USC

Course Outline

Code: MLS101
Title: Foundations in Medical Science

School: Health & Sport Sciences
Teaching Session: Semester 1
Year: 2019
Course Coordinator: Dr Mark Holmes Email: mholmes@usc.edu.au Tel: (07) 5430 2844
Course Moderator: Dr Rebecca Donkin Email: rdonkin@usc.edu.au Tel: (07) 5459 4562

Please go to the USC website 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

This course will provide you with the foundational knowledge and practical skills that are required to study medical science at university. You are introduced to the sub-disciplines of medical science; analytical methods and instrumentation used in medical science laboratories; specimen collection and processing; laboratory safety and regulations; quality management in the laboratory; clinical interpretation of laboratory test results; scientific report writing; and professional ethics and confidentiality. Applied laboratory mathematics and statistical tests are also covered in the course.

1.2 Course topics

History of and disciplines in medical science
Systems of measurement
Laboratory safety, hazards and regulations
Laboratory maths and solution preparation
Basic laboratory instrumentation and techniques
Specimen collection, processing and storage
Professional ethics and confidentiality
Quality assessment and quality control
Graphing techniques
Scientific report writing
Applied laboratory statistics
Careers in medical science

2. What level is this course?

100 level Introductory - Discipline knowledge and skills at foundational level, broad application of knowledge and skills in familiar contexts and with support. Normally associated with the first full-time 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?

Specific Learning Outcomes On successful completion of this course, you should be able to:	**Assessment tasks** You will be assessed on the learning outcomes in task/s:	**Graduate Qualities or Professional Standards mapping** Completing these tasks successfully will contribute to you becoming:
Capably and confidently demonstrate laboratory skills and competencies required to work in medical science.	Tasks 1, 2 and 3	Empowered.
Enact professional responsibilities according to appropriate decision-making frameworks and codes of conduct to practice ethically.	Task 1	Ethical.
Demonstrate current knowledge of the various disciplines of medical science.	Tasks 2 and 3	Knowledgeable.
Synthesise and evaluate knowledge produced from a variety of sources to reach conclusions.	Tasks 1, 2 and 3	Knowledgeable.
Demonstrate awareness of ecologically and economically sustainable laboratory practices.	Tasks 1 and 3	Sustainability-focused

5. Am I eligible to enrol in this course?

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

5.1 Enrolment restrictions

Students must be enrolled in SC201, SC211, SC355, SC357, SC385, SC301, UU301 or XU301

5.2 Pre-requisites

Nil

5.3 Co-requisites

Nil

5.4 Anti-requisites

Nil

5.5 Specific assumed prior knowledge and skills (where applicable)

It is recommended that students have some prerequisite knowledge in core mathematics, and basic biology and chemistry. An optional Maths Diagnostic will be available before the teaching semester commences on the MLS101 Blackboard site if you would like to test your core maths skills and determine whether you require maths support.

6. How am I going to be assessed?

6.1 Grading scale

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

6.2 Assessment tasks

Task No.	Assessment Tasks	Individual or Group	Weighting %	What is the duration / length?	When should I submit?	Where should I submit it?
1	Professional Skills Development Portfolio	Individual and group elements	50%	Multiple elements equivalent to approx. 2000 words total	Weeks 2, 3, 4, 5, 9, 11 and 12	Task dependent: see Task format on the MLS101 Blackboard site
2	Mid Semester Review Quiz	Individual	20%	One hour	Week 7	In class
3	End-of-Semester Exam	Individual	30%	Two hours	Central examination period	Exam venue
			100%			

Assessment Task 1: Professional Skills Development Portfolio (50%)

Goal:	Medical science is a complex field and you will have to develop skills and competencies including: safety in the medical science laboratory; technical laboratory skills and communication of findings; maths and computation skills; and report writing and knowledge of professional ethics. These skill sets come together and will be evidenced in this portfolio of activities as you advance your professional development, which includes developing a mastery of medical science practice, content and theory.
Product:	Multiple elements for professional development.
Format:	This portfolio will include: • Task 1a. Online Measurements Quiz: 5% - Individual - Week 2 • Task 1b. Laboratory Techniques Exercise Sheet: 5% - Individual or Pair- Week 3 • Task 1c. Online Lab Safety and Hazards Quiz: 5% - Individual - Week 4 • Task 1d. Graphing Exercise: 5% - Individual - Week 5 • Task 1e. Practical Scientific Report: 20% - Pair - Week 9 • Task 1f. Microscopy in Pathology Exercise: 5% - Individual or Pair - Week 11 • Task 1g. Professional Ethics Case Analysis: 5% - Pair - Week 12 Please refer to the MLS101 Assessment folder in Blackboard for specific details for task description, format and submission instructions.
Criteria:	You will be evaluated on: • Safe and professional laboratory skills and techniques for medical science • Professional ethical codes of conduct • Medical science discipline knowledge • Application of sustainable lab practice • Scientific communication Specific grading rubrics are available on the MLS101 Blackboard site for Tasks 1d and 1e.

