

BSc (Hons) MATHEMATICS WITH COMPUTER SCIENCE/ FULL TIME - (UNDER REVIEW) - SCE 321

1. CONTEXT AND OBJECTIVES

The BSc (Hons) Mathematics with Computer Science course is an innovative programme of study which has been redesigned for students who wish to acquire knowledge in both Mathematics and Computer Science. With increasing dependence on computations in the scientific and business worlds, this course provides the skills required for undertaking careers in Mathematics, Business Analytics and Software Development.

It is indeed a programme of study that provides the students with a firm and comprehensive knowledge in computer and mathematical sciences for them to be able to work as mathematicians in professions requiring the application of mathematical tools in modern science, engineering and finance. Various sectors of industry face increasingly large-scale problems that can be solved only through specialised knowledge and skills in applied mathematics together with the knowledge of computer science.

The objectives are:

- to help students build, develop and apply mathematical models using advanced IT tools so as to solve theoretical and practical mathematical problems in industry.
- to deepen their knowledge of current research in mathematics and informatics so as to enable them to continue their education at a postgraduate level.
- to prepare graduates for employment in application areas that require substantial input from both disciplines.

2. LEARNING OUTCOMES

(a) Subject knowledge

- A thorough understanding of core mathematical principles
- Well-developed problem solving and analytical skills
- A grounding in statistical reasoning
- An ability to use computers, both for scientific computation and for general applications
- An appreciation of the ways in which mathematical thinking can be utilised in the real world
- Acquisition of specialist knowledge and understanding, especially towards the later stages of the programme
- A sound theoretical and practical understanding of computing science coupled with a wider competence in information technology

(b) Cognitive/Analytical

- Analyse and solve mathematical problems proficiently
- Appreciate ways in which mathematical thinking can be utilised in the real world
- Work under supervision on a placement that requires mathematical skills

(c) Professional/Practical skills

- Use computers and IT for data analysis and presentation, scientific computation and general purpose applications

(d) Transferable skills

- Information literacy skills, including the ability to research, summarise and understand mathematical topics and to reference it in an academically rigorous way

3. TEACHING AND LEARNING METHODS

Modules shall be taught over 10 weeks and shall include 3 hours of contact per week, involve 6 hours of self-study per week and 9 hours of other learning activities per week for each semester. The 30 hours of contact shall include class hours, tutorials and practicals.

- By its nature, mathematics has to be presented logically. Lectures and model examples to problems provide an insight of this logical structure. Lectures provide the core method for the presentation of the knowledge required for students to be successful.
- Tutorial problems and assignments enhance the student's logical reasoning skills and additionally develop skills in organising their reasoning, selection of techniques and application of mathematics for problem solving.
- Projects (Mini and final year) will offer the students the opportunity to identify what it takes to carry out a longer individual/ group-based investigation into the applications of Mathematics at work.
- Communication through reports and/or oral presentations forms part of some of the modules offered.
- Basic computer modelling skills are developed through the mathematical modelling modules with the use of appropriate software.

4. ENTRY REQUIREMENTS

● **General Requirements**

General: As per General Entry Requirements for admission to the University for undergraduate degrees.

- **Programme (Specific) Requirements**

Programme (Specific): Minimum Grade ‘C’ in Mathematics at GCE ‘A’ level.

5. PROGRAMME DURATION

	Normal	Maximum
Degree	3 years (6 semesters)	5 years (10 semesters)

6. MINIMUM LCCS CREDITS REQUIRED:

- For Degree Award: 200

Breakdown as follows:

	LCCS credits from		
Degree	Core Taught Modules	Project	Electives
BSc (Hons) Mathematics with Computer Science	156	14	30 ^{ab}

^a at least 12 LCCS credits from level/year 2.

^b at least 18 LCCS credits from level/year 3.

