MATHEMATICS

THINK

ANALYSE

EVALUATE

STRATEGISE

COMMUNICATE

www.math.um.edu.my
BACHELOR OF SCIENCE IN MATHEMATICS  
SESSION 2018/2019  
(125 CREDITS)

1. UNIVERSITY COURSES (20 CREDITS)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLTxxxx</td>
<td>Communication in English</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>GKN/GKR/GKV</td>
<td>Co-curriculum</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1001</td>
<td>Islamic and Asian Civilization (TITAS)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1002/</td>
<td>Ethnic Relations/</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1006</td>
<td>Introduction to Malaysia</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1003</td>
<td>Basic Entrepreneurship Culture</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1004</td>
<td>Information Skills</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1005</td>
<td>Social Engagement</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIXxxxx</td>
<td>External Faculty Elective Course</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

2. CORE COURSES (70 CREDITS)

(I) FACULTY CORE COURSES (8 CREDITS) [TF]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIX1001</td>
<td>Introduction to Science and Technology Studies</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SIX1002</td>
<td>Ethics and Safety</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>SIX1004</td>
<td>Statistics</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

(II) PROGRAM CORE COURSES (62 CREDITS) [TP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM1001</td>
<td>Basic Mathematics</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SIM1002</td>
<td>Calculus I</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SIM1003</td>
<td>Calculus II</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIN1001</td>
<td>Introduction to Computing</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>SIN1002</td>
<td>Introduction to Worksheet</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>SIN1003</td>
<td>Mathematical Methods I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIT1001</td>
<td>Probability and Statistics I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
</tbody>
</table>

LEVEL 1 (24 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM2001</td>
<td>Advanced Calculus</td>
<td>SIM1003</td>
<td>4</td>
</tr>
<tr>
<td>SIM2002</td>
<td>Linear Algebra</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIM2003</td>
<td>Introduction to Combinatorics</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIM2004</td>
<td>Algebra I</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIM2005</td>
<td>Introduction to Analysis</td>
<td>SIM1003</td>
<td>4</td>
</tr>
<tr>
<td>SIM2006</td>
<td>Complex Variables</td>
<td>SIM1003</td>
<td>4</td>
</tr>
<tr>
<td>SIM2007</td>
<td>Appreciation of Mathematics</td>
<td>SIM1003</td>
<td>2</td>
</tr>
<tr>
<td>SIN2001</td>
<td>Mathematical Methods II</td>
<td>SIM1003</td>
<td>4</td>
</tr>
<tr>
<td>SIN2002</td>
<td>Structured Programming</td>
<td>SIM1002</td>
<td>4</td>
</tr>
</tbody>
</table>

LEVEL 2 (34 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM3015</td>
<td>Mathematical Science Project</td>
<td>SIM2002</td>
<td>4</td>
</tr>
</tbody>
</table>

LEVEL 3 (4 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIN3015</td>
<td>Mathematical Science Project</td>
<td>SIM2002</td>
<td>4</td>
</tr>
</tbody>
</table>

