

# **BACHELOR OF SCIENCE**

## **Programme Document**

### **School of Mathematical & Computing Sciences**

#### **Faculty of Sciences**

**(December, 2012)**

This programme document contains information about the Bachelor of Science programme in Mathematics, Computer Science and Information Systems – the programme structure, choice of units for double major degree, and unit details, etc.

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## **1 INTRODUCTION**

### **1.1 Award title: Bachelor of Science**

### **1.2 Background**

The School of Mathematical and Computing Sciences(SMCS) is created to provide high quality tertiary education and research in Mathematics, Statistics, Computer Science, Information Systems and related areas. The school aims to focus on teaching, research and consultancy of a quality that are on equality with International Standards. This enables us to adopt a research-led approach to our teaching which ensures that our students are fully prepared to generate the next wave of innovations when they graduate.

### **1.3 Rationale**

The School of Mathematical & Computing Sciences is one of schools under Faculty of Sciences (FoS) in College of Engineering, Science & Technology (CEST) and the school will offer Certificate, Trade Diploma, Higher Education Diploma and Bachelor of Science programs to accommodate single or double majors with flexible selection of units from Mathematics, Statistics, Computer Science and Information Systems.

The School of Mathematical & Computing Sciences contributes to the mission of Fiji National University (FNU) by providing mathematics major, a computer science major, information systems major, service to other departments, schools and colleges of FNU. The school focuses to measure whether students are meeting our goals for their Mathematics, Statistics, Computer science and Information system.

Within the computer industry, individuals with mathematics, statistics, computer science and Information systems expertise are employed by Internet service providers; Web search portals; and data processing, hosting, and related services firms. Others work for government, manufacturers of computer and electronic products, insurance companies, financial institutions, and universities. Areas in which someone with a degree in mathematics, statistics, computer science and information systems might find employment

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also includes artificial intelligence, biomedical information systems, computer design and engineering, computer networking, gaming systems, information technology, search engines, systems and software engineering, and computerized package distribution systems.

Graduates should be able to apply their knowledge and expertise in the development of computer-based solutions of complicated mathematical problems, including scientific and engineering calculations, and statistical analysis.

## **1.4 Graduate Profile**

This particular programme is designed to deliver at, an undergraduate level, a sound and comprehensive grounding, of the fundamentals and principles of Mathematics, Statistics, Computer science, Information systems and Information technology.

The graduates of the BSc Programme will be able to:

- Gain a degree level qualification for scientific research and analysis in industries.
- Address the needs of the local academic and industries.
- Enrol in higher degree programmes to upgrade their qualifications.
- Conduct action research to improve their quality of work.
- Design and develop appropriate projects, and write suitable project proposals.
- Acquire generic skills (teamwork, punctuality, meeting deadlines, communication, etc.)

## **1.5 Programme Philosophy**

The Bachelor of Science (B.Sc.) is a three year programme. Degree is awarded when a student has earned total credit points not less than 360 at or above level 500, with a minimum of 120 credit points at or above level 600 and a minimum of 120 credit points at or above level 700 and has performed satisfactory in generic skill units.

The programme philosophy is to ensure that the programme, Bachelor of Science, contributes to acquire skills of research, critical analysis, constructive synthesis and application to be able to demonstrate independence of thought in the areas of

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mathematics, statistics, computer science, Information systems and Information technology.

## **1.6 Aims and Objectives**

### **1.6.1 Aim**

This Programme aims to develop student's knowledge and skills in specific areas of Mathematics, Statistics, Computer science, Information technology and Information Systems to meet the demands of academia, industries, private and also the government sectors. Students can also choose one of the following subjects such as Physics, Chemistry, Biology, and Education with Mathematics or Computer Science or Information Systems for studying double major.

Teaching and learning activities that encourage students to be able to think independently, acquire life skills of teamwork, self-discipline and best practice approaches will be encouraged.

