Communicating Physics (CP)

1. General information

CP is an optional course available to
- second year BSc (F300) and MSci (F303) physics students
- second year YiE students that are not required to take language course (documentation required to prove this)
- all third year students (though not visiting Erasmus students)
- fourth year students that have not taken a humanities option in their third year
- fourth year returning YiE students

It provides the opportunity to gain first-hand experience in the education of young physicists in a school environment and learn transferable skills in demand by employers in many occupations.

It is a prerequisite for any second year student wishing to transfer to the Physics with Science Education (PSE) degree.

The majority of CP runs in term 2, with selection taking place in term 3 of the previous year and some training and administrative work necessary in term 1.

Students have the opportunity to visit the school and teacher to which they have been assigned during term 1. During term 2 each student will spend half a day a week in the school for the duration of the course. During term 2 there are 2 tutorials which all students must attend. The course leader will provides a weekly office hour in term 2. Information on assessment can be found below.

2. Aims of the Course and Learning Outcomes

The aims are for the student:
- to develop a range of communication and teaching skills appropriate to a particular Key Stage;
- to act as a role model to pupils;
- to gain confidence in communicating physics;
- to learn how to develop projects and teaching methods suitable for pupils at school.

On completing the course, students should have achieved the following learning outcomes:
- understand the needs of the individual pupils;
- answer questions on physics with the appropriate vocabulary at the selected level up to A-level;
- assess and devise appropriate ways to communicate principles and concepts;
- prepare lesson plans and teaching materials;
- report on what they have learnt.
3. Selection procedure and training

Students who wish to take CP are required to submit an application form and formally apply. Unlike other modules, it is not possible to enrol on CP without formally applying and subsequently being accepted.

Application forms will be available at the options talks and options fair. The application deadline is usually in May. Once applications have been considered, selected students are then invited to a brief interview (usually held in June). As part of the interview, students are required to give a short presentation (about 10 minutes) on an elementary topic in physics especially targeting later year secondary school audience, followed by questions. The selection procedure will assess each student’s suitability for the course based upon a profile that includes enthusiasm, academic ability, ability to communicate, willingness to operate in a school environment and their potential as an ambassador of physics.

Late applications are only ever considered in exceptional circumstances and when certified mitigation can be provided to show that mitigating circumstances have prevented the student from applying for the course by the published deadline. Late applications can only be considered if there is enough time for a DBS check to be processed prior to the commencement of the course.

Selected students are required to attend a one day training event (which normally takes place at the start of term 1), during which they learn about the national educational system, its requirements, nomenclature and potential problem areas as well as information about personal conduct and responsibilities. It will include a session on Child Protection.

Each student will be required to pass an enhanced Disclosure Barring Service (DBS) check in order to be able to work in their assigned school. Students are required to complete the form and attend a brief appointment to submit the form and necessary ID documents.

Clearly, a one-day course cannot offer detailed instruction in teaching theory or methods. It should be noted that this course is not designed to act in any way as a teacher-training course.

4. School Visits

The day and time of the weekly placement will be decided on an individual basis to match the timetable of each student and teacher. Students are required to spend a minimum of 24 hours in school. Most of these working visits should occur during the school’s spring or summer terms, the precise number depending upon the school calendar and other circumstances. It may well be in the student’s interests to make one or more visits outside the period of the college’s term. If the host teacher permits, it is possible to start visits in December.

The student’s role in the classroom should progress from initial observation to constructive support of the teacher, although the level of student/pupil interaction must be agreed between student and teacher, and should at all times be under the teacher’s direction.

The initial periods of observation should be used to study the teacher’s interaction with pupils, and the approaches taken to the introduction and development of physics topics and concepts. If possible, specific
situations should be discussed with the teacher. Students should expect to become more involved, possibly working with small groups of pupils on specific topics or activities, or in setting up practical experiments. As students gain experience and confidence, they may be asked to take a more responsible role such as taking all or part of a lesson, or in helping in some other way such as with a Physics Club project, or with a talk about undergraduate experiences, or some other educational session that goes outside the regular syllabus.

