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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** | Carmel College Darlington |
| **Lead contact** | Sara Crawshaw ([scrawshaw@carmel.org.uk)](mailto:scrawshaw@carmel.org.uk)) or David Bailey ([dbailey@carmel.org.uk)](mailto:dbailey@carmel.org.uk)) |
| **Date submitted** | September 2018 |

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| Course summary | **Notes** |
| **Intended Learning Outcomes:**  • increase your understanding and confidence in the teaching of physics at 11-16  • develop an understanding of common misconceptions and how these can be addressed  • employ the effective use of scientific models relevant to the teaching of physics  • rehearse opportunities for practical work  • draw on a wider range of techniques, strategies and pedagogies to improve your students’ knowledge and understanding of core concepts  • understand more about the researched benefits of active learning approaches  • teach the mathematical aspects of physics with greater confidence  • broaden the scope, relevance and coherence of your existing schemes of work  • design, deliver and evaluate learning episodes across the secondary physics curriculum  **Structure**  The course consists of 8 face-to-face sessions and 8 gap/post course tasks. The first and last sessions are full days (6 hrs F2F time), the 6 sessions in the middle are all 4 hours in length. Each session is supported by approximately 1 hour pre-session reading and 1 hour post-session reading largely based on the SPT materials. Gap tasks focus on how the developed subject and pedagogical content knowledge are applied in a classroom situation. Participants are expected to work with an in-school buddy to support the reflective elements of this task. Reflective gap tasks are submitted on an online learning platform and completion of this is monitored. Please note that a second cohort runs as 6 full days of CPD, with the sessions combined. The contents, teaching time, online learning and outcomes of the second cohort are the same as the 8-instance programme.  **Content**  1. Why and how to teach Physics / Forces pt 1: Pedagogical approaches for teaching forces, common forces and a common language to describe them, forces acting on an object which is not moving, the importance of labelled free-body force diagrams, using speed as an opportunity to introduce proportional reasoning.  2. Forces pt 2: Resultant force causing a change in motion, the relationship between force, mass and acceleration, distinguish between ‘third law pairs’ of forces and balanced forces, motion of a falling object by considering the forces acting upon it  3. Energy (incl thermal transfer): Scientific models to describe physical concepts, describing physical processes in terms of energy stores and transfers, the law of conservation of energy, energy transfers in a physical system, the concept of work, the difference between heat, thermal energy and temperature, evaluate practical activities to show heat transfer by conduction, convection and radiation;  4. Electricity: Student misconceptions in electricity, models for teaching electrical circuits, charging by friction and static charge, the Van der Graaff generator, and the behaviour of charges;  5. Ionising radiation: Myths and misconceptions about radioactivity, models for the decay of a radioactive material; safe practice and confidence building in the use of radioactive sources  6. Waves: Alternative models for representing waves effects and wave properties, active learning approaches linked to the electromagnetic spectrum, practical activities to explore the properties of light;  7. Space and Astronomy: Student misconceptions about the structure of solar system and 'space objects' birth life and death of stars, red shift and the BIg Bang.  8. Electromagnetism, review and presentation: Establishing the link between electricity and magnetism, describe the creation of an electro-motive force (emf), practice a wide range of practical activities linked to electromagnetism, review and demonstrate learning journey throughout the programme. | 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:   Exploration of why we teach physics and the pedagogy of teaching physics effectively | | Face to Face (Presentations, lectures, guided group tutorial work with tutor present) | 2 | 4 | 2 | 3 | 4 | 4 | | Practical (Hands on use of apparatus working individually or small groups. Observation of demonstrations is not deemed to be practical work) | 2 | 3 | 2 | 3 | 2 | 0 | | Coaching/ Mentoring (One to one or small group sessions involving coaching, mentoring or allied techniques led by an experienced practitioner.) | 0 | 0 | 0 | 0 | 0 | 0 | | Monitored independent learning (e.g. online tutorial work) | 1 | 2 | 1 | 2 | 2 | 2 | | Other modes (please specify below)  Peer coaching, the use of an in-school buddy or another participant from the course. | 2 | 2 | 2 | 2 | 2 | 0 | | Other modes (please specify below)  Unmonitored independent learning – access to materials to support the sessions from the course | 2 | 2 | 2 | 2 | 2 | 2 | | **Total hours = 63** | 9 | 13 | 9 | 12 | 12 | 8 |  |  |  | | --- | --- | | **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. | | Effective practical work is emphasised throughout the course as a key approach to teaching physics and is embedded in each session. This includes evidence-based approaches and advice from Getting Practical. Each session contains a significant proportion of practical activities and online and gap tasks direct participants to these approaches. The sessions include a variety of group, pair and individual work and involve a range of practicals that develop concepts as well as some that focus on developing practical skills in participants (and then in turn their pupils). The learning of a topic includes practical approaches related to that topic. The rationale for practical work emphasis is also explored in the first session. All practical activities are risk assessed and appropriate guidance on risk assessment and health and safety is shared with participants. | | **Subject knowledge** | Please give more details on methodology of subject knowledge (e.g. lecture, practice questions, peer tutorial, diagnostic testing) | | Subject knowledge is developed through pre and post session reading, that includes use of selected nuggets from IOP SPT materials. Face to face sessions develop subject knowledge and