3. ELECTIVE COURSES (35 CREDITS)

(I) PROGRAM ELECTIVE COURSES (at least 28 CREDITS) [EP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM2008</td>
<td>Theory of Differential Equations</td>
<td>SIM1003 and SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIM2009</td>
<td>Geometry</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIM3001</td>
<td>Graph Theory</td>
<td>SIM2003</td>
<td>4</td>
</tr>
<tr>
<td>SIM3002</td>
<td>Combinatorial Mathematics</td>
<td>SIM2003</td>
<td>4</td>
</tr>
<tr>
<td>SIM3003</td>
<td>Number Theory</td>
<td>SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIM3004</td>
<td>Advanced Linear Algebra</td>
<td>SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIM3005</td>
<td>Matrix Theory</td>
<td>SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIM3006</td>
<td>Algebra II</td>
<td>SIM2004</td>
<td>4</td>
</tr>
<tr>
<td>SIM3007</td>
<td>Ring Theory</td>
<td>SIM2004</td>
<td>4</td>
</tr>
<tr>
<td>SIM3008</td>
<td>Group Theory</td>
<td>SIM2004</td>
<td>4</td>
</tr>
<tr>
<td>SIM3009</td>
<td>Differential Geometry</td>
<td>SIM2001</td>
<td>4</td>
</tr>
<tr>
<td>SIM3010</td>
<td>Topology</td>
<td>SIM2001</td>
<td>4</td>
</tr>
<tr>
<td>SIM3011</td>
<td>Complex Analysis</td>
<td>SIM2006</td>
<td>4</td>
</tr>
<tr>
<td>SIM3012</td>
<td>Real Analysis</td>
<td>SIM2005</td>
<td>4</td>
</tr>
<tr>
<td>SIM3013</td>
<td>Probabilistic Methods in Combinatorics</td>
<td>SIM2003 and SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIN3014</td>
<td>Industrial Training</td>
<td>SIM2002</td>
<td>5</td>
</tr>
</tbody>
</table>

(II) FACULTY ELECTIVE COURSES (7 CREDITS) [EF]

* Courses Offered by Other Institute/Department within the Faculty of Science
* Refer to the Faculty Elective Courses lists other than from the Institute of Mathematical Sciences but
The exact number of elective courses offered in each year may differ. Core courses, from the Bachelor of Science in Applied Mathematics, Bachelor of Science in Statistics or Bachelor of Actuarial Science programs may be taken as elective courses. Please refer to the respective programs.

Attention:
1. Students who wish to specialize in Bachelor of Science in Mathematics must take at least 24 credits from courses with codes SIM3***/SIN3***/SIT3***/SIQ3*** (except SIN3014) of which at least 12 credits must be from SIM3***.
2. Students who wish to take SIN3014 or SIN3015 must pass at least 80 credits of the listed mathematics courses.
PROGRAM GOAL

To produce graduates with a sound knowledge of mathematics, capable of analysing and solving problems and thinking critically, able to adapt to diverse environments and contribute significantly in various professions.

PROGRAM EDUCATIONAL OBJECTIVES

1. Give opportunity to students to acquire the fundamental knowledge of mathematics. (PO1,2,6)
2. Prepare students with necessary mathematical and practical skills to assist them in their employment and research work. (PO1,2,6,7,8)
3. Guide and train students to communicate effectively and to be able to work independently as well as in teams. (PO3,4,5)

PROGRAM LEARNING OUTCOMES

At the end of the program, graduates with Bachelor of Science in Mathematics are able to:

1. Explain mathematical theory (pure, applied and statistics) which includes mathematical arguments, proofs and abstract concepts.
2. Perform mathematical computation, apply mathematical software and formulate real problems as mathematical models.
3. Conduct professional activities with good social skills, and demonstrate sense of responsibility in society.
4. Practice characteristics associated with professionalism and ethical responsibility in the field of mathematics.
5. Communicate relevant concepts effectively and accurately.
6. Analyse and assess problems, and develop strategies to obtain solutions.
7. Engage in life-long learning to advance knowledge and applications of mathematics.
8. Apply managerial and entrepreneurial skills to manage resources needed to complete a task.
# BACHELOR OF SCIENCE IN MATHEMATICS

