COURSE OUTLINE

MLS302 Molecular Diagnostics

School: School of Health - Biomedicine

2026 | Trimester 1

UniSC Sunshine Coast	BLENDED LEARNING	Most of your course is on campus but you may be able to do some components of this course online.

Please go to usc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

Molecular diagnostics plays an increasingly important role in the clinical diagnostic setting. This course will provide you with an in-depth understanding of the central principles employed in the clinical laboratory with a strong focus on molecular techniques, current methods, and their clinical applications. The course will be practically orientated with an emphasis on developing laboratory skills in techniques relevant to medical molecular diagnostic analysis and results interpretation. An emphasis will be placed on their relevance to the clinical setting with regards to the diagnosis of human genetic diseases, infectious disease testing, tumour genetic testing and pre-natal and neo-natal testing. The learning materials will feature a case study-based approach to clinical diagnosis and the development of problem-solving skills.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Online	2hrs	Week 1	12 times
Tutorial/Workshop 1 – On campus fortnightly	3hrs	Week 2	6 times
Laboratory 1 – On-campus laboratory practicals fortnightly	3hrs	Week 3	5 times

1.3. Course Topics

- STI screening (Sex/Sexual references)
- HPV screening (Sex/Sexual references)
- Molecular Diagnostics in preventing transfusion transmitted infections
- Non-Invasive Prenatal Diagnosis of HDFN
- Cytogenetics
- Molecular Diagnostics in Cancer
- Inherited disorders
- Molecular Diagnostics in Autoimmune Diseases
- Metabolic disorders
- Epigenetic changes

1.4. Mature Content

Sex/Sexual references

2. What level is this course?

300 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES MAPPING	PROFESSIONAL STANDARD MAPPING *
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...	Australian Institute of Medical and Clinical Scientists
1 Apply molecular diagnostic techniques to detect genetic, infectious, and neoplastic diseases, demonstrating proficiency in laboratory procedures and adherence to professional and ethical standards, including AIMS competency-based standards.	Knowledgeable Problem solving	1.5, 1.6, 2.1, 2.2, 2.3, 3.2, 3.3
2 Critically analyse and differentiate molecular techniques for detecting and characterising DNA, RNA, proteins, chromosomes, and epigenetic changes, with reference to their principles, applications, and limitations in diagnostic practice.	Creative and critical thinker Applying technologies	1.5, 2.1, 2.2, 7.4, 10.1
3 Evaluate, compare, and present the molecular diagnostic profiles of major infectious and genetic diseases, integrating classification systems and available diagnostic tests to justify the most appropriate diagnostic approach for patient care.	Knowledgeable	1.4, 2.1, 2.2, 2.3, 3.2, 3.3, 8.2, 8.4, 9.1.1, 9.1, 9.2
4 Critically evaluate laboratory practices to ensure adherence to professional and ethical standards, aligning with the AIMS Competency-based Standards.	Ethical Organisation	4.2, 4.3, 5.2, 5.3, 5.4, 6.4, 6.5, 7.1, 7.2, 7.3, 8.1, 9.4

* Competencies by Professional Body

CODE	COMPETENCY
AUSTRALIAN INSTITUTE OF MEDICAL AND CLINICAL SCIENTISTS	
1.4	Collection, preparation and analysis of clinical material: Determine the priority of laboratory requests (triage) to effectively manage service requirements
1.5	Collection, preparation and analysis of clinical material: Process specimen utilising appropriate techniques
1.6	Collection, preparation and analysis of clinical material: Read and validate results
2.1	Correlation and validation of results of investigations using knowledge of method(s) including analytical principles and clinical information: Assess validity of data/results against possible range of outcomes
2.2	Correlation and validation of results of investigations using knowledge of method(s) including analytical principles and clinical information: Validation of results

