

# NEXT GENERATION SCIENCE

## FREQUENTLY ASKED QUESTIONS

The State Board of Education adopted the Next Generation Science Standards (NGSS) as required by CA Education Code 60605.85 in 2013. The goal for developing the NGSS was to create a set of research-based K–12 science standards that would support two critical goals: to educate all students in science and engineering, and to provide the foundational knowledge for those who will become the scientists, engineer, technologists, and technicians of the future.

### COURSE PROGRESSIONS

QUESTION:	ANSWER:	NOTES:
<b>1. WHICH COURSE PROGRESSIONS DOES THE STATE RECOMMEND?</b>	<p>The Superintendent of Public Instruction concluded that an integrated model for grades 6-8 would be the most effective model for optimizing student learning of the Next Generation Science Standards (NGSS) The California State Board of Education approved the Superintendent’s recommended Integrated Learning Progression model as the preferred model for middle school grades 6-8.</p> <p>The State Board has not recommended a particular course sequence for high school. The standards are arranged in a grade band for grades 9-12. Districts are charged with making local decisions regarding how to bundle content between and within courses <b>as long as they strive to ensure that all students meet all the standards.</b></p> <p>Please see links below for additional information: <a href="http://www.cde.ca.gov/ci/sc/cf/scifw2nd60daypubreview.asp">http://www.cde.ca.gov/ci/sc/cf/scifw2nd60daypubreview.asp</a> <a href="http://www.cde.ca.gov/be/ag/ag/yr13/documents/nov13item06-ngss.pdf">http://www.cde.ca.gov/be/ag/ag/yr13/documents/nov13item06-ngss.pdf</a></p>	
<b>2. WHICH COURSE PROGRESSIONS WILL IUSD BE IMPLEMENTING?</b>	<p>In accordance with the recommendation by the State Board of Education, IUSD will implement the Integrated Progression course model for middle school, grades 6-8.</p> <p>At high school, in order to provide access to all science standards for all students, Woodbridge, Irvine, University, Creekside and Portola will begin implementing the Three Year Course progression in 2018-2019. This course sequence will include Biology, Chemistry, and Physics with Earth and Space Science standards in each course. Northwood High School, who currently implements a two year integrated science program, will begin implementing a three-year integrated course progression in 2018-2019.</p>	
<b>3. HOW DID IUSD MAKE THE DECISION REGARDING THESE COURSE PROGRESSIONS?</b>	<p>To successfully navigate the transition to new standards, IUSD created the Next Generation Science Standards (NGSS) Implementation Committee comprised of 98 representatives including teachers, site and district administrators, counselors, parents, and college and community representatives. Although most districts used an internal</p>	

process to determine which course progression to implement, IUSD is committed to ensuring our processes are inclusive of all stakeholders. By videotaping a panel of students, we were also able to include student voice in the process, without having them miss instruction. We captured student perspectives regarding both our current science instruction as well as their ideal vision of science instruction in IUSD.

The committee met for over 50 hours over a period of nine days, in addition to time spent outside the committee preparing and researching, to ensure that they had a thorough understanding of the NGSS expectations and recommendations for implementation.

Our parent Education Advisory Committee has helped us to craft our district-wide communication plan for the science standards implementation. While we will be launching our communication plan this year, implementation of new courses will not begin until the 2018-2019 school year.

## WHY NGSS?

### QUESTION:

#### 4. WHY DOES IUSD NEED TO MAKE ANY CHANGES?

### ANSWER:

The last set of California Science Standards are 18 years old. Our understanding of the world around us has since changed, and so has our understanding of how children learn. A growing body of research is painting a very different picture of what today's science education should look like. The Next Generation Science Standards (NGSS) represent a vision for education where students, over multiple years of school, deepen their understanding of core ideas in science and engineering through active engagement with science and engineering practices and application of crosscutting concepts (NRC Framework, 2012). Achieving this vision will require major shifts in the way that science is taught and valued in the K-12 classroom.

### NOTES:

## INTEGRATED VS. COORDINATED SCIENCE

### QUESTION:

#### 5. HAS INTEGRATED SCIENCE BEEN TAUGHT IN OTHER HIGH SCHOOLS IN THE DISTRICT?

### ANSWER:

Northwood High School is the only school in IUSD to offer an integrated science course sequence and has done so since its opening in 1999. Prior to the adoption of the new state science standards, University High School had a coordinated science Program which was phased out because the courses didn't align with the California standardized test (STAR) tests. Irvine High School has not offered integrated or coordinated programs and Woodbridge High School still offers a coordinated Science course.

### NOTES:

**6. WHAT'S THE DIFFERENCE BETWEEN COORDINATED AND INTEGRATED SCIENCE?**

Coordinated and integrated science are very different programs. In coordinated science courses, several disciplines are taught in a year in a logical sequence, with linkages between content-focused units. In this approach, a physics unit that includes a focus on heat and temperature might be followed by a unit on weather and climate that refers back to some of the concepts in the physics unit. These might then be followed by an ecology unit that refers back to the physics and earth sciences concepts. In an integrated science course, students explore concepts from more than one discipline within individual lessons and across units. Such courses often ask students to apply what they have learned to solving a problem or answering a question. For example, in an integrated science unit on global climate, students might explore within the unit concepts in the earth sciences (atmosphere, weather, and climate), physics (heat and temperature), and life sciences (effects of climate conditions on ecosystems).

