

NECT
FET PHYSICAL SCIENCES
TERMS 1&2 2019
TRAINER'S GUIDE

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Workshop Objectives

By the end of this training session, participants will:

1. Understand the structure and contents of the NECT Physical Sciences Learning Programmes
2. Understand that the Learning Programme is CAPS compliant
3. Have improved Term 1 and 2 pedagogical content knowledge – particularly around the following topics:
 - Grade 10 – Electric Circuits
 - Grade 11- Atomic Combinations and Molecular Structure
 - Grade 12 - Momentum and Impulse
 - Grade 12 – Organic Chemistry
 - Grade 12- Acids and Bases

Before the Training

1. **Be prepared to model excellence in training and facilitation.**
2. Prepare the venue as best as possible, to ensure that participants are comfortable, that they can all see the presenter, and that the setup is conducive for discussion.
3. Be prepared to show the slide show and videos. Deal with technical issues before the training.
4. Be fully prepared, have all your materials laid out in an orderly fashion.
5. Display an 'agenda' – a chart listing every activity that will be completed, together with the planned time allocation.
6. At the end of every activity, reflect on the objectives and agenda, and tick off what has been achieved that day.
7. **DISPLAY ALL RELEVANT RESOURCE THAT HAVE BEEN PRODUCED BY THE NECT FOR CLASSROOMS, I.E.: POSTERS; RESOURCE PACK ITEMS; ETC. (Make an effort to properly prepare these items to present them in a way that models good practice and will protect resources from wear and tear.)**

Tone of the Training

1. Remember that you are training TEACHERS. Please ensure that you address participants correctly.
2. Be polite, patient and RESPECTFUL always. This is possibly the most important aspect of being a trainer.
 - Participants will generally be open to you and to the programme if they are treated with respect.
 - Arrive early and be prepared – for every session!
 - Greet participants by name whenever possible and ensure that names are pronounced correctly.
 - Do not be dismissive of a participant's concern. If you do not have time, or if you know that the issue will be addressed later in the session, create a PARKING LOT. Write down the query and stick it in the parking lot to be addressed later.
 - Do not be dismissive of participants' knowledge, skills and experience. As much as possible, allow participants to contribute to discussions.
3. Remember that humour is always a good strategy – try to add some fun to the training, in a way that does not make anyone uncomfortable.
4. Please remember to use icebreakers and energisers when required – it is important to keep the mood and energy of the training positive.

NECT

GRADE 10-12 PHYSICAL SCIENCES

Term 1&2 Training January 2019

	TIME	ACTIVITY	TRAINER WORKSHOP	TEACHER WORKSHOP
1	20 minutes	Welcome, introductions and ground rules		
2	30 minutes	NECT Reflection		
3	15 minutes	Orientation to the new layout of the learning programme		
4	2 hours	Topic 1: Grade 12 – Momentum and Impulse		
5	1 hour	Preparation of Demonstration Lessons		
6	1 hour	Topic 2: Grade 10 – Electric Circuits		
7	1 hour	Topic 3: Grade 11 – Atomic Combinations and Molecular Structure		
8	2 hours	Topic 4: Grade 12- Acids and Bases		
9	30 minutes	Topic 5: Grade 12- Organic Chemistry		
10	30 minutes	Topic 6: Grade 12- Organic Chemistry-Esterification Practical		
11	3 hours	Execution of Demonstration Lessons		
12	30 minutes	Evaluation and Closure		

1	20 minutes	WELCOME INTRODUCTIONS SETTING GROUND RULES	Facilitator:	What you will need: Flipchart paper Koki Training Handout
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1. Welcome the participants into the room.
2. Settle participants in their places.
3. Introduce yourself.
4. Hand out the programme for the 3 days, and briefly go through it as well as the Training Handout
5. Set ground rules for the event.
6. Use an ice breaker to get participants to introduce themselves/catch up on news.
7. Ask participants to please remember all ground rules.