CODE	COMPETENCY
2.3	Correlation and validation of results of investigations using knowledge of method(s) including analytical principles and clinical information: Make decisions about reporting results, repeating procedures, consulting senior staff and carrying out further tests within established guidelines
3.2	Interpretation, reporting and issuing of laboratory results: Use the administrative systems in place to communicate the results
3.3	Interpretation, reporting and issuing of laboratory results: Ensure that results with important diagnostic or treatment implications are communicated as per established protocols
4.2	Maintenance of documentation, equipment, resources and stock: Participate in maintenance of the laboratory and equipment
4.3	Maintenance of documentation, equipment, resources and stock: Participate in preparation and revision of manuals and protocols
5.2	Maintenance and promotion of safe working practices: Identify and respond to unsafe work practices and breaches of regulations
5.3	Maintenance and promotion of safe working practices: Ensure correct procedures are followed for acquisition, collection, storage, transportation and disposal of biological, chemical, toxic and radioactive wastes
5.4	Maintenance and promotion of safe working practices: Respond appropriately to emergency situations
6.4	Professional accountability and participation in continuing professional development: Recognises own abilities and level of professional competence
6.5	Professional accountability and participation in continuing professional development: Complies with profession's code of ethics
7.1	Responsibility for professional practice including test selection, development and use of laboratory investigations: Accepts responsibility for own actions/omissions
7.2	Responsibility for professional practice including test selection, development and use of laboratory investigations: Makes independent, professional judgements
7.3	Responsibility for professional practice including test selection, development and use of laboratory investigations: Demonstrates knowledge of contemporary ethical issues impinging on Medical Science
7.4	Responsibility for professional practice including test selection, development and use of laboratory investigations: Knowledge of new tests and their potential in the laboratory
8.1	Liaison with health workers and others to continuously improve the service: Participate in quality improvement activities
8.2	Liaison with health workers and others to continuously improve the service: Continually review laboratory processes and testing to streamline, minimise waste and increase efficiency
8.4	Liaison with health workers and others to continuously improve the service: Establish and maintain relationships with service users
9.1.1	Research, prepare and deliver appropriate presentations: Educational topics are researched, prepared and presented to health workers and others.
9.1	Participation in education and training of health workers and others: Research, prepare and deliver appropriate presentations
9.2	Participation in education and training of health workers and others: Participate in interdepartmental and other meetings
9.4	Participation in education and training of health workers and others: Train personnel in the operation of instruments and equipment, the performance of methods and quality control procedures, patient confidentiality, and the observation of safety measures
10.1	Contribution to advancement of knowledge and improvement of laboratory practice: Contribute to planning and design of research and development projects

5. Am I eligible to enrol in this course?

Refer to the UniSC Glossary of terms for definitions of "pre-requisites, co-requisites and anti-requisites".

5.1. Pre-requisites

BIM202 and enrolled in Program UB001

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Oral	Group	25%	15 min	Throughout teaching period (refer to Format)	In Class
All	2	Practical / Laboratory Skills, and Written Piece	Individual	40%	Participation in each activity will be monitored through laboratory manual notes and questions. There will be a final practical exam in week 12.	Refer to Format	In Class
All	3	Examination - Centrally Scheduled	Individual	35%	120min + 10min perusal	Refer to Format	Exam Venue

All - Assessment Task 1: Molecular Diagnostics in Focus: Student Seminar Series

GOAL:	To present an overview of a specific molecular diagnostic test. Your presentation will include details on the test classification, application, methodological/technical details, clinical implications and ethical considerations.
PRODUCT:	Oral
FORMAT:	In-class, 15 minute oral presentation completed as group work assessment (up to 3 students). Groups and topics will be designated during the first tutorial session in week 2, presentations will be delivered in tutorial class throughout the trimester according to topic. You will have 2 weeks after the specific topic has been released to prepare your presentation.

CRITERIA:

No.		Learning Outcome assessed
1	Quality of research and synthesis of the literature to describe technical features of the selected diagnostic test.	2 3
2	Understanding of analysis and interpretation of results of the selected test.	2 4
3	Understanding of the clinical utility and implications of the selected test.	2
4	Critical evaluation of ethical and/or professional considerations of the selected test.	4
5	Effective scientific presentation and communication skills.	3

GENERIC SKILLS:	Communication, Collaboration, Information literacy

All - Assessment Task 2: Practical portfolio

GOAL:	To actively participate in laboratory practical classes, applying theory to the development of proficiency in the conduct of molecular diagnostic techniques including PCR, genetic sequencing, and protein analysis.
PRODUCT:	Practical / Laboratory Skills, and Written Piece
FORMAT:	Attendance to laboratory classes will be recorded. You will also be required to respond to questions at the end of each laboratory class to demonstrate your knowledge of the topic (10% of overall mark). There will also be a final practical exam on-site and invigilated where you will be required to perform an experiment on your own, report the results and answer some questions related to the experiment (30% of overall mark).

CRITERIA:

No.		Learning Outcome assessed
1	Demonstration of competency in the conduct of molecular diagnostic techniques, adhering to professional standards.	1
2	Quality of analysis and interpretation of data from molecular experiments.	2
3	Application and understanding of molecular testing in the identification of pathogens, genetic mutations and epigenetic changes in clinical samples.	1 4

GENERIC SKILLS:	Communication, Problem solving, Applying technologies

All - Assessment Task 3: Theory Examination

GOAL:	To demonstrate your knowledge and understanding of theoretical, diagnostic, practical and clinical concepts covered in molecular diagnostics, aligned with AIMS expectations of medical laboratory scientists.
PRODUCT:	Examination - Centrally Scheduled
FORMAT:	This is a closed book, on-campus invigilated, centrally scheduled examination. It will consist of multiple-choice questions, short answer questions and case studies. The exam will occur during the examination period of the trimester.
CRITERIA:	