The Three Year Course model (Modified Domain Specific) is also thematic in its approach. A key difference is that not every traditional science discipline is incorporated into every unit, or even into every course (year.) According to the CA Draft Science Framework, "To highlight the nature of Earth and space science (ESS) as an interdisciplinary pursuit with crucial importance in California, each of the three courses present an integration of ESS and one of the other high school disciplines." Example courses include:

- Living Earth: Integrating Biology and Earth Science
- Chemistry of the Earth System: Integrating Chemistry and Earth Science
- Physics in the Universe: Integrating Physics and Earth & Space Science

**7. WILL INTEGRATED SCIENCE RECEIVE LAB CREDIT FROM THE UC SYSTEM?**

Currently, the UC Board of Academic Admissions and Relations (BOARS) is reviewing the "d" requirement for the first year of integrated course work. As of October 2016, 119 districts have UC approval to offer Integrated Science as a "d" course. The UC system is encouraging high schools to submit new course descriptions for integrated and NGSS aligned courses. IUSD will submit our courses for approval in February 2018. (\*Please note that we will not be implementing new courses until the 2018-2019 school year). New course descriptions will be written with same language as approved courses.

Any student applying to the UC or Cal State system is taking more than two years of science and fulfilling that lab science requirement. The most recent data we have reviewed indicates that 86% of our students take 3 years of science or more.

<http://www.ucop.edu/aguide/a-g-requirements/d-lab-science/faq/index.html>

**8. WILL STUDENTS IN A HIGH SCHOOL THREE YEAR INTEGRATED SEQUENCE NEED TO “DOUBLE UP” TO TAKE AP COURSE WORK IN THEIR JUNIOR YEARS?**

The importance of balance for students is a common interest identified by all stakeholders, and the emotional/social health of our students is one of our most important priorities. When we adopt the new course progressions, we will also consider when it will be appropriate for students to begin Advanced Placement (AP) Course work. Students feeling the need to “double up” in course work to be competitive will be an important consideration as we make decisions about sequences. Our understanding has always been that students aren’t penalized in the admissions process when the school establishes restrictions regarding when students can access AP course work. That understanding was recently confirmed, again, by the Vice President of UC Admissions, Steven Handel, who shared at a presentation at Northwood High School, in the spring of 2016, that it is the knowledge of the school and the program they offer students which is critical in admissions.

## NGSS RESOURCES

### QUESTION:

**9. HOW CAN I LEARN MORE ABOUT HOW MY STUDENT’S SCIENCE EXPERIENCE WILL CHANGE?**

### ANSWER:

IUSD will be launching a district wide communication in spring 2017 regarding our transition plan. We will have resources for school sites, parents, and community members. In addition, school sites will be encouraged to communicate with their parents and highlight the shifts in instruction and new curriculum.

The NGSS national website has a parent information page:

<http://www.nextgenscience.org/parents>

The following link is particularly helpful for NGSS facts at a glance:

<http://www.nextgenscience.org/sites/default/files/resource/files/NGSSFactSheet2016.pdf>

The following links have good information on how science education will change with the new standards:

<http://www.nextgenscience.org/sites/default/files/resource/files/NewVision.pdf>

<http://www.nextgenscience.org/resources/what-students-can-learn-ngss-classrooms-storylines>

The science standards focus on fewer standards, arranged as progressions of learning, which enable students to acquire a deeper understanding of each standard. This approach moves from science inquiry to a broader view of science practices. The standards require students to form complex explanations, to know how ideas fit together, and to understand the “why” and “how” behind the scientific concept. Additionally, engineering standards and practices have been included at every grade level. The most powerful instructional shift of the new standards is the focus on students driving their own learning. Teachers encourage students to own the learning process by asking questions, defining the problem, making mistakes and proposing revisions, challenging assumptions and creating meaning for themselves.

### NOTES:

**10. WHAT RESOURCES  
HAVE WE INVESTED  
TO ENSURE A SMOOTH  
TRANSITION FOR  
TEACHERS AND  
STUDENTS?**

The California science standards were adopted in 2012. Since then, IUSD has been focusing on implementing the instructional shifts and aligning our current curriculum to meet the expectations of the new standards. In 2012-2013 teachers began the early awareness phase which involved familiarizing ourselves with the new standards, the rationale, how they were written (the architecture), and the new expectations for teaching and learning.

In 2013-2014, science teachers focused on the new content to be taught grade levels and began adapting their curriculum. We also started focusing on content area literacy aligned to the CCSS for English Language Arts.

In 2014-2015, science teachers focused on instructional shifts of the standards to include the Science and Engineering Practices (SEP) and Cross Cutting Concepts (CCC). Teachers began to restructure course units to be aligned with the standards.

In 2015-2016, IUSD provided dedicated professional learning days (K-12) to focus on the science and engineering practices, lessons based in real world phenomenon; shifts in instruction; science literacy, and engineering design

The Implementation Committee spent over 50 hours generating the rationale, interests, options, and course models for implementation. We also held a 2 day summer course for elementary teachers which focused on science literacy, instructional shifts, and engineering design.

This year (2016-2017) we have dedicated secondary Science Lead Teachers to finalize the rollout plan, course models and curriculum design. They meet twice per month and are released to work with Professional Learning Communities to focus on common assessments and ensuring high levels of learning for all students. The Science Lead Teachers collaborate across the district to design exemplary science units and course scope and sequences grades 6-12. They will also identify instructional materials that include open source/online resources and developing partnerships with other organizations to support a smooth transition.