

**FACULTY OF SCIENCE**

**SCHOOL OF SCIENCE**

**2225SCE PHYSICAL MATHEMATICS IIB**

**COURSE OUTLINE SCE/12/01**

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**1.0 IDENTIFYING INFORMATION**

Catalogue Number:	2225SCE
Course Title:	Physical Mathematics IIB
Discipline Code:	010101
Program(s) for which course is designed:	1210 Bachelor of Science; 1209 Bachelor of Science in Laser Sciences; 1211 Bachelor of Science with Advanced Studies; 1051 Bachelor of Education - Secondary.
School:	Science
Faculty:	Science
Status of course within program:	Second Year, major course.
Credit point value:	5 CP
Prerequisites:	1201SCE/SCE1201N Mathematics 1A 1210SCE (Nathan)/SCE1210N Mathematics and Computing
Corequisite:	2223SCE/SCE2223 Physical Mathematics IIA
Prior Assumed:	Nil
Incompatible	SCE2225 Physical Mathematics IIB
Year and semester:	2002 Semester 1
Year of offer:	2002
Course Convenor:	Associate Professor Hans Gottlieb Office Location: N34, 0.22 Office Phone: 57556 Email address: H.Gottlieb@sct.gu.edu.au
Teaching team members:	Assoc Prof Hans Gottlieb, Ms Chris Grigg,

**2.0 OBJECTIVES:**

This course provides further mathematical techniques needed by mathematicians and physical scientists. It is a defining course for the Physical Mathematics major, and is a supporting mathematical course (prior assumed) for some courses in the Physics major. The purpose of this course is to provide students with further mathematical tools used for the more quantitative physical sciences.

**3.0 BRIEF DESCRIPTION:**

This course investigates further topics of analysis, vector analysis, differential equations, special functions, and Laplace transforms, for applications to physical problems.

**4.0 CONTENT:**

Analysis (Convergence) This segment studies the limits of sequences and series as an integer index tends to infinity.

Special Functions (Gamma and beta functions) These functions are defined by integrals and arise in a variety of contexts.

Vector Analysis (Further identities. Green's theorems. Orthogonal curvilinear coordinates. Jacobians.) Some concepts and formulae of 2223SCE Physical Mathematics IIA concerning integrals and spaces are extended.

Differential Equations (Wronskians. Variation of parameters) More solution methods for differential equations and properties of solutions are dealt with.

## **5.0 RATIONALE FOR CONTENT:**

The course covers some of the important mathematics at second year level required for a deeper appreciation and further utilization of the mathematics required for the physical sciences.

## **6.0 ORGANISATION AND TEACHING METHODS:**

Lectures, at the rate of about three per fortnight during the semester. (approx 3 hours)  
Problem classes, at the rate of about one per fortnight (approx 1 hour), based on problem sheets.

## **7.0 RATIONALE FOR TEACHING METHODS:**

Lectures allow the students to see the mathematics actually being worked out, and give them necessary practice in writing out mathematical symbols and formats.  
The problem classes give the Lecturer time to work through some problems from the problem sheets or past exams, and provide students with the opportunity to ask further questions.

## **8.0 ASSESSMENT:**

A one and a half hour examination at the end of the semester in the standard University end of semester examination period.

## **9.0 RATIONALE FOR ASSESSMENT:**

The examination tests students' understanding of the methodology of mathematical techniques discussed, and their ability to apply this methodology in solving mathematical problems. The end of semester examination allows time for assimilation of the course as a whole.

## **10.0 TEXTS AND SUPPORTING MATERIALS:**

Recommended Reading:

Boas, M.L. Mathematical Methods in the Physical Sciences, 2nd edn, New York Wiley, 1983.

or,

Spiegel, M.R. Vector Analysis and an Introduction to Tensor Analysis, Schaum, McGraw-Hill, and

Spiegel, M.R. Fourier Analysis with Application, Schaum, McGraw-Hill.

## **11.0 COURSE EVALUATION FOCUS:**

Feedback is obtained from students during the Problem Classes.  
A brief questionnaire may be handed out near the end of the course.  
Convenor will discuss report of evaluation with teaching team.

