# International Baccalaureate
# Diploma Programme Subject Brief

## Sciences:
## Computer science – Standard level

First assessments 2014

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.

I. Course description and aims  
II. Curriculum model overview

III. Assessment model  
IV. Sample questions

# I. Course description and aims

The IB DP Computer science SL course requires an understanding of the fundamental concepts of computational thinking as well as knowledge of how computers and other digital devices operate. The course, underpinned by conceptual thinking, draws on a wide spectrum of knowledge, and enables and empowers innovation, exploration and the acquisition of further knowledge.  Students study how computer science interacts with and influences cultures, society and how individuals and societies behave, and the ethical issues involved. During the course the student will develop computational solutions. This will involve the ability to:

- identify a problem or unanswered question
- design, prototype and test a proposed solution
- liaise with clients to evaluate the success of the proposed solution and make recommendations for future developments.

The aims of the computer science standard level courses are to:

- provide opportunities for study and creativity within a global context that will stimulate and challenge students developing the skills necessary for independent and lifelong learning
- provide a body of knowledge, methods and techniques that characterize computer science
- enable students to apply and use a body of knowledge, methods and techniques that characterize computer science

- demonstrate initiative in applying thinking skills critically to identify and resolve complex problems
- engender an awareness of the need for, and the value of, effective collaboration and communication in resolving complex problems
- develop logical and critical thinking as well as experimental, investigative and problem-solving skills
- develop and apply the students' information and communication technology skills in the study of computer science to communicate information confidently and effectively
- raise awareness of the moral, ethical, social, economic and environmental implications of using science and technology
- develop an appreciation of the possibilities and limitations associated with continued developments in IT systems and computer science
- encourage an understanding of the relationships between scientific disciplines and the overarching nature of the scientific method.

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## II. Curriculum model overview

| Component | Recommended teaching hours |
|---|---|
| *Core syllabus content* **SL/HL core** The topics that must be studied, including some practical work, are: <br> • Topic 1: System fundamentals <br> • Topic 2: Computer organization <br> • Topic 3: Networks <br> • Topic 4: Computational thinking, problem-solving and programming | 80 |
| *Option* **SL/HL core** | 30 |
| *Internal assessment* **Solution** <br> • Practical application of skills through the development of a product and associated documentation | 30 |
| **Group 4 project** | 10 |

## III. Assessment model

Having followed the computer science standard level course, students will be expected to:

Know and understand:
- relevant facts and concepts
- appropriate methods and techniques
- computer science terminology
- methods of presenting information.

Apply and use:
- relevant facts and concepts
- relevant design methods and techniques
- terminology to communicate effectively
- appropriate communication methods to present information.

Construct, analyse, evaluate and formulate:
- success criteria, solution specifications including task outlines, designs and test plans
- appropriate techniques within a specified solution.

Demonstrate the personal skills of cooperation and perseverance as well as appropriate technical skills for effective problem-solving in developing a specified product.

## Assessment at a glance

| Type of assessment | Format of assessment | Time (hours) | Weighting of final grade (%) |
|---|---|---|---|
| External | | | 70 |
| Paper 1 | • Section A consists of several compulsory short answer questions <br> • Section B consists of three compulsory structured questions. | 1.5 | 45 |
| Paper 2 | An examination paper of between two and five compulsory questions; linked to the option studied. | 1 | 25 |
| Internal | | | 30 |
| Solution | The development of a computational solution. Students must produce: <br> • a cover page that follows the prescribed format <br> • a product supporting documentation (word limit 2,000 words). There must be evidence of independent research and investigation for students to reach the top level. | 30 | |
| **Group 4 project** | To be assessed using the criterion Personal skills. | 10 | |

## IV. Sample questions

- The colour of a pixel can be stored as a 16-bit integer.
  (a) State how many different colours can be represented in a 16-bit integerfield.
  (b) State whether this storage system for colour values is digital or analog.
  (c) Outline one advantage and one disadvantage of using 32-bits per-pixel to store colours instead of 16-bits per-pixel.
- State the output of the following code fragment:
  double n= 1234.5678;
  double p = math.floor((n*100)/100); output (p);
  Recall that math.floor(3.7) produces the integer result 3.