularly relevant (for example, using the Van de Graaff generator, laser pens, etc.), participants are redirected to CLEAPSS for a full health and safety assessment.The illustrated *commentary* that accompanies the course also includes descriptions of all of the practical activities. |
| **Subject knowledge** | Please give more details on methodology of subject knowledge (e.g. lecture, practice questions, peer tutorial, diagnostic testing) |
| Where appropriate, participants will improve their subject knowledge by doing the same activities that they will be able to use with students, for example by setting up Melde’s apparatus and using it to calculate the wave-speed by measuring the wavelength and frequency of the waves. Where material is taught by ‘direct teaching’, participants are given full access to presentations used, so that they can use them in their own teaching.Before most topics participants will undertake some form of diagnostic testing: EPSE questions, Next-Time questions, National Strategies true-false sheets, or similar; or they may be given questions based upon practical demonstrations (for example, an Atwood machine).\* Note, energy is not taught as a standalone topic in the main, but when it fits into other content. For example, specific heat capacity is taught alongside the states of matter, electrical power is taught alongside electricity. |
| **Pedagogical Content Knowledge** | Give further details on methodology used (e.g. pupils, misconceptions/naïve conceptions) |
| Pupil (and teacher) alternative conceptions form the bedrock of the course. Before each topic the well-known alternative conceptions are either listed, discussed, or participants are tested against them. At the end of the topic participants are able to see how the practical activities can be used to Elicit, Confront and Resolve the alternative conceptions. |
| **Research Informed Practice** | How do you propose to embed the results of research informed best practice (e.g. access to research articles)  |
| The course is designed to put conceptual understanding at the heart of each lesson, using techniques suggested by Peer Instruction by Eric Mazur and Five Easy Lessons by Randall Knight. Individual approaches to teach topics are generally informed by IOP or National Strategies best practice.Throughout the course participants are given bibliographic links to materials that have informed the course, or that can extend their understanding. |
| **Handling of Mathematical Requirements** | e.g. handling of graphical techniques, proportionality, errors |
| Generally mathematical content is taught at the same time as some content, for example using a calculator is taught when we are solving momentum questions. The exception to this is memorising and rearranging equations which is taught as a standalone topic.The following mathematical techniques are covered at least once at some point: rearranging equations (basic and advanced), memorising equations, using a calculator, decimal places, significant figures, converting between dimensions (for example $m^{3}$ and $mm^{3}$), estimating errors, drawing graphs, interpreting graphs, proportional reasoning, standard form, exponentials and logarithms, trigonometry. |
| **Participant Assessment Arrangements** | Use of various modes e.g. lesson observation, portfolio, diagnostic testing, etc.  |
| Before and during sessions participants are continually being assessed for learning. A range of techniques is used including diagnostic testing, peer assessment, mini-whiteboards, peer teaching.At the end of every day’s session participants are given a list of gap extension tasks, and it is expected that participants will pick and choose suitable assessments for themselves. The range of materials linked to include conceptual tests, simple numerical problems, or advanced written tests. The advanced tests have been created from a specially curated selection past-paper AQA A level questions, designed to stretch and challenge participants, and to give them confidence to teach high-attaining KS4 or KS5 students. These tests have online worked-answer videos accompanying them, so that participants can be supported whilst studying these challenging questions. |
| **Quality Assurance Mechanisms** | Mention use of any form of quality assurance – use of validated material, external validation or accreditation. Please include qualifications of staff.  |
| The course is an evolution of previous non-specialist and TSST courses that have been used with hundreds previous participants. The new written materials have been peer-assessed by two Heads of Physics. Some of the sessions are delivered by multiple trainers, therefore supporting and assessing one another. Alan Denton is the lead tutor for the course, and he is a well-known physics trainer in East Anglia. He has an MPhys from Oxford, and has been teaching for 11 years, and has been full-time teacher training for 5 years. |
| **Individualisation for Participants** | Mention any separate routes possible, and how those routes are decided. |
| During individual sessions, participants sometimes get a chance to decide what activities to undertake, how much time to spend on each activity, or what the success criteria is. However, the overall course is fairly linear for the first seven days.The largest personalisation comes from the range of problems given in the *gap extension tasks*, listed in ‘Participant Assessment Arrangements’ section, above.Some participants will complete the final three days of the course, designed to extend the high-end; some participants will not (for example if they are only expected to teach KS3). In the past we have had about 60% complete the full course, with 40% opting to only complete the first seven days. |
| **Course Evaluation Mechanism** | Mention evaluation by participants, or external body, if you intend to publish survey results etc.  |
| This is a direct evolution of a course that has been used in some form or another for years, and the work that is currently being done to it (for example the new gap extension tasks) comes directly from feedback received in previous years.Participants are expected to contribute to the evaluations* Ongoing feedback. This is available after day 2 of the course: participants can complete an online form giving general feedback about the level of challenge of the course. Participants are asked again after day 6 to complete an online form.
* Formal evaluation. At the end of the course all participants are asked to write an evaluation of the course with the deliberately open questions: What went well? What could we improve?
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| **Lifelong Learning of Participants** | The TSST courses are inevitably of limited duration. Explain how participants are enabled to acquire the skills for autonomous learning beyond the course itself.  |
| Ensuring the longevity of the learning has been the priority this year in the course, and consequently a lot of work has gone into developing the written materials:* Everyone has the illustrated commentary that accompanies the course, which should be the jumping-off point for all participants before they next start teaching a topic. Participants are encouraged to add their own notes at home to the commentaries after every session.
* Participants will continue to have access to all of the resources online, which are frequently updated and improved.
* Participants are given a reading list, which they can use to inform and extend their understanding, including books that helped form the structure of the course.
* Participants have gap extension tasks following every session that they can use to study at home, including videos of relevant problems being solved to enable flipped learning.
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