## List of Courses According to Semester

### Planning of Courses

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>YEAR 1</th>
<th></th>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
<td>CREDIT</td>
</tr>
<tr>
<td>University Courses</td>
<td></td>
<td>GLT Communication in English</td>
<td>3</td>
<td>GLT Communication in English</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIG1001 / GLT1017* TITAS / Basic Malay Language*</td>
<td>2</td>
<td>GIG1002 / GIG1006* Ethnic Relations/ Introduction to Malaysia*</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIG1004 Information Literacy</td>
<td></td>
<td>GIG1005 Social Engagement</td>
<td>2</td>
</tr>
<tr>
<td>Core Courses</td>
<td></td>
<td>SIX1004 Statistics</td>
<td>3</td>
<td>SIX1001 Introduction to Science and Technology Studies</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIX1002 Ethics and Safety</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIM1001 Basic Mathematics</td>
<td>4</td>
<td>SIM1003 Calculus II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIM1002 Calculus I</td>
<td>4</td>
<td>SINT1002 Introduction to Worksheet</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIN1001 Introduction to Computing</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td></td>
<td>18</td>
<td></td>
<td>20</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>YEAR 2</th>
<th></th>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
<td>CREDIT</td>
</tr>
<tr>
<td>University Courses</td>
<td></td>
<td>GIG1003 Basic Entrepreneurship Culture</td>
<td>2</td>
<td>GKN/GRK/GKV Co-Curriculum</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIX External Faculty Electives Course</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Core Courses</td>
<td></td>
<td>SIT1001 Probability and Statistics I</td>
<td>4</td>
<td>SIM2005 Introduction to Analysis</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIN1003 Mathematical Methods I</td>
<td>4</td>
<td>SIM2006 Complex Variables</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIM2001 Advanced Calculus</td>
<td>4</td>
<td>SIM2007 Appreciation of Mathematics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIM2002 Linear Algebra</td>
<td>4</td>
<td>SIN2001 Mathematical Methods II</td>
<td>4</td>
</tr>
<tr>
<td>Elective Courses</td>
<td>Faculty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td></td>
<td>18</td>
<td></td>
<td>18</td>
<td>36</td>
</tr>
</tbody>
</table>
### YEAR 3

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>COURSE</th>
<th>CREDIT</th>
<th>COURSE</th>
<th>CREDIT</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses Program</td>
<td>SIM2003 Introduction to Combinatorics</td>
<td>4</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>SIM2004 Algebra I</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIN2002 Structured Programming</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty Courses outside of Institute</td>
<td>3</td>
<td></td>
<td>Courses outside of Institute</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Elective Courses Program</td>
<td>SIM 2*** / 3***</td>
<td>4</td>
<td>SIM 3***</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SIM 3***</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SIM 3***</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SIM 3***</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>19</td>
<td></td>
<td>18</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

### YEAR 4

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>COURSE</th>
<th>CREDIT</th>
<th>COURSE</th>
<th>CREDIT</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses Program</td>
<td>SIN3015 Mathematical Science Project</td>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Elective Courses Faculty Courses outside of Institute</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Program</td>
<td>SIM 3***</td>
<td>4</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>SIM 3***</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>14</td>
<td></td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 1. UNIVERSITY COURSES (20 CREDITS)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLTxxxx</td>
<td>Communication in English</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>GKN/GKR/GKV</td>
<td>Co-curriculum</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1001</td>
<td>Islamic and Asian Civilization (TITAS)</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1002/</td>
<td>Ethnic Relations/</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1006</td>
<td>Introduction to Malaysia</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1003</td>
<td>Basic Entrepreneurship Culture</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1004</td>
<td>Information Skills</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1005</td>
<td>Social Engagement</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIxxxx</td>
<td>External Faculty Elective Course</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

### 2. CORE COURSES (73 CREDITS)

#### (I) FACULTY CORE COURSES (8 CREDITS) [TF]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIX1001</td>
<td>Introduction to Science and Technology Studies</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>SIX1002</td>
<td>Ethics and Safety</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>SIX1004</td>
<td>Statistics</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

#### (II) PROGRAM CORE COURSES (65 CREDITS) [TP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVEL 1 (24 Credits)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIM1001</td>
<td>Basic Mathematics</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>SIM1002</td>
<td>Calculus I</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>SIM1003</td>
<td>Calculus II</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIN1001</td>
<td>Introduction to Computing</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>SIN1002</td>
<td>Introduction to Worksheet</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>SIN1003</td>
<td>Mathematical Methods I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIN1004</td>
<td>Mathematical Methods II</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIT1001</td>
<td>Probability and Statistics I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
</tbody>
</table>