Each student will be required to keep a journal of his or her experiences in the school. It is not expected that the teacher will need to read this journal, but it will be used by the student as a basis for the report that will be written as part of the course assessment. College staff will need evidence that this journal is being kept and it is expected to be the basis for tutorial discussion.

An integral part of the placement is the teaching project. The choice of the project should be made following discussion with the teacher and with the course coordinators. It should be targeted at a specific physics concept or activity for which there is a perceived need in the school. The project may be a novel method of presentation appropriate to the topic or a pupil activity, and will almost certainly involve the preparation of special materials. If at all possible it should be used in the school with a class or a small group of pupils before the end of the course. The nature of the project and materials must be discussed fully with the teacher, particularly if it is to be used in the school. If equipment is being used, then safety issues must be addressed and the teacher’s advice should be carefully followed.

5. Assessment

CP summative assessment is in four parts:

1. A journal of teaching activity (20%)
2. An end of course report detailing the teaching project (40%)
3. A 15-minute presentation by the student on his/her experience in the classroom, to include an account of the teaching project and the materials prepared (25%).
4. A teacher assessment (15%)

The overall aim is to assess your ability to observe and analyse, to apply your physics knowledge in ways relevant to your environment, and to do this in an enthusiastic and helpful manner. It is not expected that you should suddenly become an expert teacher and this will not be directly assessed.

The elements to be included in the teaching journal:

The journal should be an introspective day-to-day record of you teaching placement. It is a factual, though personal, warts-and-all account of your experiences, normally handwritten for future reference. Though it is written as a diary (i.e. as if it is for your own use) it will be read and assessed by your course tutor. The tutors will not physically mark the journal with red pen and it will be returned to you as submitted.

At the bare minimum the journal should include:
1. An introduction with:
   - a general description of the school, the teachers and the pupils encountered during your placement,
   - a description of your position and how you contributed,
   - descriptions of any other activities you undertook,
   - a critical analysis of your experiences in the classroom (e.g. situations to avoid, teaching strategies that work, pivotal tasks that help ensure success).

2. A chronological account, starting with a description of your preliminary visit, and going on to give details of the lessons at which you assisted, which should include critical descriptions of lessons (or part lessons), with details of how they were planned, the physics you dealt with, how they were received, and what the feedback indicated about how the physics was understood.

3. An outro with a comprehensive summary containing concluding remarks on your experiences and thoughts of your time at the school.

The elements to be included in the end of course report on your project:
- a description of the teaching project,
- details of how and why the topic of the project was selected,
- a brief taster of the project teaching method and of materials produced,
- the rationale of the choice of teaching method and any materials produced,
- a report on how it was received (if it was possible to use it with pupils),
- a critical discussion of its worth, the conclusions to be drawn and how it could be improved.

5.1 Further details of the end of course report on your project

The written report should be based on your teaching project and be around 4,000 words or the equivalent in figures; it should not be a chronological account of your time in the school as this is covered by the journal.

The report will be marked according to the following criteria:

- presentation 10%
- selectivity 10%
- evidence of understanding of the teacher/pupil interaction 20%
- evidence of understanding of pupils’ problems with the subject 20%
- evidence of your knowledge of the contexts within which the physics needs to be presented 20%
- the quality of your critical analysis. 20%

The deadline for submission of the report will normally be shortly after the Easter recess.
5.2 Oral presentation

The duration of the presentation should be 15 minutes to include questions. Oral assessments normally take place during the last week of term 2. Students should be expected to present to the course leader, the course associate, the course administrator and to the other undergraduates taking this course. Marks are evenly weighted between delivery and content, and includes response to questions and involvement in discussion following the talk.