2	30 minutes	NECT- PROGRESS THUS FAR	Facilitator:	What you will need: Training Handout Video clip: TED Talk
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1. Recap the aims of the NECT.
2. Get participants to fill in the form in the training handout on the success of the Learning Programme thus far, as well as their expectations and commitment to this training session. Allow time for brief feedback.
3. Show TED Talk DVD
4. Thank participants for their comments and ask them to please not forget about this – **we need bold, brave leaders, who are willing to start movements to teach our children to read and to think – in all subjects!**

3	30 minutes	ORIENTATION TO THE LEARNING PROGRAMME	Facilitator:	What you will need: <ul style="list-style-type: none"> • Content Booklet: Targeted Support • Resource Pack • Planner & Tracker • Practical Videos • Posters
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Introduction

- Settle the participants so that you have their attention
- Tell the participants that you are now going to re-orientate them to the Term 1&2 Learning Programme materials to familiarise them with the changes that have been made.

The Orientation Programme (The first part of the lesson plan booklets)

1. Ask participants to open their booklets.
2. Ask the participants to please not race ahead. You will give them time to explore the materials in detail during the next activity. Request that they follow your navigation step-by-step.
3. Next, work through the **Orientation** part of the booklet in the following manner:
 - a. Ask a participant to read a section aloud.
 - b. Ask participants to look at that feature in the content booklet or other resource.
 - c. Explain further or clarify if need be.
 - d. Be sure that participants understand **the purpose** and **the structure** of the programme clearly.
4. Note: When you get to the points about the **Planner & Tracker, the Resource Booklet, the Posters, the Practical Booklet, and the Practical Videos**, show these elements to the participants.

Closure

1. Ask participants if they have any questions for clarity.

4	2 hours	TOPIC 1: GRADE 12 – MOMENTUM AND IMPULSE	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 12 Term 1 Targeted Support Booklet • Grade 12 Term 1 Resource Pack • Grade 12 Term 1 Planner and Tracker • Calculators
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1. Refer to the Planner and Tracker and put this topic in context for the term. Show how to use the Planner and Tracker for planning.
2. Refer to Topic 2 in the Grade 12 Term 1 Targeted Support Booklet – Momentum and Impulse.
3. Discuss the sequential table to revise what prior knowledge learners will have with regards to Momentum and Impulse. This table also discusses briefly what has been covered in Grade 10 and 11 on this topic and it also looks at what material the topic is will cover in Grade 12.
4. Discuss the table of definitions and describe that the laws and definitions that are in bold and shaded are the ones that are examinable. The other definitions are vital for the understanding of the topic.
5. Refer to the breakdown of the topic and targeted support offered. It is important to state that it is not the purpose of the Targeted Support Booklet to cover the entire topic necessarily, but rather to focus on problem areas and highlight areas of misconception in this topic. Discuss the last column of the table and highlight the areas in this topic that the Targeted Support Booklet will cover.
6. Ask the participants, in their experience, what areas of misconception there are in this topic. List them on the board and encourage participants to write them down.
7. Explain that the Targeted Support Booklet now proceeds to work through the topic and that it is directed to the teacher. It gives advice on how to teach aspects of the topic and also highlights problem areas and areas of misconception.
8. The teacher should use the booklet to prepare lessons and wherever possible, use the worked examples to use as a teaching tool. Learners should be encouraged to copy down the question and the answers of worked example, to use as a reference whilst studying.
9. Select some examples to work through with participants and use these to illustrate how to use the Targeted Support Booklet.
10. Explain that at first, introductory level questions are given, to introduce a concept. Then, more challenging examples are given.

11. Use the Targeted Support Booklet to show how, at regular intervals, at the Checkpoints, questions are set from the Resource Pack, Worksheet Section for learners to do on their own.
12. Explain that, whilst the Worksheet in the Resource Pack is used in pieces throughout the topic, the Consolidation Exercise in the Resource Pack is used at the end of the topic. Its purpose is as to be a summative exercise at the end of the topic that is given to learners to attempt and mark on their own.
13. If time permits, select some questions from the consolidation exercise and break into small groups. Give each group a question to work on and feed back to the whole group after.

