COURSE OUTLINE – DP MATHEMATICS: APPLICATION AND INTERPRETATION

Course Description:

This course is available only at standard level. It has an emphasis on applications of mathematics, and the largest section is on statistical techniques. It is designed for students with varied mathematical backgrounds and abilities. It offers students opportunities to learn important concepts and techniques and to gain an understanding of a wide variety of mathematical topics. It prepares students to be able to solve problems in a variety of settings, to develop more sophisticated mathematical reasoning and to enhance their critical thinking. Its intent is to allow students to learn through inquiry and investigation. The individual project is an extended piece of work based on personal research involving the collection, analysis and evaluation of data. Students taking this course are well prepared for a career in social sciences, humanities, languages or arts.

Course Syllabus:

Syllabus component	Teaching hours
	SL
All topics are compulsory. Students must study all the sub-topics in each of the topics in the syllabus as listed in this guide. Students are also required to be familiar with the topics listed as prior learning.	
Topic 1 Number and algebra	16
Topic 2 Functions	31
Topic 3 Geometry and Trigonometry	18
Topic 4 Statistics and Probability	36
Topic 5 Calculus	19
Internal Assessment This is an individual piece of work involving the collection of information or the generation of measurements, and the analysis and evaluation of the information or measurement.	30
Total teaching hours	150

IB Concepts and Considerations

- **THEORY OF KNOWLEDGE (TOK):** Students will reflect on the nature of knowledge in Math, and on how we know what we claim to know throughout the course.
- **CREATIVITY, ACTIVITY, SERVICE (CAS):** Students will be encouraged to consider ways they can take meaningful action in their CAS activities connected to topics learned in Math throughout the course.
- **APPROACHES TO LEARNING (ATL): Thinking, Social, Communication, Research**, and **Self-Management** skills will be developed and encouraged throughout the course.
- **LEARNER PROFILE ATTRIBUTES (LP):** Connections will be made to the IB Learner Profile Attributes (**Inquirer, Knowledgeable, Thinker, Communicator, Principled, Open-minded, Caring, Risk-taker, Balanced,** and **Reflective)** throughout the course. Students are encouraged to embody these traits as IB learners.

Assessment Objectives:

Problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems. Having followed a DP mathematics course, students will be expected to demonstrate the following.

1. **Knowledge and understanding**: recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts.

2. **Problem-solving**: recall, select and use their knowledge of mathematical skills, results and models in both real and abstract contexts to solve problems.

3. **Communication and interpretation**: transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation.

4. **Technology**: use technology, accurately, appropriately and efficiently both to explore new ideas and to solve problems.

5. **Reasoning**: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.

6. **Inquiry approaches**: investigate unfamiliar situations, both abstract and real-world, involving organizing and analysing information, making conjectures, drawing conclusions and testing their validity.

Assessment Overview & Timeline:

Assessment component	Weighting	
External assessment (3 hours)	**80%**	
Paper 1 (1 hour 30 minutes) 15 compulsory short-response questions based on the whole syllabus. (90 marks)		**40%**
Paper 2 (1 hour 30 minutes) 6 compulsory extended-response questions based on the whole syllabus. (90 marks)		**40%**
Internal assessment This component is internally assessed by the teacher and externally moderated by the IB at the end of the course.	**20%**	
The project is an individual piece of work involving the collection of information or the generation of measurements, and the analysis and evaluation of the information or measurements. (20 marks)		**20%**

Grade Descriptors:

Grade 7

Demonstrates a thorough knowledge and comprehensive understanding of the syllabus; successfully constructs and applies mathematical arguments at a sophisticated level in a wide variety of contexts; successfully uses problem-solving techniques in challenging situations; recognizes patterns and structures, makes generalizations and justifies conclusions; understands and explains the significance and validity of results, and draws full and relevant conclusions; communicates mathematics in a clear, effective and concise manner, using correct techniques, notation and terminology; demonstrates the ability to integrate knowledge, understanding and skills from different areas of the course; uses technology correctly in challenging situations—makes efficient use of calculator's functionality when required.

