



**Australian Government**

# **MSL70109 Graduate Certificate in Instrumental Analysis**

**Release: 1**

# **MSL70109 Vocational Graduate Certificate in Instrumental Analysis**

## **Modification History**

Not applicable.

## Description

This qualification covers the skills and knowledge required by technical specialists who already have a relevant higher education or vocational qualification, or have extensive vocational experience without formal qualifications and require the competence to develop or adapt analytical methods and operate and troubleshoot advanced analytical instruments.

This qualification was developed in response to a widespread industry shortage of technicians who have more than 'a black box' knowledge of analytical instruments and an ability to optimise them for specific analytical methods and samples. It replaces a non-Training Package qualification and has strong industry support.

### *Job roles/employment outcomes*

The Vocational Graduate Certificate in Instrumental Analysis provides training in advanced instrumental analysis techniques for individuals who already have some previous training or work experience in laboratory operations at AQF V or higher. Employment outcomes targeted by this qualification include senior technical officers, senior technical specialists, analysts and similar personnel.

Senior technical officers who undertake analysis using advanced analytical instrumentation are able to:

- conduct a wide range of complex and specialised tests
- exercise considerable analytical and judgemental skills to determine appropriate methods and procedures from a range of alternatives
- install and configure a range of accessories that extend the capability of analytical instruments
- modify methods to cope with non-routine tests and analyses where unusual samples could be involved
- develop or adapt methods and procedures
- optimise and troubleshoot the performance of analytical instruments by applying a specialised knowledge of the sample characteristics, instrument sub-systems and analytical procedure problems/remedies
- maintain analytical instruments fit for purpose.

Senior technical officers require both broad and highly specialised knowledge and skills. For example, they need to be able to:

- apply complex chemical principles to prepare samples and separate species effectively
- apply complex principles associated with heat, temperature, fluid flow, behaviour of gases, ionisation, interaction of ionised particles with electric/magnetic fields and the electromagnetic spectrum to understand the design of sample injection systems, instrument pathways, detection and control systems
- interpret complex technical manuals and test methods and apply logical and lateral thinking, fault finding and troubleshooting skills to optimise instruments and methods
- apply a detailed knowledge of measurement principles (accuracy, precision and calculation of uncertainties), calibration and quality control procedures to instrumental analysis

Senior technical officers work under broad direction from scientists/medical staff/engineers and accept responsibility for the day-to-day operation of their work/functional area (This may include responsibility for conducting analyses using one or more specific instruments).

In the course of their normal work, they:

- plan, allocate and monitor resources for their work area and are responsible for their work group's outputs
- explain complex instructions and procedures to others
- define and solve complex problems by investigating, developing and testing alternatives in response to vague or ill-defined information which is not readily accessible and requires selective analysis
- liaise with clients, suppliers and contractors on technical matters
- provide technical information to internal and external customers.

An example of the work of a senior technical officer is given below.

- A senior technical officer works in forensic science laboratory and may use advanced chromatography techniques (GC-MS) and micro-spectrophotometric techniques (UV/VIS/NIR and FTIR) to analyse samples collected at crime scenes.
- A senior technical officer works in an environmental monitoring laboratory and may use ICP-MS to measure the presence of heavy metal ions in water.
- A senior technical officer works for a major pharmaceutical company and may undertake pharmacokinetic studies using LC-MS techniques to establish the time taken for selected company products to be eliminated from the human body.

### ***Application***

This qualification applies to experienced senior technical officers and technical specialists who conduct instrumental analysis in laboratories providing consultancy, research and development and quality assurance services. These services may be provided for a wide range of industry sectors, such as forensic science, biomedical, environmental monitoring, food and beverage processing, pharmaceuticals and many other kinds of testing of manufactured products.

### ***Pathways into the qualification***

Entrants to the Vocational Graduate Certificate in Instrumental Analysis are required to have one of the following:

- relevant extensive vocational practice without formal qualifications
- a relevant Diploma or Advanced Diploma, such as MSL50109 Diploma of Laboratory Technology or MSL60109 Advanced Diploma of Laboratory Operations, together with significant relevant vocational practice
- a Bachelor Degree in Science in a relevant discipline, such as chemistry, biochemistry, forensic science, environmental science, physics, geology or food technology
- a relevant higher education qualification, with relevant vocational practice.

For the purposes of this qualification, the term 'vocational practice' is defined as experience of:

- performing a wide range of instrumental analysis in a laboratory that provides consultancy, research and development or quality assurance services
- installing, commissioning and maintaining analytical instruments for a company that manufactures/supplies instruments.

### ***Licensing considerations***

There are no specific licences that relate to this qualification. However, depending on the jurisdiction, licensing or regulatory requirements may apply to the use of some units in this qualification. Local regulations should be checked for details.

## **Pathways Information**

Not applicable.

## **Licensing/Regulatory Information**

Not applicable.

## **Entry Requirements**

Not applicable.

