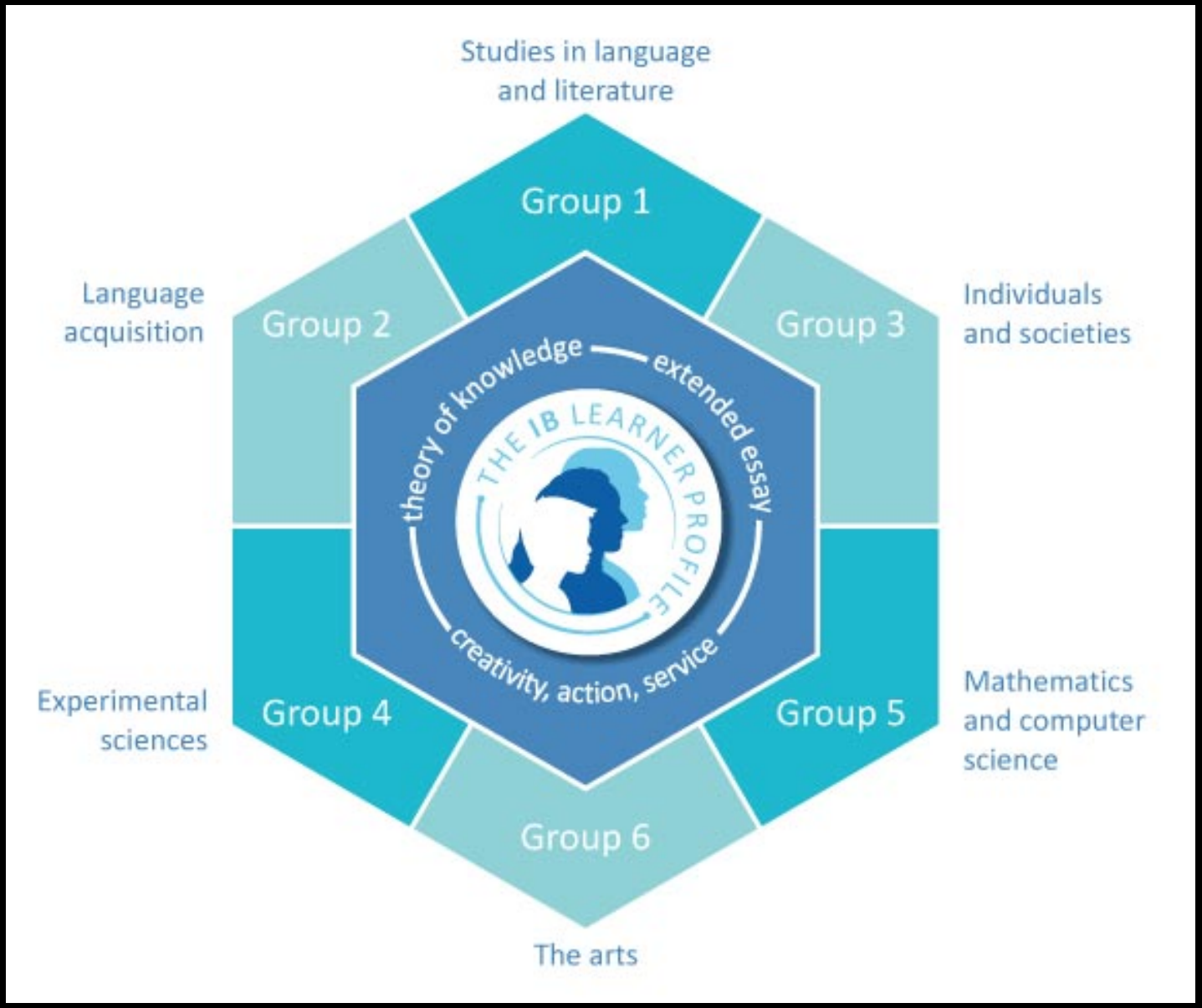
IB PHYSICS

Dr Macleod

INTERNATIONAL BACCALAUREATE



IB LEARNER PROFILE

CURRICULUM MODEL

Standard Level

		Teaching Hours
Theory	Core	80
	Options	30
Practical	Investigations	30
	Group 4 Project	10
Total		**150**