5	1 hour	Preparation of Demonstration lessons	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 10-12 Term 1&2: Targeted Support Booklets • Resource Packs • Planner and Trackers • Posters • Kokis • A1 sheets of paper • Pens • Rulers • Calculators • Prestik
<ol style="list-style-type: none"> 1. Explain to the participants that Demonstration Lessons are a vital tool for learning how to become better teachers. 2. The demonstrator needs to prepare the lesson topic according to CAPS and use the resources provided by the NECT. 3. The audience will learn new skills and ideas from watching the lessons. 4. Misconceptions will be addressed. 5. Almost all topics will be covered in unique and novel ways. 6. All participants will learn from the feedback. 7. This is a great learning exercise. 8. Divide participants into groups and give each group a topic from Term 1, for either Grade 10, 11 or 12. 9. The group must elect: <ul style="list-style-type: none"> • a scribe • a participant to check that the lesson is CAPS compliant • a participant to use the targeted Support Booklet • a participant to use the Resource Pack • a participant/s to demonstrate the lesson 10. The lessons must be UNIQUE, INTERESTING and ADDRESS A MISCONCEPTION. 11. Lessons must be 20 minutes MAXIMUM. 12. Hand out resources to participants. 				

6	1 hour	TOPIC 2: GRADE 10 – ELECTRIC CIRCUITS	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 10 Term 2 Targeted Support Booklet • Grade 10 Term 2 Resource Pack • Grade 10 Term 2 Planner and Tracker • Training Handout
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1. Refer to the Planner and Tracker and put this topic in context for the term.
2. Refer to Topic 16 in the Grade 10 Term 2 Targeted Support Booklet – Electric Circuits.
3. Discuss the sequential table to revise what prior knowledge learners will have with regards to Electric Circuits. This table also discusses briefly what has been covered in previous grades on this topic.
4. Discuss the table of definitions and describe that the laws and definitions that are in bold and shaded are the ones that are examinable. The other definitions are vital for the understanding of the topic.
5. Refer the breakdown of topic and targeted support offered. It is important to state that it is not the purpose of the Targeted Support Booklet to cover the entire topic necessarily, but rather to focus on problem areas and high areas of misconception in this topic. Discuss the last column of the table and highlight the areas in this topic that the Targeted Support Booklet will cover.
6. Ask the participants, in their experience, what areas of misconception there are in this topic. List them on the board and encourage participants to write them down.
7. Explain that the Targeted Support Booklet now proceeds to work through the topic and that it is directed to the teacher. It gives advice on how to teach aspects of the topic and highlights problem areas and areas of misconception. The teacher should use the booklet to prepare lessons and wherever possible, use the worked examples to use as a teaching tool. Learners should be encouraged to copy down the question and the answers of worked example, to use as a reference whilst studying.
8. Select some examples to work through with participants and use these to illustrate how to use the Targeted Support Booklet.
9. Explain that at first, introductory level questions are given, to introduce a concept. Then, more challenging examples are given.
10. Use the Targeted Support Booklet to show how, at regular intervals, at the Checkpoints, questions are set from the Resource Pack for learners to do on their own.

11. Explain that, whilst the Worksheet in the Resource Pack is used in pieces throughout the topic, the Consolidation Exercise in the Resource Pack is used at the end of the topic. Its purpose is to be used as a summative exercise at the end of the topic that is given to learners to attempt use for feedback.
12. Participants must work through the section on Electric Circuits in the Training Handout.
13. If time permits, select some questions from the consolidation exercise and break into small groups. Give each group a question to work on and feed back to the whole group after.