## Employability Skills Summary

<b>EMPLOYABILITY SKILLS QUALIFICATION SUMMARY</b>	
<b>Employability Skill</b>	<b>Industry/enterprise requirements for this qualification include:</b>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Liaise with clients, suppliers and other laboratory personnel about technical matters (e.g. samples, testing methods, advanced analytical equipment)</li> <li>• Interpret complex test methods and technical procedures</li> <li>• Explain complex technical problems, issues and possible solutions</li> <li>• Prepare complex technical reports and submissions</li> <li>• Obtain 'sign off' for results and/or outputs from relevant persons</li> </ul>
<b>Teamwork</b>	<ul style="list-style-type: none"> <li>• Work autonomously or as part of a team</li> <li>• Contribute to developing and/or validating test methods and analytical procedures</li> <li>• Contribute to improving the quality of laboratory services</li> </ul>
<b>Problem solving</b>	<ul style="list-style-type: none"> <li>• Analyse data quality issues</li> <li>• Determine root causes of problems with sample preparation, testing procedures and/or advanced analytical instrument performance</li> <li>• Evaluate options for quality improvements, corrective and/or preventative actions</li> </ul>
<b>Initiative and enterprise</b>	<ul style="list-style-type: none"> <li>• Research current and new technical developments and assess their significance for the laboratory or own job role</li> <li>• Network with other technical specialists to extend own knowledge</li> <li>• Recognise opportunities for quality improvements and recommend improvement strategies</li> </ul>
<b>Planning and organising</b>	<ul style="list-style-type: none"> <li>• Prioritise work activities</li> <li>• Determine resource requirements and organise/optimize resource use in work area</li> <li>• Organise schedules to optimise work outputs without sacrificing quality</li> <li>• Adjust plans to suit new information, changing conditions and priorities</li> </ul>

<b>EMPLOYABILITY SKILLS QUALIFICATION SUMMARY</b>	
<b>Self-management</b>	<ul style="list-style-type: none"> <li>• Manage own time and establish own work schedule</li> <li>• Monitor and evaluate own work quality</li> <li>• Maintain professional and ethical standards in own work</li> <li>• Comply with legislative requirements, codes of practice and organisational policies and procedures</li> </ul>
<b>Learning</b>	<ul style="list-style-type: none"> <li>• Identify opportunities for own learning</li> <li>• Maintain current technical knowledge of instrumental analytical techniques used in job role</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>• Set up and optimise advanced analytical instruments to obtain reliable results</li> <li>• Conduct routine maintenance of advanced analytical instruments used in job role</li> <li>• Use instrument control software, laboratory information management systems, information directories, databases, online data search facilities and computer networks.</li> </ul>

## Packaging Rules

### Packaging Rules

To be awarded a Vocational Graduate Certificate in Instrumental Analysis, competency must be achieved in a total of **eleven (11)** units of competency, consisting of:

- **seven (7)** core units of competency
- **four (4)** elective units of competency.

Units listed under **core** are considered essential for all technical specialists. The units listed as **electives** may only apply to some personnel according to the size and scope of the particular enterprise and the instrumental techniques employed in the laboratory.

### Core units of competency

- Select all **seven (7)** units of competency listed below.

<b>Unit code</b>	<b>Unit title</b>	<b>Prerequisites</b>
MSL944001A	Maintain laboratory/field safety	

Unit code	Unit title	Prerequisites
MSL974001A	Prepare, standardise and use solutions	
MSL924001A	Process and interpret data	
MSL925002A	Analyse measurements and estimate uncertainties	MSL924001A
MSL976003A	Evaluate and select appropriate test methods and/or procedures	
MSL977003A	Contribute to the validation of test methods	MSL976003A
MSL977004A	Develop or adapt analyses and procedures	MSL976003A

### Elective units of competency

Select **four (4)** elective units of competency from Groups A and B, as specified below:

- a minimum of **one (1)** unit must be chosen from Group A
- the remainder may be chosen from Groups A and B, to bring the total number of electives to **four (4)**.

### Group A

Unit code	Unit title	Prerequisites
MSL977006A	Apply specialised knowledge of gas chromatography techniques to analysis	
MSL977007A	Apply specialised knowledge of liquid chromatography techniques to analysis	
MSL977008A	Apply specialised knowledge of inductively coupled	



Unit code	Unit title	Prerequisites
	plasma spectroscopy to analysis	

### Group B

Unit code	Unit title	Prerequisites
MSL977009A	Apply advanced ultraviolet, visible and near infra red spectroscopic techniques to analysis	
MSL977010A	Apply advanced infra red spectroscopic techniques to analysis	
MSL977011A	Contribute to the selection, commissioning and maintenance of analytical instruments	

Two electives relevant to instrumental analysis may be chosen from this Training Package, other endorsed Training Packages and accredited courses where those units are available at Diploma or above.

Registered Training Organisations should seek a determination from Manufacturing Skills Australia regarding the suitability of any unit proposed for use in this qualification.