6. Marking criteria

First class: extremely clear and accurate description of the school, the role in the classroom and the teaching methods used; shows deep understanding of the needs of the pupils, and demonstrates an ability to answer pupils’ questions clearly and readily; can explain the connection between demonstrations and examples and the concepts of physics; shows that the lesson plans and teaching materials will hold the interest and the enthusiasm of the pupils and increase their understanding; thorough analysis of any particular successes and any failures to communicate; original and thought-provoking description of the teaching project, showing clearly the relation between the project and the physics concepts to be illustrated; demonstrates how the success of the project as a whole depends on the various parts; shows a high level of self-analysis; shows a good ability to evaluate relevant literature. The written report has a coherent structure, with no or very minor errors of spelling, punctuation and grammar. The oral presentation demonstrates excellent use of presentation aids and materials; is audible and retains the interest of the audience; keeps to time (allowing for a few questions).

Upper second class: clear and accurate description of the school, the role in the classroom and the teaching methods used; shows clear understanding of the needs of the pupils, and demonstrates an ability to answer pupils’ questions clearly and with appropriate vocabulary; demonstrates knowledge of the connection between demonstrations or examples and the concepts of physics; shows that the lesson plans and teaching materials will keep the interest of the pupils and help them learn; explicit analysis of any particular successes and any failures to communicate; clear and interesting description of the teaching project, showing the relation between the project and the physical concepts to be illustrated; describes how the success of the project as a whole depends on the various parts; shows a good level of self-analysis and an ability to evaluate relevant literature. The written report has a coherent structure, with few errors of spelling, punctuation and grammar. The oral presentation demonstrates good use of presentation aids and materials; always audible; keeps to time (allowing for a few questions).

Lower second class: a description of the school, the role in the classroom and the teaching methods used; shows understanding of the needs of the pupils, and demonstrates an ability to answer pupils’ questions with appropriate vocabulary; demonstrates some knowledge of the connection between demonstrations or examples and the concepts of physics; shows that some of the pupils learn from the use of the lesson plans and teaching materials; some discussion of any successes and any failures to communicate; a clear description of the teaching project, showing some connection between the project and the physical concepts to be illustrated; a description of some of the aspects of the project; shows some attempt at self-
analysis and an awareness of relevant literature. The written report has a recognizable structure, with some errors of spelling, punctuation and grammar. The oral presentation demonstrates satisfactory use of presentation aids and materials; generally audible; keeps roughly to time (allowing for a few questions).

Third class: a partial description of the school, the role in the classroom and the teaching methods used; shows limited understanding of the needs of the pupils, and sometimes is able to answer pupils’ questions with appropriate vocabulary; demonstrates little knowledge of the connection between demonstrations or examples and the concepts of physics; the lesson plans and teaching materials prepared are little help to the pupil’s learning; little discussion of any successes and failures to communicate; an incomplete description of the teaching project, showing very little connection between the project and the physical concepts to be illustrated; a confused or very partial description of the aspects of the project shows hardly any attempt at self-analysis or awareness of relevant literature. The written report is disorganized, with frequent errors of spelling, punctuation and grammar. There is generally an unsatisfactory use of presentation aids and materials within the oral presentation, which is barely audible; does not keep to time.

Fail: muddled or incomplete description of the school, the role in the classroom and the teaching methods used; shows little or no understanding of the needs of the pupils, and finds it difficult to answer pupils’ questions appropriately; is unable to explain the relation between demonstrations or examples and the concepts of physics; the lesson plans and teaching materials are inappropriate to the pupils and their stage of development; does not attempt to analyze the failures; no analysis of the degree of the student’s success; failure to address the central ideas of the teaching project and poor description of the physical concepts involved; no description of the integration of the parts of the project. The written report is disorganized or fragmentary, with many errors of spelling, punctuation and grammar. There is poor use of presentation aids and materials in the oral presentation; poor audibility; misjudging the time needed to give the presentation.