understanding through discussion, practical work, AfL tasks before, during and after sessions. Subject knowledge development will be assessed by using pre and post session/course testing and we will endeavour to gather this information in a way that can be shared with session facilitators (subject to permission from participants) to aid session planning. Handling of subject knowledge follows guidelines from IOP and other relevant bodies. | | **Pedagogical Content Knowledge** | Give further details on methodology used (e.g. pupils, misconceptions/naïve conceptions) | | All of our face to face sessions will allow participants to experience what it is like for the young people they teach. This will include them providing explanations to phenomena, which will be explored further through discussion. They will experience and be taught how to use approaches such as cognitive conflict and metacognitive strategies to develop these ideas further. The use of online testing and AfL during sessions will help facilitators identify pre and misconceptions that are unhelpful and give participants chance to test these fully and revisit these pre and misconceptions, promoting change to a more helpful set of ideas. Handling of PCK is evidence based and follows guidelines from IOP and other relevant bodies. | | **Research Informed Practice** | How do you propose to embed the results of research informed best practice (e.g. access to research articles) | | The course will draw on a range of materials and approaches both to support their own development and their pedagogical practice. In particular, in relation to high-value subject specific pedagogies and assessment strategies, metacognitive strategies, co-operative learning and peer coaching These are explicitly stated during the first session of the course, which includes access to a range of summarised educational research findings, such as the work by John Hattie, IoP Girls in Physics resources, the work of Robin MIllar and Phil Scott. Findings of Ofsted in science and science specific approaches will be referred to throughout. | | **Handling of Mathematical Requirements** | e.g. handling of graphical techniques, proportionality, errors | | The emphasis throughout the course will be 'maths last' and will take participants through the idea of proportional thinking first. A range of strategies to support effective use of maths, such as 'feature assessment' of graphs and calculations will be explored with participants. Alternative ways of developing graph work such as 'living graphs' will be used too. Significant figures also included. These skills are built gradually through the course, increasing in demand for participants in later sessions. | | **Participant Assessment Arrangements** | Use of various modes e.g. lesson observation, portfolio, diagnostic testing, etc. | | Participants are required to submit a reflective piece to an online portal in between each session. These are also required to provide a summative presentation of their learning and the impact of this at the end of the programme. This includes a written summary. Diagnostic assessment is written in to each of the modules using the IOP online testing materials. A portfolio of the impact of the work is built up during the course and participants use this to apply for external accreditation. | | **Quality Assurance Mechanisms** | Mention use of any form of quality assurance – use of validated material, external validation or accreditation. Please include qualifications of staff. | | Each face to face session is led by a STEM Learning Network (DYHNE) approved presenter or an IOP TLC. Each of these has a minimum of 3 years consultancy/course leadership experience at a regional or national level and many have much more. Each has a very strong track record of designing/delivering similar sessions/programmes in terms of high ratings from participants and evidence of impact on practice/pupils. All presenters will have over 50% of a degree level qualification in Physics and some will have M-level or PhD level qualifications too. Participant evaluations are monitored by programme leader and by HEI. Where teacher or novice presenters are used, these will work alongside a lead consultant. The material used will be based on materials that have been shown to be effective when used for similar purposes and will be developed by Sheffield Institute of Education Centre for Science Education, STEM Learning Network and IOP. Planning is shared across all facilitators to ensure continuity for participants. | | **Individualisation for Participants** | Mention any separate routes possible, and how those routes are decided. | | The programme outlined in this document describes the minimum requirements for completion of the programme. In addition, participants can use the approaches to develop an action research approach, gathering evidence of impact using the resources provided. They can also take this further by opting for an additional 30 credit M-level module. In addition, extra pre-session reading is in place to support participants and extra post-session reading is in place to consolidate and challenge participants further. Routes are decided by participants (in conjunction with their line manager in school) with guidance from facilitators, programme leaders. | | **Course Evaluation Mechanism** | Mention evaluation by participants, or external body, if you intend to publish survey results etc. | | Each session is evaluated by participants using the STEM Learning Network impact toolkit. These are overseen by the TSA and HEI. Participants will be encouraged to apply for external accreditation of their learning via the Science Learning Network 'Effective STEM Teacher' status (or higher). It could also be used support an application for CSciTeach or other similar accreditation. | | **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. | | During the course, we will focus on the skill development in participants to allow them to continue their development. This will include the development of reflective practice, use of buddies/peer coaches to support their development and use of action research. We will also highlight bodies of information that will help them to continue to develop their subject knowledge, for example the SPT materials from IOP. We will also provide access to online materials for participants for a minimum of 1 year past their completion of the programme. | |  |  |  |  |  |  |  |  |