The ability to be able to carry out different types of researches will be emphasised, computer science and Information Systems programmes aims are to train the students to:

- A. Demonstrate the understanding of the fundamentals of Computer science and information systems and information technology.
- B. Enable them to solve problems intelligently.
- C. Meet the needs of ICT of Fiji and the region.
- D. Enable to establish the IT industry in Fiji.

### **1.6.2 Objectives**

Upon completion of the Programme students should be able to: -

- Demonstrate their ability to understand and apply the fundamental concept and principles in the proposed programme.
- Look at the situation and problem from a perspective where the fundamental issues are apparent.
- Have the ability to evaluate an existing computing based system, process, component and program.
- Work efficiently in teams in designing and implementing software systems.

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- Understand key ethical issues affecting computing and their responsibilities as professionals in the related area.
- Demonstrate a solid understanding of the concepts used in the field of study.
- Demonstrate the ability to use current techniques, skills and tools for ICT.
- Demonstrate the ability to apply mathematical foundations, algorithmic principles and computer science theory in the modeling and design of computing based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- Demonstrate a working knowledge of selected topics from calculus, algebra, linear algebra, analysis, statistics and a distribution of other branches of mathematics.
- Determine the validity of a given argument and be able to construct mathematical proofs independently.
- Carry out the mathematical basis of common algorithms, and the ability to calculate accurately and efficiently.
- Solve problems, including applications outside of mathematics, by means of intuition, creativity, guessing, and the experience gained through the study of particular examples and mathematical models.
- Communicate mathematical ideas clearly. They will use correct mathematical terminology and proper mathematical notation.
- Design and write computer programs that are correct, simple, clear, efficient, well organized, and well documented.
- Create and implement data structures and algorithms.
- Apply mathematical knowledge in the areas of calculus and discrete mathematics to problems in computer science.
- Determine the hardware and software aspects of computer systems that support application software development.
- Show competence in data gathering, statistical analysis, interpretation, and reporting of results for decision making.
- Maintain quality standard of practice in the workplace.
- Communicate ideas and results using good English.

## **1.7 Learning Outcomes**

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On successful completion of the programme a graduate should demonstrate knowledge and skills as follows:

**A: Knowledge and Understanding**

- Mathematical principles and techniques.
- Basic and advanced Computer Science and information systems principles.
- Mathematical principles that is fundamental to understanding of Computer Science issues.

**B: Intellectual/Cognitive Skills**

- Analyse a given problem and select the most appropriate methods for its solution.
- Evaluate the relative strengths of a range of theories, techniques, and tools for automation of solution.
- Analyse validity of expressions and formulas.
- Construct formal proofs using valid and correct Mathematical theorems and techniques
- Using artificial intelligence for the development of cognitive machines and their solutions.

**C: Practical Skills**

- Effectively use a range of software and development tools.
- Analyse performance of hardware.
- Evaluate efficacy of algorithms and solution techniques.

**D: Key Skills**

**Communication**

- Communicate effectively in written reports and oral presentations using appropriate terminology and technical language.

**Numeracy**

- Use mathematical techniques in the processes of analysis and design

**Problem Solving**

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- Analyse complex problems and design effective solutions.

**Working with Others**

- Plan and manage team projects using available support tools; work effectively as part of a team.

**Self-Learning**

- Organise activity and manage time in a programme of self-directed study.

## **2 PROGRAMME REGULATION**

### **2.1 Entry Requirements**

~~The minimum entry requirement for this programme is a pass in Form 7 (i.e. minimum of 250 out of 400) or foundation science programme, with pass in Mathematics and English and any other two subjects.~~

OR

Mature students (23 years and above) with relevant work experience will also be considered for candidature on a case by case basis subject to the selection committees approval or consent.