Higher Level

		Teaching Hours
Theory	Core	80
	Additional Higher Level	55
	Options	45
Practical	Investigations	50
	Group 4 Project	10
Total		**240**

CURRICULUM OBJECTIVES

1. Demonstrate an understanding of:

a. scientific facts and concepts

b. scientific methods and techniques

c. scientific terminology

d. methods of presenting scientific information.

2. Apply and use:

a. scientific facts and concepts

b. scientific methods and techniques

c. scientific terminology to communicate effectively

d. appropriate methods to present scientific information.

3. Construct, analyse and evaluate:

a. hypotheses, research questions and predictions

b. scientific methods and techniques

c. scientific explanations.

4. Demonstrate the personal skills of cooperation, perseverance and responsibility appropriate for effective scientific investigation and problem solving (Group 4 Project).

5. Demonstrate the manipulative skills necessary to carry out scientific investigations with precision and safety (Teacher Observation).

COMMAND TERMS

Objective 1

Define, Draw, Label, List, Measure, State

Objective 2

Annotate, Apply, Calculate, Describe, Distinguish, Estimate, Identify, Outline

Objective 3

Analyse, Comment, Compare, Construct, Deduce, Derive, Design, Determine, Discuss, Evaluate, Explain, Predict, Show, Sketch, Solve, Suggest

EXTERNAL ASSESSMENT

Paper 1

Multiple-choice questions

Test the core (SL) / the core and AHL (HL)

Short one- or two-stage problems

Objectives 1 and 2

No marks deducted for incorrect answers

Calculators not permitted

EXTERNAL ASSESSMENT

Paper 2

Tests the core (SL) / core and AHL (HL)

Objectives 1, 2 and 3

Section A

- Data-based question
- Short-answer questions

Section B

- Extended-response questions
- One question from a choice of three (SL)
- Two questions from a choice of four (HL)

Calculators permitted

EXTERNAL ASSESSMENT

Paper 3

Tests the options

Objectives 1, 2 and 3

SL students: several short-answer questions in each of the two options studies

HL students: several short-answer questions and an extended-response question in each of the two options studied

Calculators permitted

A clean copy of the *Physics Data Booklet* is required for all papers.

EXTERNAL ASSESSMENT (SL)

Paper	Weighting (%)	Weighting of Objectives (%) 1+2	3	Duration (hours)	Format
Paper 1	20	20	0	¾	30 multi-choice questions on the core
Paper 2	32	16	16	1 ¼	Section A: one data-based question and several short-answer questions Section B: one extended-response question out of three
Paper 3	24	12	12	1	Several short-answer questions on each of the two options studied

EXTERNAL ASSESSMENT (HL)

Paper	Weighting (%)	Weighting of Objectives (%) 1+2	3	Duration (hours)	Format
Paper 1	20	20	0	1	40 multi-choice questions on the core and AHL
Paper 2	36	18	18	2 ¼	Section A: one data-based question and several short-answer questions Section B: two extended-response question from a choice of four
Paper 3	20	10	10	1 ¼	Several short-answer questions and one extended-response question on each of the two options studied

INTERNAL ASSESSMENT

Internally-assessed laboratory reports are marked for three criteria:

- Design
- Data collection and processing
- Concluding and evaluating

Each criterion is marked out of 6

Your two best grades for each criterion will be submitted for your internal assessment (giving a maximum of 36)

Your personal skills are marked during the Group 4 Project (maximum of 6)

Your manipulative skills are assessed by teacher observation (maximum of 6)

INTERNAL ASSESSMENT

Design

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Defining the problem and selecting variables	Controlling variables	Developing a method for collection of data
Complete/2	Formulates a focused problem/research question and identifies the relevant variables.	Designs a method for the effective control of the variables.	Develops a method that allows for the collection of sufficient relevant data.
Partial/1	Formulates a problem/ research question that is incomplete or identifies only some relevant variables.	Designs a method that makes some attempt to control the variables.	Develops a method that allows for the collection of insufficient relevant data.
Not at all/0	Does not identify a problem/research question and does not identify any relevant variables.	Designs a method that does not control the variables.	Develops a method that does not allow for any relevant data to be collected.