7	1 hour	TOPIC 3: GRADE 11 – ATOMIC COMBINATIONS AND MOLECULAR STRUCTURE	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 11 Term 1 Targeted Support Booklet • Grade 11 Term 1 Resource Pack • Grade 11 Term 1 Planner and Tracker • Training Handout
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1. Refer to the Planner and Tracker and put this topic in context for the term.
2. Refer to Topic 3 in the Grade 11 Term 1 Targeted Support Booklet – Atomic Combinations and Molecular Structure.
3. Discuss the sequential table to revise what prior knowledge learners will have with regards to Atomic Combinations and Molecular Structure. This table also discusses briefly what has been covered in previous grades on this topic.
4. Discuss the table of definitions and describe that the laws and definitions that are in bold and shaded are the ones that are examinable. The other definitions are vital for the understanding of the topic.
5. Refer the breakdown of topic and targeted support offered. It is important to state that it is not the purpose of the Targeted Support Booklet to cover the entire topic necessarily, but rather to focus on problem areas and high areas of misconception in this topic. Discuss the last column of the table and highlight the areas in this topic that the Targeted Support Booklet will cover.
6. Ask the participants, in their experience, what areas of misconception there are in this topic. List them on the board and encourage participants to write them down.
7. Explain that the Targeted Support Booklet now proceeds to work through the topic and that it is directed to the teacher. It gives advice on how to teach aspects of the topic and highlights problem areas and areas of misconception. The teacher should use the booklet to prepare lessons and wherever possible, use the worked examples to use as a teaching tool. Learners should be encouraged to copy down the question and the answers of worked example, to use as a reference whilst studying.
8. Select some examples to work through with participants and use these to illustrate how to use the Targeted Support Booklet.
9. Explain that at first, introductory level questions are given, to introduce a concept. Then, more challenging examples are given.
10. Use the Targeted Support Booklet to show how, at regular intervals, at the Checkpoints, questions are set from the Resource Pack for learners to do on their own.

11. Explain that, whilst the Worksheet in the Resource Pack is used in pieces throughout the topic, the Consolidation Exercise in the Resource Pack is used at the end of the topic. Its purpose is to be used as a summative exercise at the end of the topic that is given to learners to attempt use for feedback.
12. Complete the task in the Training Handout.
13. If time permits, select some questions from the consolidation exercise and break into small groups. Give each group a question to work on and feed back to the whole group after.

8	2 hours	TOPIC 4: GRADE 12 – ACIDS AND BASES	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 12 Term 2 Targeted Support Booklet • Grade 12 Term 2 Resource Pack • Grade 12 Term 2 Planner and Tracker • Training Handout
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1. Refer to the Planner and Tracker and put this topic in context for the term.
2. Refer to Topic 9 in the Grade 12 Term 2 Targeted Support Booklet – Acids and Bases.
3. Discuss the sequential table to revise what prior knowledge learners will have with regards to Acids and Bases. This table also discusses briefly what has been covered in previous grades on this topic.
4. Discuss the table of definitions and describe that the laws and definitions that are in bold and shaded are the ones that are examinable. The other definitions are vital for the understanding of the topic.
5. Refer the breakdown of topic and targeted support offered. It is important to state that it is not the purpose of the Targeted Support Booklet to cover the entire topic necessarily, but rather to focus on problem areas and high areas of misconception in this topic. Discuss the last column of the table and highlight the areas in this topic that the Targeted Support Booklet will cover.
6. Ask the participants, in their experience, what areas of misconception there are in this topic. List them on the board and encourage participants to write them down.
7. Explain that the Targeted Support Booklet now proceeds to work through the topic and that it is directed to the teacher. It gives advice on how to teach aspects of the topic and highlights problem areas and areas of misconception. The teacher should use the booklet to prepare lessons and wherever possible, use the worked examples to use as a teaching tool. Learners should be encouraged to copy down the question and the answers of worked example, to use as a reference whilst studying.
8. Select some examples to work through with participants and use these to illustrate how to use the Targeted Support Booklet.
9. Explain that at first, introductory level questions are given, to introduce a concept. Then, more challenging examples are given.
10. Use the Targeted Support Booklet to show how, at regular intervals, at the Checkpoints, questions are set from the Resource Pack for learners to do on their own.

11. Explain that, whilst the Worksheet in the Resource Pack is used in pieces throughout the topic, the Consolidation Exercise in the Resource Pack is used at the end of the topic. Its purpose is to be used as a summative exercise at the end of the topic that is given to learners to attempt use for feedback.
12. Complete the task in the Training Handout.
13. If time permits, select some questions from the consolidation exercise and break into small groups. Give each group a question to work on and feed back to the whole group after.