No.		Learning Outcome assessed
1	Demonstration of depth of knowledge of molecular techniques used to identify diseases.	2 3
2	Analysis of DNA, RNA and protein-based techniques in molecular diagnostics.	2
3	Understanding of ethical and clinical considerations in molecular diagnostics.	4

GENERIC SKILLS:	Information literacy

6.4. Assessment to competency mapping

PROGRAMME DELIVERY MODE	ASSESSMENT TYPE	TITLE	COMPETENCY	TEACHING METHODS
AIMS - COMPETENCY-BASED STANDARDS FOR MEDICAL SCIENTISTS				
All delivery modes	Examination - Centrally Scheduled	Theory Examination	1.3.2	Taught
			1.5.1	Taught
			2.1.1	Taught, Assessed
			2.1.2	Taught, Assessed
			2.3.1	Assessed
			3.2.6	Taught
			6.2.1	Taught
			6.5.1	Taught
			7.3.1	Taught
	Oral	Molecular Diagnostics in Focus: Student Seminar Series	1.3.1	Practiced
			1.5.1	Practiced
			2.1.2	Practiced
			3.2.6	Practiced, Assessed
			6.5.1	Taught, Assessed
			7.3.1	Taught, Assessed
			9.1.1	Taught, Assessed
			9.3.1	Practiced
			9.4.1	Taught, Assessed
	Practical / Laboratory Skills, and Written Piece	Practical portfolio	1.1.1	Taught
			1.1.6	Taught
			1.3.4	Practiced
			1.5.4	Practiced
			1.6.1	Practiced
			2.1.2	Practiced, Assessed
			2.3.1	Assessed
			3.2.1	Assessed
			5.1.1	Taught, Practiced
			5.2.1	Practiced
			6.2.1	Taught
			7.4.1	Taught

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

7.1. Schedule

PERIOD AND TOPIC	ACTIVITIES
Introduction to DNA, RNA, Proteins and Epigenetics	Learning materials and tutorial/Laboratory Textbook Chapter
STI Screening	Learning materials and tutorial/Laboratory Textbook Chapter
HPV Screening	Learning materials and tutorial/Laboratory Textbook Chapter
Molecular Diagnostics in preventing transfusion transmitted infections	Learning materials and tutorial/Laboratory Textbook Chapter
Non-Invasive Prenatal Diagnosis of HDFN	Learning materials and tutorial/Laboratory Textbook Chapter
Cytogenetic Diagnostics	Learning materials and tutorial/Laboratory Textbook Chapter
Molecular Diagnostics in Cancer	Learning materials and tutorial/Laboratory Textbook Chapter
Inherited Disorders	Learning materials and tutorial/Laboratory Textbook Chapter
Molecular Diagnostics in Autoimmune Diseases	Learning materials and tutorial/Laboratory Textbook Chapter
Metabolic Disorders	Learning materials and tutorial/Laboratory Textbook Chapter
Epigenetic Modification Disorders	Learning materials and tutorial/Laboratory Textbook Chapter

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Recommended	Lela Buckingham	2019	Molecular Diagnostics	3	n/a

8.2. Specific requirements

To successfully complete the UB001 Bachelor of Medical Laboratory Science (Pathology) and meet accreditation requirements of AIMS, UB001 students enrolled in MLS302 must attend and participate in all on-campus practical classes. All final assessments within MLS302 will be invigilated. Students must attain at least 50% in both theory and laboratory practical assessments. Students will need to purchase safety glasses and laboratory coats and any other necessary PPE a hard copy of the laboratory manual and require a computer with internet access.

9. How are risks managed in this course?

Risk assessments have been performed for all laboratory classes and a moderate level of health and safety risk exists. Moderate risks are those associated with laboratory work such as working with chemicals and hazardous substances. You will be required to undertake laboratory induction training and it is also your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students, and following the instructions of the University staff

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:
(a) The final mark is in the percentage range 47% to 49.4%; and
(b) The course is graded using the Standard Grading scale

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:
(a) One day: deduct 5%;
(b) Two days: deduct 10%;
(c) Three days: deduct 20%;
(d) Four days: deduct 40%;
(e) Five days: deduct 60%;
(f) Six days: deduct 80%;
(g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:
Less than 15 minutes: No penalty
From 15 minutes to 30 minutes: 20% penalty
More than 30 minutes: 100% penalty

10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: 07 5430 1168 or using the SafeZone app. For general enquires contact the SafeUniSC team by phone 07 5456 3864 or email safe@usc.edu.au.

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call 07 5430 1226 or email studentwellbeing@usc.edu.au.

10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the Learning Advisers web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to Student Hub, email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, AccessAbility Services can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to Student Hub, email AccessAbility@usc.edu.au or call 07 5430 2890.

10.8. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The Student Charter sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.10. General Enquiries

In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au