INTERNAL ASSESSMENT

Data collection and processing

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Recording raw data	Processing raw data	Presenting processed data
Complete/2	Records appropriate quantitative and associated qualitative raw data, including units and uncertainties where relevant.	Processes the quantitative raw data correctly.	Presents processed data appropriately and, where relevant, includes errors and uncertainties.
Partial/1	Records appropriate quantitative and associated qualitative raw data, but with some mistakes or omissions.	Processes quantitative raw data, but with some mistakes and/or omissions.	Presents processed data appropriately, but with some mistakes and/or omissions.
Not at all/0	Does not record any appropriate quantitative raw data or raw data is incomprehensible.	No processing of quantitative raw data is carried out or major mistakes are made in processing.	Presents processed data inappropriately or incomprehensibly.

INTERNAL ASSESSMENT

Conclusion and evaluation

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Concluding	Evaluating procedure(s)	Improving the investigation
Complete/2	States a conclusion, with justification, based on a reasonable interpretation of the data.	Evaluates weaknesses and limitations.	Suggests realistic improvements in respect of identified weaknesses and limitations.
Partial/1	States a conclusion based on a reasonable interpretation of the data.	Identifies some weaknesses and limitations, but the evaluation is weak or missing.	Suggests only superficial improvements.
Not at all/0	States no conclusion or the conclusion is based on an unreasonable interpretation of the data.	Identifies irrelevant weaknesses and limitations.	Suggests unrealistic improvements.

INTERNAL ASSESSMENT

Personal skills (for group 4 project assessment only)

This criterion addresses objective 4.

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Self-motivation and perseverance	Working within a team	Self-reflection
Complete/2	Approaches the project with self-motivation and follows it through to completion.	Collaborates and communicates in a group situation and integrates the views of others.	Shows a thorough awareness of their own strengths and weaknesses and gives thoughtful consideration to their learning experience.
Partial/1	Completes the project but sometimes lacks self-motivation.	Exchanges some views but requires guidance to collaborate with others.	Shows limited awareness of their own strengths and weaknesses and gives some consideration to their learning experience.
Not at all/0	Lacks perseverance and motivation.	Makes little or no attempt to collaborate in a group situation.	Shows no awareness of their own strengths and weaknesses and gives no consideration to their learning experience.

INTERNAL ASSESSMENT

Manipulative skills (assessed summatively)

This criterion addresses objective 5.

Levels/marks	Aspect 1	Aspect 2	Aspect 3
	Following instructions*	Carrying out techniques	Working safely
Complete/2	Follows instructions accurately, adapting to new circumstances (seeking assistance when required).	Competent and methodical in the use of a range of techniques and equipment.	Pays attention to safety issues.
Partial/1	Follows instructions but requires assistance.	Usually competent and methodical in the use of a range of techniques and equipment.	Usually pays attention to safety issues.
Not at all/0	Rarely follows instructions or requires constant supervision.	Rarely competent and methodical in the use of a range of techniques and equipment.	Rarely pays attention to safety issues.