### **2.2 Credit Value**

2.2.1 University awards Bachelor of Science with single major or double major.

2.2.2 Bachelor of Science consist of -

- a. A total credit of not less than 360 points from units at 500-700 level
- b. A pass in two generic units

2.2.3 A double major in a science subject is awarded upon completion of –

- a. 120-130 credits each in two of the subjects
- b. In each majoring subject at least 20-25 credits are 500 level, 40-50 credits at 600 level and 60-70 credits at 700 levels in each of the major subjects.
- c. Criteria a and b apply simultaneously

2.2.4 A single major in a science subject, is awarded upon completion of-



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- a. 140-160 credits in the subject, with at least 30-35 credits are 500 level, 40-50 credits at 600 level and 60-70 credits at 700 level in each of the major subject.
- b. At least 75 credit in two other subjects wherein at least 20 credits is earned at 500,600 and 700 level each.
- c. At least 30 credit from any other subject units at 500-700 level or their equivalent
- d. Criteria b and c apply simultaneously.

### **2.3 Programme Duration**

A Bachelor of Science degree is a three (3) year study programme and maximum duration of five (5) years on full time basis and ten (10) years on part-time basis for completing the programme.

### **2.4 Credit Transfer**

Students have to apply for credit transfers of individual units. The School Board in accordance with the University Academic & Student Regulations (UASR) of the Fiji National University would consider and deliberate on credit transfers

### 3 PROGRAMME STRUCTURE

#### 3.1 Unit Table (B.Sc./B.Ed.)

The units offered for each major are outlined as below:

##### 3.1.1 Mathematics

Year-1		Credit	Pre-Requisite	Campuses
MTH515	Single Variable Calculus	12	Pass in Form 7 or Equivalent	TBA
MTH516	Solid Geometry and Multivariable Calculus	12	Pass in Form 7 or Equivalent	TBA
MTH514	Probability and Statistics	12	Pass in Form 7 or Equivalent	TBA
MTH511	Discrete Mathematics	13	Pass in Form 7 or Equivalent	TBA
<b>Year-2</b>				
MTH611	Real Analysis	15	Pass MTH515 or MTH516	TBA
MTH613	Linear Algebra	15	Pass MTH515 or MTH516	TBA
<u>Elective Units</u>				
MTH610	Ordinary & Partial Differential Equations	15	Pass MTH515 or MTH516	TBA
MTH612	Abstract Algebra	16	Pass MTH515 or MTH516	TBA
MTH 614	Inferential Statistics	15	Pass MTH 514	TBA
<b>Year-3</b>				
MTH710	Complex Analysis	20	Pass MTH 611	TBA
<u>Elective Units</u>				
MTH711	Numerical Analysis	20	Pass MTH611 or MTH613	TBA
MTH712	Linear Programming	20	Pass MTH613	TBA
MTH713	Stochastic Process	20	Pass MTH614	TBA
MTH714	Number Theory	20	Pass MTH612	TBA

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MTH715	Integral Transforms	20	Pass MTH610	TBA
MTH716	Classical Mechanics	20	Pass MTH610	TBA

**3.1.2 Computer Science**

	<b>Year-1</b>	<b>Credit</b>	<b>Pre-Requisite</b>	<b>Campuses</b>
CSC511	Foundations of Programming	16	Pass in Form 7 or equivalent	TBA
CSC512	Object Oriented Programming	16	Pass CSC511	TBA
<b>Year-2</b>				
CSC621	Data Structures and Algorithms	16	Pass CSC511	TBA
CSC622	Artificial Intelligence	16	Pass CSC511	TBA
CSC625	Software Engineering	16	Pass CSC511 and CSC512	TBA
<u>Elective Units</u>				
CSC633	Operating Systems	16	Pass CSC511	TBA
CSC635	Mobile Computing	16	Pass CSC511	TBA
CSC638	Compiler Design	16	Pass CSC511	TBA
<b>Year-3</b>				
CSC725	Cryptography	16	Pass CSC511	TBA
CSC720	Design and Analysis of Algorithms	16	Pass CSC621	TBA
CSC722	Data Communication and Networks	16	CSC511	TBA
<u>Elective Units</u>				
CSC711	Automata Theory	16	Pass CSC511 and MTH511	TBA



