# Year 12 Investigating Science – Excursion Outline and Syllabus Outcomes

ANSTO has been Australia's home of nuclear science since 1953 and operates Australia's only nuclear reactor, the Australian Synchrotron, cyclotrons and linear accelerators.

ANSTO conducts Year 12 Investigating Science excursions, which cover specific Knowledge and Understanding content from Module 6: Technologies, Module 8: Science and Society, and Working Scientifically skills from the NSW NESA Stage 6 Investigating Science syllabus. These excursions consist of:

- A 120 minute tour of ANSTO's research facilities, including the OPAL research reactor, the ANSTO Nuclear Medicine production facility, the Australian Centre for Neutron Scattering, and the Centre for Accelerator Science
- A 20 minute break for students
- 70 minutes of educator-led activities in our Discovery Centre theatrette and display area

Students will complete the excursion workbook during the excursion.

| **Excursion content** | **Syllabus links** |
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| <u>Pre-work in excursion workbook:</u><br><br>• Process information to identify properties of alpha, beta and gamma radiation<br>• Research ANSTO's current scientific infrastructure, research and expertise<br>• Process and analyse real data sets from ANSTO research programs<br>• Prepare questions for a Q&A session with ANSTO education officers specific to students' chosen depth study topic | Working scientifically<br><br>• Questioning and predicting<br>• Processing data and information<br>• Analysing data and information<br>• Problem solving<br>• Communicating |
| <u>Tour:</u><br><br>• Students visit the OPAL research reactor, the ANSTO Nuclear Medicine production facility, the Australian Centre for Neutron Scattering, and the Centre for Accelerator Science. We discuss how:<br>  • OPAL is used to produce nuclear medicines, irradiate silicon and produce neutrons for research<br>  • Neutrons are used in diffraction experiments to investigate crystal structures of materials<br>  • Linear accelerators are used to conduct environmental research<br>  • Nuclear medicines are designed, produced and used to diagnose and treat disease | Module 6:<br>• Using examples, assess the impact that developments in scientific theories, laws and models have had on the development of new technologies, including but not limited to:<br>- radioactivity and radioactive decay on the development of radiotherapy and nuclear bombs<br>• Using examples, assess the impact that developments in technologies have had on the accumulation of evidence for scientific theories, laws and models, including but not limited to:<br>- technology to detect radioactivity and the development of atomic theory<br><br>Module 8:<br>• Investigate and assess ethical issues surrounding current scientific research in, for example:<br>- use of radiation<br>• Investigate the need for the regulation of scientific research in, for example:<br>- products and processes of the nuclear industry<br>• evaluate how scientific research aids economic development and human progress in relation to, for example:<br>- nuclear power generation |

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| <u>In the Discovery Centre:</u><br><br>• Draw traces left by alpha particles, beta particles, protons and muons in the cloud chamber<br>• Observe demonstrations of devices for measuring/detecting radiation (scintillation counter, thermoluminsecent device, dosimeter)<br>• Process information to learn how the Australia Synchrotron accelerates electrons to produce intense light for research purposes<br>• Process information to learn how the fission reaction in the OPAL reactor is controlled<br>• Ask prepared questions about students' depth study topic in a Q&A session with ANSTO education officers | Working scientifically<br><br>• Questioning and predicting<br>• Processing data and information<br>• Analysing data and information<br>• Conducting investigations |