9	30 minutes	TOPIC 5: GRADE 12 – ORGANIC CHEMISTRY	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 12 Term 1 Targeted Support Booklet • Grade 12 Term 1 Resource Pack • Grade 12 Term 1 Planner and Tracker • Training Handout
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1. Refer to the Planner and Tracker and put this topic in context for the term.
2. Refer to Topic 4 in the Grade 12 Term 1 Targeted Support Booklet – Organic Chemistry.
3. Discuss the sequential table to revise what prior knowledge learners will have with regards to Organic Chemistry. This table also discusses briefly what has been covered in previous grades on this topic.
4. Discuss the table of definitions and describe that the laws and definitions that are in bold and shaded are the ones that are examinable. The other definitions are vital for the understanding of the topic.
5. Refer the breakdown of topic and targeted support offered. It is important to state that it is not the purpose of the Targeted Support Booklet to cover the entire topic necessarily, but rather to focus on problem areas and high areas of misconception in this topic. Discuss the last column of the table and highlight the areas in this topic that the Targeted Support Booklet will cover.
6. Ask the participants, in their experience, what areas of misconception there are in this topic. List them on the board and encourage participants to write them down. The following points are highlighted in the Diagnostic Report and must also be listed if not mentioned by any participant:
 - a. Van der Waals Forces is a synonym for intermolecular forces and is NOT a type of intermolecular force. Learners must stipulate London, dipole-dipole, H-bonds.
 - b. Language challenges such as ‘substituent’ instead of ‘substitution’.
7. Explain that the Targeted Support Booklet now proceeds to work through the topic and that it is directed to the teacher. It gives advice on how to teach aspects of the topic and also highlights problem areas and areas of misconception. The teacher should use the booklet to prepare lessons and wherever possible, use the worked examples to use as a teaching tool. Learners should be encouraged to copy down the question and the answers of worked example, to use as a reference whilst studying.
8. Select some examples to work through with participants and use these to illustrate how to use the Targeted Support Booklet.
9. Explain that at first, introductory level questions are given, to introduce a concept. Then, more challenging examples are given.

10. Use the Targeted Support Booklet to show how, at regular intervals, at the Checkpoints, questions are set from the Resource Pack for learners to do on their own.
11. Explain that, whilst the Worksheet in the Resource Pack is used in pieces throughout the topic, the Consolidation Exercise in the Resource Pack is used at the end of the topic. Its purpose is to be used as a summative exercise at the end of the topic that is given to learners to attempt and mark on their own.
12. Work through the exercise in the Training Handout on Esterification.
13. If time permits, select some questions from the consolidation exercise and break into small groups. Give each group a question to work on and feed back to the whole group after.

10	30 minutes	Topic 6: ENGAGING WITH PRACTICALS BOOKLET AND VIDEOS	Facilitator:	What you will need: <ul style="list-style-type: none"> • Practical Booklets • Practical DVDs • Training Handout
<ol style="list-style-type: none"> 1. Start by discussing and acknowledging the challenges teachers still face with regards to the execution of Physical Science practicals in the classroom. 2. Ask participants what their experience is with regards to practicals and the Practical Pack: <ul style="list-style-type: none"> • Do teachers perform the prescribed experiments? • If not, what is/are the reason/s? Lack of equipment, experience? 3. Is there anything that the Subject Advisor might be able to do to enable teachers to perform these experiments first hand? This may involve: <ol style="list-style-type: none"> a. Putting teachers in touch with resource suppliers. b. Giving teachers the necessary training. c. Creating a pool of shared resources between a cluster of schools. 4. Now remind teachers that in an effort to assist with practicals and in response to the need highlighted in the evaluation forms filled in by teachers in Term 4 training of 2017, we have put together a Practical Pack for teachers. This practical pack includes: <ol style="list-style-type: none"> a. DVDs of all practicals required for formal assessment. These DVDs contain an introduction to the experiment and then shows the experiment being performed. b. Because learners need to become familiar with the recording and interpretation of results, a guideline practical handout will be provided that can be photocopied for all learners. However, at the point in the DVD where the reading must be taken, it will be up to the learners to take the readings and record them themselves. c. Marking guidelines will be provided for the teacher to mark the practicals from. 5. Next, use the Training Handout section: Grade 12 practical on Esterification. 6. Play the DVD on this experiment and allow participants to work through the experiment, recording results etc. Work through the whole experiment from start to finish and allow participants to break into small groups to finalise their results and conclusions. 7. Hand out a copy of the marking guidelines to each participant and allow time for groups to mark and discuss the answers. 8. Ask participants for their comments on / responses to the Practical Pack. Do they find it worthwhile? Will it help them to address some of the challenges around practicals? 9. Document these comments for your report. 				