LCCS credits per Semester

Minimum: 18 LCCS credits; Maximum (including retake modules): 48 LCCS credits

7. ASSESSMENT AND DEADLINES

Each module will be assessed over 100 marks, which includes a written examination of one and a half hour duration for modules carrying six LCCS credits, unless specified otherwise, and a 3- hour paper for modules carrying twelve LCCS credits, and continuous assessment done during the semester or year. Written examinations accounting for 60%, will be carried out at the end of the semester in which they are taught.

The continuous assessment will count for 40% of the overall percentage mark of the module(s), except for a module where the structure makes for other specific provision(s). Continuous assessment may be based on practical work, presentations, seminars and/or assignments and class test.

An overall total of 40% is required for a candidate to pass a module.

Projects/Dissertations will carry 14 LCCS credits for degree award.

The following list of modules will be assessed solely by continuous assessment:

MA1118(1), MA1208(1), MA3010(5)

8. LIST OF MODULES

A. Core Modules (156 + 14 LCCS credits)

Code	Module Name	Contact Hrs L/T+P	Self-Study/hrs	Other Learning Activities/ hrs	LCCS Credits
MA1111(1)	Mathematical Techniques I	30+0	60	90	6
MA1112(1)	Mathematical Analysis I	30+0	60	90	6
MA1113(1)	Applied Mathematics I	30+0	60	90	6
MA1115(1)	Probability & Statistics	30+0	60	90	6
MA1118(1)	Spreadsheet Modelling and Simulation	20+20	60	80	6
DGT1031Y(1)	Database Systems & Administration	40+20	120	180	12
DGT1038Y(1)	Programming and Data Structures	40+20	120	180	12
MA1211(1)	Mathematical Techniques II	30+0	60	90	6
MA1212(1)	Mathematical Analysis II	30+0	60	90	6
MA1205(1)	Algebra for Computer Science	30+0	60	90	6
MA2111(3)	Numerical Analysis I	30+0	60	90	6
MA2112(3)	Mathematical Methods I	30+0	60	90	6
MA2113(3)	Mathematical Statistics	30+0	60	90	6
MA2104(3)	Complex Analysis	30+0	60	90	6
MA2118(3)	Linear Algebra	30+0	60	90	6
ICT2019Y(3)	Algorithms and Complexities	40+20	120	180	12
MA2212(3)	Linear Programming	30+0	60	90	6
MA2204(3)	Numerical Analysis II	30+0	60	90	6
MA2208(3)	Metric Spaces	30+0	60	90	6
MA3000Y(5)	Project	-	-	-	14
MA3101(5)	Measure & Integral	30+0	60	90	6
ICT3053Y(5)	Computer Networks and System Administration	40+20	120	180	12
DGT3122Y(5)	Distributed and Cloud Computing	40+20	120	180	12
MA3201(5)	Applied Probability	30+0	60	90	6

B. Electives (Not all modules may be on offer)

Code	Module Name	Contact hrs L/T+P	Self-Study/hrs	Other Learning Activities/ /hrs	LCCS Credits
MA1208(1)	Advanced Spreadsheet Modelling and Simulation	20+20	60	80	6
ICDT1016Y(1)	Communications and Business Skills for IT	60+0	120	180	12
DGT1032Y(1)	Web Design And Development	40+20	120	180	12
MA2002(3)	Discrete Mathematics	30+0	60	90	6
MA2003(3)	Vector & Tensor Analysis	30+0	60	90	6
DGT2035Y(3)	Software Modelling and Design	40+20	120	180	12
MA2203(3)	Linear Regression Analysis	30+0	60	90	6
MA2205(3)	Numerical Linear Algebra	30+0	60	90	6
MA2010(3)	Data Science and Data Analytics	30+0	60	90	6
MA3003(5)	Numerical Solution of PDE's	30+0	60	90	6
MA3004(5)	Optimisation	30+0	60	90	6
MA3010(5)	Mathematical Modelling	30+0	60	90	6
MA3011(5)	Time Series Analysis I	30+0	60	90	6
MA3102(5)	Fluid Dynamics I	30+0	60	90	6
DGT3123Y(5)	Mobile Computing and Wireless Technologies	40+20	120	180	12
MA3202(5)	Functional Analysis	30+0	60	90	6
MA3203(5)	Multivariate Analysis	30+0	60	90	6

