International Baccalaureate Computer Science for the Diploma Programme

Standard Level (140 - 150 Contact Hours)

Course Overview and Goals

The International Baccalaureate (IB) Diploma Programme for Computer Science is designed to facilitate the learning and exam taking processes for students who are enrolled in the Standard Level (SL) section of their IB Diploma Programme. This course covers programming components and critical skills, which align with each of the 10 characteristics of the IB Learner Profile. Students will learn how programming and cybersecurity are applicable to nearly all fields of study and how to implement these skills in real-life.

Learning Environment

This course adapts the blended learning approach, giving teachers more autonomy in their pedagogical approach. The course content is a combination of web-based and offline activities. However, students will access lessons through the CodeHS platform.

Programming Environment

Students will demonstrate their programming skills by learning Computer Science Principles in Python, which aligns with the standards established by the College Board and the International Baccalaureate Organization. Certain concepts such as Databases, Web Science, and Modelling and Simulation will be covered through the Cybersecurity portion of the course and utilize SQL. Students will also be able to practice exam problems throughout the course.

Quizzes

Each lesson includes at least one multiple choice assessment. At the end of each module, students will take a summative multiple choice assessment to test their understanding of the concepts covered throughout.

Prerequisites

The International Baccalaureate Computer Science for Diploma Programme course uses the Python programming language and is designed for complete beginners with no previous background in computer science. The course is highly visual, dynamic, and interactive, making it engaging for new coders.

More Information

Browse the content of this course at: https://codehs.com/course/13496

Course Breakdown

Module 1: Welcome (1 day/.5 hours)

In this module, students will get a sense of what this course is about and will reflect on what they hope to get out of it.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18683

Objectives / Topics Covered	• Course Overview • Goal Setting
Assignments / Labs	• Students are introduced to the course and set goals for themselves

Module 2: Intro to Programming with Turtle Graphics (6 weeks/30 hours)

In this module, students learn Python commands, functions, and control structures by drawing shapes on their screen and solving puzzles with Turtle Graphics.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18686

Objectives / Topics Covered	• What is a Command? • Moving Tracy • Tracy's Coordinate System • For Loops • Functions and Parameters • Top Down Design • Variables • User Input • If/else Statements • While Loops
Assignments / Labs	• Row of Circles • Circle Pyramid • Bubble Wrap • Rating

Module 3: Basic Python and Console Interaction (3 weeks/15 hours)

In this module, students will learn the basics of programming by writing programs that interact with users through the keyboard.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18684

Objectives / Topics Covered	• Printing • Variables • Types • User Input • Converting Input Types • Arithmetic Expressions • String Operators

	• Comments • Graphics in Python
Assignments / Labs	• Printing • Variables • Types • Arithmetic Expressions & Converting Input Types

Module 4: Conditionals (2 weeks/10 hours)

In this module, students teach their programs to make decisions based on the information it receives.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18685

Objectives / Topics Covered	• If Statements • Boolean Values • Logical Operators • Comparison Operators • Floating Point Numbers and “Equality”
Assignments / Labs	• If Statements and Boolean Values • Boolean Operators and Expressions

Module 5: Looping (2 weeks/10 hours)

In this module, students learn how to write more efficient code by using loops as shortcuts.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18687

Objectives / Topics Covered	• While Loops • For Loops • Break and Continue • Nested Control Structures
Assignments / Labs	• While Loops • For Loops • Break and Continue • Nested Control Structures

Module 6: Functions and Exceptions (3 weeks/15 hours)

In this module, students learn how their programs can be decomposed into smaller pieces that work together to solve a problem.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18688

Objectives / Topics Covered	• Functions • Namespaces • Parameters • Return Values • Exceptions

Assignments / Labs	• Functions • Exceptions • Putting it All Together

Module 7: Strings (3 weeks/15 hours)

In this module, students use more sophisticated strategies for manipulating text in their programs - slicing, concatenating, and formatting.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18689

Objectives / Topics Covered	• Indexing and Slicing • Math Operators on Strings • For Loops Over a String • String Methods
Assignments / Labs	• Indexing • Math Operators and Strings • For Loops on Strings • String Methods

Module 8: Creating and Altering Data Structures (2 weeks/10 hours)

In this module, students learn how tuples and lists are formed and the various methods that can alter them.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18690

Objectives / Topics Covered	• Tuples • Lists • For Loops and Lists • List Methods
Assignments / Labs	• Tuples • Lists

Module 9: Extending Data Structures (3 weeks/15 hours)

In this module, students learn to build more complex programs that make use of grids and dictionaries.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18692

Objectives / Topics Covered	• Dictionaries • 2d lists • List comprehensions • Packing and unpacking • Mutable vs. immutable • Equivalence vs. identity
Assignments / Labs	• Dictionaries • 2D Lists

Module 10: Software Security (3-4weeks/15-20 hours)

In this module, students will learn what happens when running a web application and how to look inside web apps using developer tools, code source, and more. They will learn basic SQL and common attacks like SQLi.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18693

Objectives / Topics Covered	• Inside Web Applications • Developer Tools • The Value of Data • SQL Overview • Clients, Servers, Databases • Common Security Problems • SQL Injection
Assignments / Labs	• Scavenger Hunt • Getting Started with OWASP • Chrome Developer Tools • SELECT statement to query a database • Discuss Equifax SQL injection attack • Practice basic SQLi on a safe site • Research SQLi prevention

Module 11: Exam Practice (1 week/5 hours)

In this module, students will have the opportunity to apply their programming and cybersecurity knowledge and complete IB-related exam practice questions.

Browse the full content of this module at: https://codehs.com/library/course/13496/module/18694

Objectives / Topics Covered	• Exam Overview • Testing Mindset
Assignments / Labs	• Review: Exam Guidelines • Exercise: Key Terms • Quiz: Practice Exam