



The University of Southern Queensland

## Course specification

The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>.  
Please consult the web for updates that may occur during the year.

### Description: Biophysical Sciences in Nursing

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
NSC	1500	75144	1, 2008	ONC	1.00	Fraser Coast

<b>Academic group:</b>	FOSCI
<b>Academic org:</b>	FOS002
<b>Student contribution band:</b>	National Priority Nursing
<b>ASCED code:</b>	060399

## STAFFING

Examiner: Helen Ison

## RATIONALE

The purpose of this course is to assist students to understand the physics, chemistry, and biochemistry relevant to the functioning of the healthy human body. It also provides an understanding of basic microbiology and immunology from a clinical perspective, outlining the nature of the infectious process and its control.

## SYNOPSIS

This course contains the basic chemistry, biochemistry and physics necessary for understanding the functioning of the healthy human body and for nursing practice. It provides an introduction to the significance of microbes to human health and the fundamentals of infection control practice in the health care setting. The nature of infectious agents, mechanisms of pathogenicity and modes of microbial control are also investigated.

## OBJECTIVES

On completion of this course students will be able to:

1. demonstrate a knowledge of the principles of optics and acoustics as related to the eyes and ears (Quizzes; Mid-semester CMA Test; Mid-semester Short Answer Test);
2. utilise an understanding of the scientific basis of therapeutic and diagnostic devices used in health care settings (Quizzes; Mid-semester CMA Test; Mid-semester Short Answer Test);
3. demonstrate an understanding of basic chemical concepts with particular reference to chemical processes found within the healthy human body (Quizzes; Mid-semester CMA Test; Mid-semester Short Answer Test);
4. describe the structure and functions of cells and their processes at the molecular level (Quizzes, End-semester CMA Exam; End-semester Short Answer Exam);
5. demonstrate an understanding of the fundamental nature of viruses, bacteria, fungi and parasites and explain the relevance of microbes to human disease (Quizzes, End-semester CMA Exam; End-semester Short Answer Exam);

6. demonstrate an understanding of the fundamentals of controlling infections in a hospital setting and the relationship between infectious disease and patient immunological status (Quizzes, End-semester CMA Exam; End-semester Short Answer Exam).

## TOPICS

Description	Weighting (%)
1. PHYSICS: The metric system and measurement; Physics of human vision and hearing; Mechanics and heat as related to human function and therapeutic equipment; Electricity and its therapeutic application including safety; Gas laws including pressure, volume and temperature relationships.	21.00
2. CHEMISTRY: Nomenclature; Atomic theory, radiation and its therapeutic applications; Bonding; Chemical quantities, equations, reactions and equilibria; Solutions, Acids, bases and buffers.	23.00
3. BIOCHEMISTRY: Properties of biological molecules - Proteins, carbohydrates, nucleic acids and lipids; Enzymes, major metabolic pathways and biosynthetic processes; the cell membrane - Diffusion, osmosis, filtration and dialysis.	25.00
4. MICROBIOLOGY AND IMMUNOLOGY: Introduction to the bacteria, viruses, fungi and parasites; Concepts in controlling microbes; An overview of the human immune system; Concepts in infectious diseases and pathogenesis; Nosocomial infections; Epidemiology; Infection control.	31.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Jenkins, GW, Kemnitz, CP & Tortora, GJ 2007, *Anatomy and physiology: from science to life*, Wiley, USA.

Lee, G & Bishop, P 2006, *Microbiology and infection control for health professionals*, 3rd edn, Pearson, Sydney.

McCabe, B & Ison, H 2007, *Instructional guide: course NSC1500 biophysical sciences in nursing*, USQ Publication, Toowoomba.

## REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Bettelheim, FA, Brown, WH & March, J 2007, *Introduction to general, organic and biochemistry*, 8th edn, Harcourt Brace College, Fort Worth.