Note: Contact Hours: L= Lectures, T=Tutorials, P = Practicals

9. PROGRAMME PLAN

				<u>YEAR 1</u>			
Semester 1 Code	Module Name	Hrs/wk L/T+P	LCCS Credits	Semester 2 Code	Module Name	Hrs/wk L/T+P	LCCS Credits
CORE				CORE			
MA1111(1)	Mathematical Techniques I	3+0	6	MA1211(1)	Mathematical Techniques II	3+0	6
MA1112(1)	Mathematical Analysis I	3+0	6	MA1212(1)	Mathematical Analysis II	3+0	6
MA1113(1)	Applied Mathematics I	3+0	6	MA1205(1)	Algebra for Computer Science	3+0	6
MA1115(1)	Probability & Statistics	3+0	6				
MA1118(1)	Spreadsheet Modelling and Simulation	2+2	6				
DGT1031Y(1)	Database Systems and Administration	2+1	12				
DGT1038Y(1)	Programming and Data Structures	2+1	12				
ELECTIVES:							
ICDT1016Y(1)	Communications and Business Skills for IT	3+0	12	MA1208(1)	Advanced Spreadsheet Modelling and Simulation	2+2	6
DGT1032Y(1)	Web Design and Development	2+1	12	Subtotal			72

				<u>YEAR 2</u>			
Semester 1 Code	Module Name	Hrs/wk L/T+P	LCCS Credits	Semester 2 Code	Module Name	Hrs/wk L/T+P	LCCS Credits
CORE				CORE			
MA2111(3)	Numerical Analysis I	3+0	6	MA2212(3)	Linear Programming	3+0	6
MA2112(3)	Mathematical Methods I	3+0	6	MA2204(3)	Numerical Analysis II	3+0	6
MA2113(3)	Mathematical Statistics	3+0	6	MA2208(3)	Metric Spaces	3+0	6
MA2104(3)	Complex Analysis	3+0	6				
MA2118(3)	Linear Algebra	3+0	6				
ICT2019Y(3)	Algorithms and Complexities	2+1	12				

NOTE: AT LEAST 12 LCCS CREDITS FROM THE FOLLOWING ELECTIVES:

DGT2035Y(3)	Software Modelling and Design	2+1	12	MA2203(3)	Linear Regression Analysis	3+0	6
MA2002(3)	Discrete Mathematics	3+0	6	MA2205(3)	Numerical Linear Algebra	3+0	6

MA2003(3)	Vector & Tensor Analysis	3+0	6	MA2010(3)	Data Science and Data Analytics	3+0	6
Subtotal							72

YEAR 3

Semester 1 Code	Module Name	Hrs/ Wk L/T+P	LCCS Credits	Semester 2 Code	Module Name	Hrs/ Wk L/T+P	LCCS Credits
CORE				CORE			
MA3000Y(5)	Project	-	14	MA3201(5)	Applied Probability	3+0	6
MA3101(5)	Measure & Integral	3+0	6				
Either							
ICT3053Y(5)	Computer Networks and System Administration	2+1	12				
Or							
DGT3122Y(5)	Distributed and Cloud Computing	2+1	12				

NOTE: AT LEAST 18 LCCS CREDITS FROM THE FOLLOWING ELECTIVES:

DGT3123Y(5)	Mobile Computing and Wireless Technologies	2+1	12	MA3202(5)	Functional Analysis	3+0	6
MA3003(5)	Numerical Solution of PDE's	3+0	6	MA3203(5)	Multivariate Analysis	3+0	6
MA3004(5)	Optimisation	3+0	6				
MA3010(5)	Mathematical Modelling	3+0	6				
MA3011(5)	Time Series Analysis I	3+0	6				
MA3102(5)	Fluid Dynamics I	3+0	6				

Subtotal							56
Grand Total							200