

Summary

HL Statistics and Probability

Subject	Year	Start date	Duration
Mathematics: analysis and approaches	IB1	Week 3, February	5 weeks

Course Part

Description

Statistics is concerned with the collection, analysis and interpretation of data and the theory of probability can be used to estimate parameters, discover empirical laws, test hypotheses and predict the occurrence of events. Statistical representations and measures allow us to represent data in many different forms to aid interpretation.

Inquiry & Purpose

? Inquiry / Higher Order Questions

Type	Inquiry Questions
Debatable	Why have mathematics and statistics sometimes been treated as separate subjects? How easy is it to be misled by statistics? Is it ever justifiable to purposely use statistics to mislead others?
Skills-based	Discussion of the different formulae for the same statistical measure (for example, variance).

Curriculum

🎯 Aims

Communicate mathematics clearly, concisely and confidently in a variety of contexts

📌 Objectives

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

📖 Syllabus Content

Topic 4: Statistics and probability

SL Content

SL 4.1

Concepts of population, sample, random sample, discrete and continuous data.

Reliability of data sources and bias in sampling.

Interpretation of outliers.

Sampling techniques and their effectiveness.

SL 4.2

Presentation of data (discrete and continuous): frequency distributions (tables).

Histograms.

Cumulative frequency; cumulative frequency graphs; use to find median, quartiles, percentiles, range and interquartile range (IQR).

Production and understanding of box and whisker diagrams.

SL 4.3

Measures of central tendency (mean, median and mode).

Estimation of mean from grouped data.

Modal class.

Measures of dispersion (interquartile range, standard deviation and variance).

Effect of constant changes on the original data.

Quartiles of discrete data.

SL 4.5

Concepts of trial, outcome, equally likely outcomes, relative frequency, sample space (U) and event.

The probability of an event A is $P(A) = \frac{n(A)}{n(U)}$

The complementary events A and A' (not A).

Expected number of occurrences.

SL 4.6

Use of Venn diagrams, tree diagrams, sample space diagrams and tables of outcomes to calculate probabilities.

Combined events: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Mutually exclusive events: $P(A \cap B) = 0$.

Conditional probability: $P(A|B) = \frac{P(A \cap B)}{P(B)}$

Independent events: $P(A \cap B) = P(A)P(B)$.

SL 4.7

Concept of discrete random variables and their probability distributions.

Expected value (mean), for discrete data.

Applications.

SL 4.8

Binomial distribution.

Mean and variance of the binomial distribution.

SL 4.9

The normal distribution and curve.

Properties of the normal distribution.

Diagrammatic representation.

Normal probability calculations.

Inverse normal calculations

SL 4.11

Formal definition and use of the formulae: $P(A|B) = \frac{P(A \cap B)}{P(B)}$ for conditional probabilities, and $P(A|B) = P(A) = P(A|B')$ for independent events.

SL 4.12

Standardization of normal variables (y - values).

Inverse normal calculations where mean and standard deviation are unknown.

AHL Content

AHL 4.13

Use of Bayes' theorem for a maximum of three events.

AHL 4.14

Variance of a discrete random variable.

The effect of linear transformations of X .

ATL Skills

Approaches to Learning

Thinking

- In this unit, we will

ask students to formulate a reasoned argument to support their opinion or conclusion

give students time to think through their answers before asking them for a response

reward a new personal understanding, solution or approach to an issue

ask open questions

set students a task which required higher-order thinking skills (such as analysis or evaluation)

build on a specific prior task

help students to make their thinking more visible (for example, by using a strategy such as a thinking routine)

require students to take an unfamiliar viewpoint into account when formulating arguments


ask questions that required the use of knowledge from a different subject from the one you are teaching


include a reflection activity


make a link to TOK

Developing IB Learners

Learner Profile


 Inquirers

 Knowledgeable

 Thinkers

 Communicators

 Risk-takers (Courageous)

 Reflective