Generic skill assessed	**Skill assessment level**
Problem solving	Introductory
Communication	Introductory
Organisation	Introductory

Assessment Task 2: Mid-Semester Review Quiz (20%)

Goal:	This review quiz will allow you to demonstrate your understanding of the medical science discipline and related areas of study. You will show your understanding of the history of laboratory medicine and disciplines in medical science; common laboratory equipment; laboratory maths and solution preparation; and collection and handling of human venous blood.
Product:	Review quiz
Format:	Week 7 Closed book One hour Multiple-choice questions
Criteria:	You will be assessed on your ability to: • Demonstrate knowledge and understanding of the course theoretical content covered in Weeks 1 to 5 of the course • Apply theoretical knowledge identified in the course lecture, practical and tutorial material to solve problems

Generic skill assessed	**Skill assessment level**
Problem solving	Introductory

Assessment Task 3: End-of-Semester Exam (30%)

Goal:	This exam will allow you to demonstrate your knowledge and understanding of the course topics covered from Week 6 including: human specimen collection; techniques and instrumentation in medical science; and quality assessment and quality control.
Product:	Exam
Format:	Central exam period Closed book Two hours Multiple-choice and short answer questions
Criteria:	You will be assessed on your ability to: • Demonstrate knowledge and understanding of the course theoretical content covered in Weeks 6 to 13 of the course • Apply theoretical knowledge identified in the course lecture, practical and tutorial material to solve problems

Generic skill assessed	**Skill assessment level**
Problem solving	Introductory

7. What are the course activities?

7.1 Directed study hours

Weekly online lecture modules
1 hour tutorial each week
2 hour practical each fortnight (odd weeks)
1 hour tutorial each fortnight (even weeks)

7.2 Teaching semester/session(s) offered

Sippy Downs: Semester 1

7.3 Course content

Teaching Week / Module	What key concepts/content will I learn?	What activities will I engage in to learn the concepts/content?	
		Directed Study Activities	**Independent Study Activities**
1	**Introduction to medical science** · History of laboratory medicine · Disciplines in medical science **Measurements in medical science** · Systems of measurement · Units of measurement · Unit prefixes · Common equalities and conversions	**Practical 1:** Introduction to the MLS101 course staff, structure, content, assessment and laboratory class. Measurements in medical science: Practice exercises.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 1 & 6. Read the Practical 1 notes in the MLS101 Course Manual.
2	**Safety and hazards in the medical science laboratory** · Health and safety acts and regulations · Safety awareness and equipment · Personal protective equipment · Hand-washing · Biological and chemical safety · Fire safety and other hazards · Disposal of hazardous materials	**Tutorial 1:** Graphing techniques for medical science. The basics of graphing data in Excel. **Assessment Task 1a:** Online Measurements Quiz to be completed.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 2. Read the Tutorial 1 notes and associated exercises in the MLS101 Course Manual.
3	**Common laboratory equipment in the medical science laboratory** · Laboratory plasticware and glassware · Pipettes and pipetting techniques · Laboratory balances · Centrifuges · Reagent water	**Practical 2:** Assessment of accuracy and precision for basic lab techniques. **Assessment Task 1b:** Laboratory Techniques Exercise Sheet is due at the end of Practical 2.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 6 & 7. Read the Practical 2 notes in the MLS101 Course Manual.
4	**Laboratory maths and solution preparation** · Common concentration units · Proportions and ratios · Dilution calculations – single dilutions; dilution factors, serial dilutions · Standard and blank solutions	**Tutorial 2:** Laboratory maths and solution preparation: Practice exercises. **Assessment Task 1c:** Online Lab Safety and Hazards Quiz to be completed.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 7. Read the Tutorial 2 notes and associated exercises in the MLS101 Course Manual.
5	**Specimen collection (Part 1)** · Types of human specimens · Composition of blood · Whole blood, blood plasma, blood serum · Phlebotomy: Collecting and processing venous blood	**Practical 3:** Preparing a clinical laboratory assay: Determination of blood plasma glucose. **Assessment Task 1d:** Graphing Exercise is due via SafeAssign.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). C. 4. Read the Practical 3 notes in the MLS101 Course Manual.
6	**Specimen collection (Part 2)** · Capillary blood collection · Arterial blood collection · Fluid aspirations (CSF, serous fluids, synovial fluid)	**Tutorial 3:** Human blood collection and handling.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 4, 13 & 14. Read the Tutorial 3 notes