- Cree, L & Rischmiller, S 2001, *Science in nursing*, 4th edn, Harcourt Australia, Sydney.  
(revised)
- Cutnell, JD & Johnson, KW 2004, *Physics*, 6th edn, John Wiley & Sons, New York.
- Giancoli, DC 2004, *Physics: principles with applications*, 6th edn, Prentice Hall, New Jersey.
- Hewitt, PG, Suchocki, J & Hewitt, LA 2004, *Conceptual physical science*, 3rd edn, Addison Wesley Longman, Menlo Park CA.
- Hickman, R & Caon, M 1995, *Nursing science: matter & energy in the human body*, 2nd edn, MacMillan Education Australia, Melbourne.
- Hinwood, B 1993, *A textbook of science for the health professions*, 2nd edn, Chapman & Hall, London.
- Hollins, M 1992, *Medical physics*, Thomas Nelson and Sons Ltd, Surrey.
- Holum, JR 1998, *Fundamentals of general organic and biological chemistry*, 6th edn, John Wiley & Sons, New York.
- Lankford, TR 1984, *Integrated science for health students*, 3rd edn, Reston Publishing Company: Prentice Hall, Virginia.
- Marieb, EN 2007, *Human anatomy and physiology*, 7th edn, Benjamin Cummings, Menlo Park, Ca.
- Nave, C & Nave, B 1985, *Physics for the health sciences*, WB Saunders, Philadelphia.
- Robards, K & Welch, M 1991, *Science for health professionals*, Harper Educational, Artarmon.
- Sackheim, GI & Lehman, DD 1998, *Chemistry for the health sciences*, 8th edn, Prentice Hall, Upper Saddle River, NJ.
- Stoker, HS 2001, *General, organic and biological chemistry*, 2nd edn, Houghton Mifflin Company, Boston.
- Strube, P 2003, *Body works: physics and chemistry for nurses*, 2nd edn, Pearson Education Australia, Frenchs Forest, Sydney, NSW.
- Timberlake, K 2006, *Chemistry: An introduction to general, organic and biological chemistry*, 9th edn, Pearson/Benjamin Cummings, San Francisco.
- Young, HD & Freeman, RA 2003, *Sears and Zemensky's university physics*, 11th edn, Addison Wesley, Reading, Mass.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Examinations	3.00
Lectures	39.00
Private Study	110.00
Tutorials	13.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
PART A REST PHY/CHEM CMA TEST	50.00	30.00	03 Mar 2008 (see note 1)
QUIZ 1 - PHYSICS (OPEN BOOK)	24.00	7.00	24 Mar 2008
QUIZ 2 - CHEMISTRY (OPEN BOOK)	24.00	7.00	28 Apr 2008
PT B REST PHY/CHEM S/ANS TEST	15.00	5.00	30 Apr 2008 (see note 2)
QUIZ 3 - BIOCHEM (OPEN BOOK)	24.00	7.00	19 May 2008
QZ 4 - MICROB/IMMUN (OPEN)	24.00	9.00	16 Jun 2008
PART A RESTRICTED CMA EXAM	50.00	30.00	END S1 (see note 3)
PART B RESTRICTED S/ANS EXAM	15.00	5.00	END S1 (see note 4)

### NOTES

1. Examiner to advise date and details of the 1.5 hr multiple choice closed test (Part A). Part A - 1.5hr CMA Test - Phy & Chem.
2. Examiner to advise date and details of closed test (Part B). Part B - 1.5hr Short Answer Test - Phy & Chem.
3. Examination dates will be available during the Semester. Please refer to the examination timetable when published. Part A 1.5 hr exam - Biochem.& Micro.
4. Examination dates will be available during the Semester. Please refer to the examination timetable when published. Part B 1.5hr exam - Biochem.& Micro.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures and tutorials) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration. To maximize their chances of satisfying the objectives of the tutorial component of the course, students should attend and actively participate in the tutorial sessions in the course.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To satisfactorily complete an individual assessment item a student must achieve at least 50% of the marks or a grade of at least C-. (Depending upon the requirements in Statement 4 below, students may not have to satisfactorily complete each assessment item to receive a passing grade in this course).
- 3 Penalties for late submission of required work:  
There are no assignments in this course.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade a student must achieve at least 50% of the total weighted marks available for the course

- 5 Method used to combine assessment results to attain final grade:  
The final grades for students will be assigned on the basis of the weighted aggregate of the marks obtained for each of the summative assessment items in the course.
- 6 Examination information:  
Students are allowed access to specific materials during a Restricted Examination. The only materials that a candidate may use in a restricted examination for this course are: calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during examination). Students whose first language is not English, may, take an appropriate unmarked non-electronic translation dictionary (but not technical dictionary) into the examination. Dictionaries with any handwritten notes will not be permitted.
- 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held in the second week of the semester following this course offering and the examiner will advise students involved in writing of the date time and location of any such examination.
- 8 University Regulations:  
Students should read USQ Regulations 5.1 Definitions, 5.6 Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.