11	3 hours	Execution of Demonstration lessons	Facilitator:	What you will need: <ul style="list-style-type: none"> • Grade 10-12 Term 1&2: Targeted Support Booklets • Resource Packs • Planner and Trackers • Posters • Kokis • A1 sheets of paper • Pens • Rulers • Calculators • Prestik
<ol style="list-style-type: none"> 1. Explain to the participants that Demonstration Lessons are a vital tool for learning how to become better teachers. 2. Remind participants that the lessons be CAPS compliant. 3. Remind the audience that they will be learning new skills and ideas from watching the lessons, that they can take into their classrooms. 4. Remind the audience to notice if misconceptions are addressed correctly. 5. Remind participants that they will have time for feedback and that demonstrators will learn from the feedback. 6. This is a great learning exercise for ALL involved. 7. Call each group up in turn. They must introduce their lesson by stating the Grade, Term and Topic to be covered. 8. The group must introduce their: <ul style="list-style-type: none"> • scribe • participant who checked that the lesson is CAPS compliant • participant who used the targeted Support Booklet • participant who used the Resource Pack • participant/s who will demonstrate the lesson 9. Lessons MUST be stopped after 20 minutes, give a 5-minute warning. 10. Once the lesson has been executed, allow time for feedback from the audience. Limit this to 10 minutes. 11. Make sure you focus on the misconceptions addressed. 12. Remember to thank participants for their efforts. 				

12	30 minutes	MOTIVATING TEACHERS, CLOSURE AND EVALUATION	Facilitator:	What you will need: Evaluation Forms Video clip: Ted Talk
<ol style="list-style-type: none"> 1. Settle participants so that you have their attention. 2. Watch the clip. 3. Ask participants to think for a minute about the sacrifices that some of our children make to go to school. <ul style="list-style-type: none"> • We have learners who face physical dangers to get to school. • We have families who make enormous financial sacrifices to send their children to school. • Ask if anyone would like to share a story about a particular child or family that comes to mind. (Please document these stories for your report.) 4. Remind participants that this is something we must never forget, the millions of South Africans who put their faith in us, in the Department of Education, that we will educate their children and offer them a better life. 5. Ask participants if they think it is important for us to share and think about this kind of story with teachers, and if so why? 6. Next, ask participants to think about some of the different aspects we have dealt with in this workshop. Aside from thinking about FET PHYSICAL SCIENCES, we have raised and discussed some broader educational issues. 7. Ask participants if they have enjoyed this aspect of the training? Do they think it is important for us to think about and discuss the 'big picture' of education in South Africa? 8. Do they think we should just focus on developing the skills and content knowledge of teachers, or do we need to try and motivate and inspire teachers? 9. Give participants an evaluation form, briefly take them through the form, and then ask them to please complete it thoughtfully and carefully. 10. Once participants are finished, encourage them to take a photograph of what they have written, to remind them of this experience. 11. Next, go around the room and ask participants to share their third answer – what they personally commit to doing to improve education. 12. End the workshop by reminding them that we, together with our colleagues, are responsible for the dreams and aspirations of so many families. 13. Wish participants well for their own training. 				

Thank you for your ongoing dedication and commitment to this cause.

THE future
OF THE
WORLD IS IN
MY classroom
TODAY.