	· The kidneys and techniques for urine collection · Urine handling guidelines		and associated exercises in the MLS101 Course Manual.
7	**Techniques and instrumentation in medical science (Part 1)** · Principles of spectrophotometry and biochemical assays · Nephelometry and turbidimetry · The flow cytometry · Electrophoresis	**Assessment Task 2**: You will complete the Mid-Semester Review Quiz in Science Lab H1.04.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 8
8	**Techniques and instrumentation in medical science (Part 2)** · Biosafety in the laboratory and biosafety cabinets · History of the microscope · Types of microscopes · The compound light microscope	**Tutorial 4:** How to write a concise scientific report. Note: Tutorial 4 will be available online because Thursday 25 April is a public holiday.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 5 & 15. Read the Tutorial 4 notes and associated exercises in the MLS101 Course Manual.
9	**Professional ethics in medical science** · What is ethics? · The four principles approach to ethical behaviour – autonomy, non-maleficence, beneficence, justice · Codes of conduct; confidentiality · Case studies in professional ethics in medical science laboratories	**Practical 4:** Working with the compound light microscope for diagnostic testing in the clinical laboratory. **Assessment Task 1e:** Practical Scientific Report due.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 5 & 15. Download and familiarise yourself with the professional ethics readings. Read the Practical 4 notes in the MLS101 Course Manual.
10	**Quality assessment and quality control (Part 1)** · Elements of a total quality control program · Standards and controls · Types of control material · Quality assessment descriptors (accuracy, precision, sensitivity, specificity, predictive values)	**Tutorial 5:** Thinking about professional ethics in medical science.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 3. Read the Tutorial 5 notes in the MLS101 Course Manual.
11	**Quality assessment and quality control (Part 2)** · Quality control statistics · Determination of control ranges · Monitoring quality control · Levey-Jennings charts · Westgard rules	**Practical 5:** Differential staining for the identification of bacteria using the compound light microscope. **Assessment Task 1f:** Microscopy in Pathology Exercise due at the end of Practical 5.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 3, 5 & 15. Read the Practical 5 notes in the MLS101 Course Manual.
12	**Careers in medical science (Part 1)** · Seminars to be presented by medical scientists from industry to discuss careers in areas such as pathology,	**Tutorial 6** Quality control charting and Westgard rules.	Turgeon M.L., 2016. Clinical Laboratory Science (7th ed.). Ch. 3.

	clinical measurements, clinical trials management, and clinical embryology · Program advice provided on how to apply for a structured work placement in medical science	**Assessment Task 1g:** Professional Ethics Case Analysis is due.	Read the Tutorial 6 notes and associated exercises in the MLS101 Course Manual.
13	**Careers in medical science (Part 2)** · Seminars to be presented by USC medical science researchers · Information provided about entry into the Honours and Postgraduate (MSc and PhD) programs at USC	**Exam revision session and fun quiz.**	Revise the Weeks 6 to 11 lecture module topics.

Please note that the course activities may be subject to variation.

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

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

8.1 Prescribed text(s)

Please note that you need to have regular access to the resource(s) listed below as they are required:

Author	Year	Title	Publisher
Turgeon, M.L.	2016	Linne & Ringsrud's Clinical Laboratory Science (7th Edn.)	Elsevier Mosby

8.2 Specific requirements

A MLS101 Course Manual will be available for purchasing from USC Mail and Print Services (MaPS). You will require this manual for your practical and tutorial classes. MLS101 is structured to provide you with knowledge and practical skills necessary to meet industry established proficiency standards. It is therefore an expectation of both the University and our industry partners that you will participate in all the directed study activities (online lecture modules, lectorials, laboratories, tutorials) and demonstrate satisfactory proficiency in the practical assessment. To gain such proficiency you must attend and participate in at least 80% of the laboratory practicals throughout the semester. You are required to provide and wear appropriate protective equipment during the laboratory practical, including: covered, non-slip shoes, laboratory coat/gown and safety glasses. Disposable gloves and other protective equipment will be provided when required.

9. Risk management

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 research and understand the 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.

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 Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

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%
b) The course is graded using the Standard Grading scale
c) You have not failed an assessment task in the course due to academic misconduct

10.3 Assessment: Submission penalties

Late submission of assessment tasks will be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day
- 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task.

Weekdays and weekends are included in the calculation of days late.
To request an extension, you must contact your Course Coordinator and supply the required documentation to negotiate an outcome.

10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to Student Hub.

Contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au

10.5 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
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:
http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.6 General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Fraser Coast -** Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au