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		Points			Points			Points
MTH710	Complex Analysis	20	MTH 7XX	Elective 2 (Mathematics)	20	<b>Industrial Attachment</b>		
CSC720	Design and Analysis and Algorithms	16	CSC 7XX	Elective 1 (Computer Science)	16			
MTH 7XX	Elective 1 (Mathematics)	20	CSC 7XX	Elective 2 (Computer Science)	16			
<b>Total Credit Points</b>		<b>56</b>	<b>Total Credit Points</b>		<b>52</b>	<b>Total Credit Points</b>		

### 3.2.2 Mathematics and Other Major

This section describes the delivery of Mathematics and Other Major as double major program

Year 1									
Trimester 1				Trimester 2				Trimester 3	
Unit		Credit Points	Unit		Credit Points	Unit		Credit Points	
XXX	Major 2		XXX	Major 2		MTH516	Solid Geometry & Multivariable Calculus	12	
LNG501	English for Academic Purposes	8	MTH 514	Probability & Statistics	12	MTH 511	Discrete Mathematics	13	
MTH 515	Single Variable Calculus	12	XXX	Major 2		XXX	Major 2		
EVG501	Ethics and Value and Governance	11							
<b>Total Credit Points</b>			<b>Total Credit Points</b>			<b>Total Credit Points</b>			

Year 2									
Trimester 1				Trimester 2				Trimester 3	
Unit		Credit Points	Unit		Credit Points	Unit		Credit Points	
XXX	Major-2		XXX	Major-2		MTH 613	Linear Algebra	15	
MTH 611	Real Analysis	15	MTH 6XX	Elective 1 (Mathematics)	15	XXX	Major 2		
XXX	Major-2		XXX	Major2		MTH 6XX	Elective2 (Mathematics)	15	
<b>Total Credit Points</b>			<b>Total Credit Points</b>			<b>Total Credit Points</b>			

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Year 3								
Trimester 1			Trimester 2			Trimester 3		
Unit		Credit Points	Unit		Credit Points	Unit		Credit Points
MTH710	Complex Analysis	20	MTH 7XX	Elective 2 (Mathematics)	20	XXX	Elective 1(Major 2)	20
MTH 7XX	Elective1(Mathematics)	20	XXX	Major2		XXX	Elective 2 (Major2)	
<b>Total Credit Points</b>			<b>Total Credit Points</b>			<b>Total Credit Points</b>		

### 3.2.3 Computer Science and Other Major

This section describes the delivery of Computer Science with other majors as double major program.

Year 1									
Trimester 1			Trimester 2			Trimester 3			
Unit		Credit Points	Unit		Credit Points	Unit		Credit Points	
CSC511	Foundations of Programming	16	CSC512	Object Oriented Programming	16	EVG501	Ethics and Value and Governance	11	
LNG501	English for Academic Purposes	8	XXX	Major 2		MTH511	Discrete Mathematics	13	
XXX	Major 2		XXX	Major 2		XXX	Major 2		
<b>Total Credit Points</b>			<b>Total Credit Points</b>			<b>Total Credit Points</b>			

Year 2									
Trimester 1			Trimester 2			Trimester 3			
Unit		Credit Points	Unit		Credit Points	Unit		Credit Points	
CSC622	Artificial Intelligence	16	CSC625	Software Engineering	16	XXX	Major 2		
CSC XXX	Elective(Computer Science)		CSC621	Data structures and Algorithms		CSC725	Cryptography	16	
XXX	Major 2		XXX	Major 2		XXX	Major 2		
<b>Total Credit Points</b>			<b>Total Credit Points</b>			<b>Total Credit Points</b>			

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Year 3							
Trimester 1			Trimester 2			Trimester 3	
Unit		Credit Points	Unit		Credit Points	Unit	Credit Points
CSC720	Design and Analysis and Algorithms	16	CSC722	Data Communications and Networks	16	Industrial Attachment	
CSC7XX	Elective	16	XXX	Major 2	16		
XXX	Major 2		XXX	Major 2	16		
<b>Total Credit Points</b>			<b>Total Credit Points</b>			<b>Total Credit Points</b>	