

*Data Science Standards of Learning***Frequently Asked Questions****1. What content will the Data Science Standards of Learning address?**

The *Data Science Standards of Learning* provide an introduction to the learning principles associated with analyzing big data. Through the use of open source technology tools, students taking a course based on the *Data Science Standards of Learning* will identify and explore problems that involve the use of relational database concepts and data-intensive computing to find solutions and make generalizations. Students will engage in a data science problem-solving structure to interact with large data sets as a means to formulate problems, collect and clean data, visualize data, model using data, and communicate effectively about data formulated solutions.

2. Will students be able to earn a mathematics credit toward graduation through taking a course based on these Standards of Learning?

Data Science courses, based on the *Data Science Standards of Learning*, may be offered as a semester ($\frac{1}{2}$ credit) or yearlong (1 credit) mathematics course toward graduation starting in 2022-2023 (pending final approval by the Virginia Board of Education).

3. What is the Virginia approved SCED code that has been designated for Data Science?

Data Science is included on the [Virginia Active SCED Codes](#) list and is designated a Virginia specific code of 02911.

4. What certification do teachers need to teach this course?

Teachers for this course must be certified in Mathematics (3100), Computer Science (2004), or Computer Science Specialist (3010).

5. Are there any prerequisite mathematics or computer science courses needed for Data Science?

The course will be considered at or above the level of Algebra II. For example, students successfully completing an Algebra, Functions, and Data Analysis course may wish to enroll in a course based on the *Data Science Standards of Learning*. Students may wish to enroll in a course based on the *Data Science Standards of Learning* before or after completing Probability and Statistics. Students may enroll in a course based on the *Data Science Standards of Learning* either before or after taking a Mathematical Analysis course. There will be no assumed prior knowledge of computer science or coding prior to taking a course based on the *Data Science Standards of Learning*. School divisions can make local decisions about prerequisite courses and possible course trajectories.

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6. Which students would be interested in a Data Science course?

This course is targeted to a wide range of students. If a student matches any of the following, they may be interested in a course based on the *Data Science Standards of Learning*:

- Curious about exploring the intersection of mathematics, statistics, computer science, and information technology;
- Has future career goals of business, communications, energy, finance, government & public administration, information technology, law, public safety, STEM, transportation, or distribution & logistics;
- Interested in asking open-ended questions of choice that can be explored through data in a project on a topic of interest;
- Eager to explore the variety of ways that data can be visually displayed and explained.

7. Are there curriculum resources or a textbook available to support a course based on the *Data Science Standards of Learning*?

Currently, teams of teachers are working to develop curricular resources that will support instruction in Data Science. Pending approval of the *Data Science Standards of Learning* by the Board of Education, a small pilot of Data Science I and II is planned. School divisions wishing to participate in the pilot will complete a VDOE application and agree to use components of the curricular resources and provide feedback on their instructional use. School divisions not involved in the pilot would still be able to offer the course, but would not be a part of the cohort study of resources. At this time, VDOE has not reviewed textbooks for Data Science.

8. Are there specific technology application tools or minimum technology requirements for schools wishing to offer a course in Data Science?

The minimum technical requirements for students to utilize open-source and cloud-based resources in Data Science are:

- Chromebook *or* computer for each student
- Adequate bandwidth for accessing cloud-based servers
- Google Sheets *or* Excel
- [CODAP](#)
- [Kaggle](#)-Jupyter Notebooks to run Python

9. Will a course in Data Science meet mathematics requirements for a Standard Diploma? Advanced Studies Diploma?

There are many pathways that students may choose in order to meet the graduation requirements to earn a Standard or an Advanced Studies diploma. Currently, in order to meet the graduation requirements to earn a Standard diploma, students (entering grade 9 in 2018-2019 and beyond) must earn three standard mathematics credits and one verified mathematics credit¹.

¹Courses completed to satisfy this requirement shall include at least **two** different course selections from among: algebra I, geometry, algebra functions, and data analysis, algebra II, or other mathematics courses approved by the Board to satisfy this requirement. An approved [computer science](#) course credit earned by students may be considered a mathematics course credit.

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Currently, in order to meet the graduation requirements to earn an Advanced Studies diploma, students (entering grade 9 in 2018-2019 and beyond) must earn four standard mathematics credits and one verified mathematics credit².

Courses completed to satisfy this requirement shall include at least three different course selections from among: algebra I, geometry, algebra II, or other mathematics courses above the level of algebra II. The board shall approve courses to satisfy this requirement. An approved [computer science](#) course credit earned by students may be considered a mathematics course credit.

Sample high school mathematics academic pathways that include Data Science are indicated below.

Grade Level ↓	Standard Diploma (Sample I)	Standard Diploma (Sample II)	Advanced Diploma (Sample III)	Advanced Diploma (Sample IV)	Advanced Diploma (Sample V)
Grade 9	Algebra I	Algebra I	Algebra I	Geometry	Geometry
Grade 10	Geometry	Geometry	Geometry	Algebra II	Algebra II
Grade 11	Data Science	Algebra, Functions, and Data Analysis	Algebra II	Data Science	Data Science
Grade 12		Data Science	Data Science	AP Statistics	AP Computer Science

(note these are samples only and additional options are available)

10. Will colleges/universities recognize Data Science as a mathematics course to prepare students for college admission and participation in college level sports?

A high school data science course based on the *Data Science Standards of Learning* introduces students to analysis of big data through the lens of mathematics, statistics, and computer science. A course based on these standards is very applicable to the content that students may encounter at the college-level. As with any new course, local public schools are required to submit new high school courses that will appear on a child's transcript to the NCAA eligibility center using eligibilitycenter.org to ensure that the course will be recognized for students participating in college level sports. Schools may refer to the [How to Update Your List of NCAA Courses](#) document.

11. How does Data Science differ from Advanced Placement Statistics or high school Probability and Statistics?

The focus of the *Data Science Standards of Learning* is a blend of mathematics, statistics, and computer science to support the analysis of data. The standards support problem solving using large data sets through an inquiry based approach. This application driven focus integrates the mathematics, statistics, and computer science that is needed to solve problems through a data lens. Advanced Placement Statistics is based on the College Board's Advanced Placement curriculum which is different from the *Data Science Standards of Learning*. High School Probability and Statistics is based on Probability and Statistics Standards of Learning and contains standards not included in the approach of the *Data Science Standards of Learning*.

12. Is there a Standards of Learning End of Course assessment tied to this course based on the *Data Science Standards of Learning*?

No, there is not a Mathematics Standards of Learning End of Course assessment associated with the *Data Science Standards of Learning*.

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13. Can a course based on the *Data Science Standards of Learning* be used as a verified credit?

No. In order to earn a verified credit, the student must pass a course and pass the Standards of Learning assessment tied to a course. Currently, the only mathematics courses at the high school level that have a Standards of Learning assessment are Algebra I, Geometry, and Algebra II. There are other tests that can be used to substitute for the Algebra I, Geometry, and Algebra II tests. The substitute tests can be found at [substitute tests for verified credit](#). There is no Virginia BOE approved end-of-course test or substitute test associated with a Data Science course.