OUTLINE OF TOPICS

Topic (SL Core)	Hrs	Topic (AHL)	Hrs
1. Physic & Measurement	5	9. Motion in Fields	8
2. Mechanics	17	10. Thermal Physics	6
3. Thermal Physics	7	11. Wave Phenomena	12
4. Oscillations & Waves	10	12. Electromagnetic Induction	6
5. Electric Currents	7	13. Quantum & Nuclear Physics	15
6. Fields & Forces	7	14. Digital Technology	8
7. Atomic & Nuclear Physics	9		
8. Energy, Power, Climate Change	18		

Option (SL)	Hrs	Option (SL&HL)	Hrs	Option (HL)	Hrs
A. Sight & Waves	15	**E. Astrophysics**		H. Relativity	22
B. Quantum & Nuclear	15	F. Communications		I. Medical Physics	22
C. Digital Technology	15	**G. Electromagnetic Waves**		J. Particle Physics	22
D. Relativity & Particle	15				

YEAR PLANNER 2013

Year Planner 2013

Week	1	2	3	4	5	6	7	8	9	10	11	12
Term 1	Staff Meetings & Course Approval		Waitangi Day						Otago Anniversary	Good Friday	Easter Mon & Tue			
Starting	28 Jan	4 Feb	11 Feb	18 Feb	25 Feb	4 Mar	11 Mar	18 Mar	25 Mar	1 Apr	8 Apr	15 Apr

Week	1	2	3	4	5	6	7	8	9	10		
Term 2					Queen's Birthday			Senior Assessment Week				
Starting	6 May	13 May	20 May	27 May	3 Jun	10 Jun	17 Jun	24 Jun	1 Jul	8 Jul		

Week	1	2	3	4	5	6	7	8	9			
Term 3							Senior Exam Week	Senior Exam Week				
Starting	29 Jul	5 Aug	12 Aug	19 Aug	26 Aug	2 Sept	9 Sept	16 Sept	23 Sept			

Week	1	2	3	4	5	6	7	8				
Term 4			Labour Day		NCEA Exams Start							
Starting	14 Oct	21 Oct	28 Oct	4 Nov	11 Nov	18 Nov	25 Nov	2 Dec				

COMMAND TERMS

Objective 1

- **Define** Give the precise meaning of a word, phrase or physical quantity
- **Draw** Represent by means of pencil lines.
- **Label** Add labels to a diagram
- **List** Give a sequence of names or other brief answers with no explanation
- **Measure** Find a value for a quantity
- **State** Give a specific name, value or other brief answer without explanation or calculation

COMMAND TERMS

Objective 2

- **Annotate** Add brief notes to a diagram or graph
- **Apply** Use an idea, equation, principle, theory or law in a new situation
- **Calculate** Find a numerical answer showing the relevant stages in the working (unless instructed not to do so)
- **Describe** Give a detailed account
- **Distinguish** Give the differences between two or more different items
- **Estimate** Find an approximate value for an unknown quantity
- **Identify** Find an answer from a given number of possibilities
- **Outline** Give a brief account or summary

COMMAND TERMS

Objective 3

- **Analyse** Interpret data to reach conclusions
- **Comment** Give a judgment based on a given statement or result of a calculation
- **Compare** Give an account of similarities and differences between two (or more) items, referring to both (all) of them throughout
- **Construct** Represent or develop in graphical form
- **Deduce** Reach a conclusion from the information given
- **Derive** Manipulate a mathematical relationship(s) to give a new equation or relationship
- **Design** Produce a plan, simulation or mode
- **Determine** Find the only possible answer

COMMAND TERMS

Objective 3 cont.

- **Discuss** Give an account including, where possible, a range of arguments for and against the relative importance of various factors, or comparisons of alternative hypotheses
- **Evaluate** Assess the implications and limitations
- **Explain** Give a detailed account of causes, reasons or mechanisms.
- **Predict** Give an expected result
- **Show** Give the steps in a calculation or derivation
- **Sketch** Represent by means of a graph showing a line and labelled but un-scaled axes but with important features (for example, intercept) clearly indicated
- **Solve** Obtain an answer using algebraic and/or numerical methods
- **Suggest** Propose a hypothesis or other possible answer