Grade 6

Demonstrates a broad knowledge and comprehensive understanding of the syllabus; successfully constructs and applies mathematical arguments in a variety of contexts; uses problem-solving techniques in challenging situations; recognizes patterns and structures, and makes some generalizations; understands and explains the significance and validity of results, and draws relevant conclusions; communicates mathematics in a clear and effective manner, using correct techniques, notation and terminology; demonstrates some ability to integrate knowledge, understanding and skills from different areas of the course; uses technology correctly in routine situations—makes efficient use of calculator's functionality when required.

Grade 5

Demonstrates a broad knowledge and good understanding of the syllabus; applies mathematical arguments in performing routine tasks; successfully uses problem-solving techniques in routine situations; successfully carries out mathematical processes in a variety of contexts, and recognizes patterns and structures; understands the significance of results and draws some conclusions; communicates mathematics effectively, using appropriate techniques, notation and terminology; demonstrates an awareness of the links between different areas of the course; makes use of calculator's functionality when required—may occasionally be inefficient.

Grade 4

Demonstrates a satisfactory knowledge of the syllabus; applies mathematical arguments in performing some routine tasks; uses problem-solving techniques in routine situations; successfully carries out mathematical processes in straightforward contexts; shows some ability to recognize patterns and structures; has limited understanding of the significance of results and attempts to draw some conclusions; communicates mathematics adequately, using some appropriate techniques, notation and terminology; makes some use of calculator's functionality, but perhaps not always when required—may be inefficient at times.

Grade 3

Demonstrates partial knowledge of the syllabus and limited understanding of mathematical arguments in performing some routine tasks; attempts to carry out mathematical processes in straightforward contexts; makes an attempt to use problem-solving techniques in routine situations; communicates some mathematics, using some appropriate techniques, notation or terminology; occasionally uses calculator's functionality, but often inefficiently; does not always use it when required and may use an inefficient analytic approach.

Grade 2

Demonstrates limited knowledge of the syllabus; attempts to carry out mathematical processes at a basic level; communicates some mathematics, but often uses inappropriate techniques, notation or terminology; unable to use calculator correctly when required—questions exclusively requiring the use of the GDC are generally not attempted.

Grade 1

Demonstrates minimal knowledge of the syllabus; demonstrates little or no ability to use mathematical processes, even when attempting routine tasks; communicates only minimal mathematics and consistently uses inappropriate techniques, notation or terminology; is unable to make effective use of technology.

BC Ministry Requirements:

In line with the philosophy of the IB Diploma Programme, students will be assessed against the course objectives at their current level of achievement on the 7-point scale throughout the course. As required by the Ministry of Education, students will also be given a percentage converted from the IB level that reflects their achievement in relation to the corresponding BC Curriculum course.

Academic Honesty and Personal Integrity

The faculty at Carson Graham expects our students to complete academic and nonacademic work that is authentic and respectful of intellectual property. As diploma candidates, you are expected to adhere to the school's Policy for Academic Integrity, and also to the principles and practices set out in the IB document, Diploma Programme: Academic Honesty, 2011. Ignorance of the standards related to academic honesty and student integrity is not an excuse for dishonesty, plagiarism and malpractice. You are expected to familiarize yourself with the policy.

In accordance with this policy, students can use advanced automated tools (artificial intelligence or machine learning tools such as ChatGPT or Dall-E 2) on assignments in this course if instructor permission is obtained in advance. Unless permission is given to use the aforementioned tools, each student is expected to complete each assignment without substantive assistance from others, including automated tools. Additionally, if students are allowed to use advanced automated tools on assignments in this course, that use must be properly documented and credited. For example, text generated using ChatGPT-3 should include a citation such as: "Chat-GPT-3. (YYYY, Month DD of query). "Text of your query." Generated using OpenAI. https://chat.openai.com/" Material generated using other tools should follow a similar citation convention.[1]

[1] Adapted from https://learninginnovation.duke.edu/ai-and-teaching-at-duke-2/artificial-intelligence-policies-in-syllabi-guidelines-and-considerations/

http://www.sd44.ca/school/carson/Documents/Carson%20Graham%20Policy%20for%20Academic%20Honesty%20June%202015.pdf