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| Stage 4 (Years 7 & 8) Science |
| Tour outline and syllabus outcomes |
| ANSTO is a leader in chemical, materials and environmental research.ANSTO conducts Years 7/8 Science tours, which cover specific syllabus content in the NSW science syllabus (to be implemented in 2026) from the focus areas **Periodic table and atomic structure** and **Observing the Universe.**These tours consist of: * A 30 minute presentation which includes a demonstration using safe radioactive sources
* A 30 minute circuit of three hands-on activities in our Discovery Centre Display Area
* A 30 minute break for students
* A 90 minute tour of ANSTO’s research facilities, including the OPAL research reactor, the Australian Centre for Neutron Scattering, and the Centre for Accelerator Science.

During the excursion students will address the following syllabus outcomes:* uses scientific tools and instruments for observations **SC4-WS-01**
* uses a variety of ways to process and represent data **SC4-WS-05**
* uses data to identify trends, patterns and relationships, and draw conclusions **SC4-WS-06**
* explains how uses of elements and compounds are influenced by scientific understanding and discoveries relating to their properties **SC4-PRT-01**
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Focus Area: **Observing the Universe**

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| **Syllabus content covered in tour** | **Tour content** |
| Nature of science* Discuss that the purpose of science is to build knowledge and understanding of the world and the Universe through observation, experimentation and analysis
* Explore why scientific research is usually collaborative and builds on the work of others

Practice of science* Identify that the practice of science involves using the Working scientifically processes

Observing the Universe in context* Investigate how a recent advancement in science has increased knowledge of the world and the Universe
 | We explain ANSTO research and the roles of different scientists while touring the site, including: * using air trapped in air bubbles in Antarctic ice cores to investigate the concentration of greenhouse gases in the Earth’s past atmosphere
* measuring and characterising fine particle air pollution from key sites around Australia, which we have been doing for more than 30 years
* the search for cheaper and safer lithium-ion batteries
* tackling antibiotic resistance
* investigating the materials on the surface of the icy moons, such as Jupiter’s Europa and Saturn’s Titan.

We emphasise that collaboration between scientists with different areas of expertise is necessary to conduct quality research. In particular, we explain how many facilities at ANSTO are available for use by scientists from different universities within Australia and internationally. We are happy to answer students’ questions about science career opportunities at ANSTO and in other scientific organisations. |

Focus Area: **Periodic table and atomic structure**

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| **Syllabus content covered in tour** | **Tour content** |
| **Classification of matter*** Identify some common elements in everyday objects
* Conduct a series of investigations to identify and compare the physical properties of metals, non-metals and metalloids
* Explain how the properties of some common elements, compounds and alloys relate to their use(s)
 | Students examine samples of common elements and use the periodic table to classify them as metals, non-metals and metalloids.We discuss the use of elements such as lead, nickel, hafnium, aluminium, lithium in objects used at ANSTO and relate their properties to their use.We identify radioactive elements on the periodic table such as uranium, thorium and radium, and demonstrate how scintillation counters can be used to detect radiation from several safe radioactive sources incorporating these elements in our Discovery Centre. |
| **Atomic structure*** Identify the atom as the smallest unit of an element that retains the properties of that element
* Identify protons, neutrons and electrons as subatomic particles
* Describe the location, relative charge and mass of protons, neutrons and electrons using the planetary atomic model
 | Students use an interactive atom-builder program to investigate the location of subatomic particles in atoms, that the number of protons in an atom determines the element and the number of protons equals the number of electrons in a neutral atom.  |
| **Periodic table*** Outline patterns and relationships found in the periodic table, including reactivity
* Predict the properties of elements based on their position and location on the periodic table
* Identify the unique symbol of a range of elements
* Model the atomic structure of the first 18 elements to identify that atomic structure changes with increasing atomic number
* Describe how the historical development of the periodic table demonstrated understanding of the chemical and physical properties of elements

**Periodic table and atomic structure in context*** Investigate how the properties and availability of materials, including metals, alloys and compounds, influence their uses
 | Students measure and compare the weights of element samples, sized so that they each contain an equal number of atoms.  They relate the weights to the element positions on the periodic table. Students use element symbols on element samples to locate them on the periodic table.We discuss the work of Mendeleev in the development of the periodic table.We discuss radioactivity as radiation emitted from the nucleus of atoms, and how ANSTO’s OPAL reactor produces radioactive atoms of elements that can be used in medicine. We discuss the benefits of these nuclear medicines and outline the precautions taken to minimise the negative effects of radiation from these materials.  |