| LEVEL 2 (36 Credits) |
| SIM2001     | Advanced Calculus                                | SIM1003       | 4       |
| SIM2002     | Linear Algebra                                   | SIM1001       | 4       |
| SIN2001     | Mathematical Methods II                          | SIN1003       | 4       |
| SIN2002     | Structured Programming                           | SIM1002       | 4       |
| SIN2003     | Basic Operational Research                       | SIM1001 and SIN1002 | 4       |
| SIN2004     | Partial Differential Equations                   | SIN1003       | 4       |
| SIN2005     | System of Ordinary Differential Equations        | SIN1003       | 4       |
| SIN2006     | Vector Analysis                                  | SIM1003       | 4       |
| SIT2001     | Probability and Statistics II                    | SIT1001       | 4       |

| LEVEL 3 (5 Credits) |
| SIN3014     | Industrial Training                              | SIM2002       | 5       |

#### 3. ELECTIVE COURSES (35 CREDITS)

##### (I) PROGRAM ELECTIVE COURSES (at least 28 CREDITS) [EP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIN2007</td>
<td>Management Mathematic</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIN2008</td>
<td>Optimization Technique</td>
<td>SIM2001</td>
<td>4</td>
</tr>
<tr>
<td>SIN2009</td>
<td>Computer Graphics</td>
<td>SIN1001 and SIN2002</td>
<td>4</td>
</tr>
<tr>
<td>SIN3001</td>
<td>Introduction to Quantum Mechanics with Computers</td>
<td>SIN2002</td>
<td>4</td>
</tr>
<tr>
<td>SIN3002</td>
<td>Cryptography</td>
<td>SIN2002 and SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIN3003</td>
<td>Computational Fluid Dynamics</td>
<td>SIN2004</td>
<td>4</td>
</tr>
<tr>
<td>SIN3004</td>
<td>Analysis of Mathematical Models</td>
<td>SIN2005</td>
<td>4</td>
</tr>
<tr>
<td>SIN3005</td>
<td>Numerical Methods and Analysis</td>
<td>SIN2001</td>
<td>4</td>
</tr>
<tr>
<td>SIN3006</td>
<td>Production and Inventory Control</td>
<td>SIN2003 or SIN2007</td>
<td>4</td>
</tr>
<tr>
<td>SIN3007</td>
<td>Heuristic Methods</td>
<td>SIN2002</td>
<td>4</td>
</tr>
<tr>
<td>SIN3008</td>
<td>Mathematical Programming</td>
<td>SIN2003</td>
<td>4</td>
</tr>
<tr>
<td>SIN3009</td>
<td>Industrial Operational Research</td>
<td>SIN2003</td>
<td>4</td>
</tr>
<tr>
<td>SIN3010</td>
<td>Computational Geometry</td>
<td>SIN2002</td>
<td>4</td>
</tr>
<tr>
<td>SIN3011</td>
<td>Scientific Computing</td>
<td>SIN2002</td>
<td>4</td>
</tr>
<tr>
<td>SIN3012</td>
<td>Mechanics</td>
<td>SIN2006</td>
<td>4</td>
</tr>
<tr>
<td>SIN3013</td>
<td>Fourier and Wavelets Analysis</td>
<td>SIN1001 and SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIN3015</td>
<td>Mathematical Science Project</td>
<td>SIM2002</td>
<td>4</td>
</tr>
</tbody>
</table>

##### (II) FACULTY ELECTIVE COURSES (7 CREDITS) [EF]
<table>
<thead>
<tr>
<th>* Courses Offered by Other Institute/Department within the Faculty of Science</th>
<th>* Refer to the Faculty Elective Courses lists other than from the Institute of Mathematical Sciences but within the Faculty of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>The exact number of elective courses offered in each year may differ. Core courses, from the Bachelor of Science in Mathematics, Bachelor of Science in Statistics or Bachelor of Actuarial Science programs may be taken as elective courses. Please refer to the respective programs.</td>
<td></td>
</tr>
</tbody>
</table>

**Attention:**

1. Students who wish to specialize in Bachelor of Science in Applied Mathematics must take at least 20 credits from courses with codes SIN3***/SIM3***/SIT3***/SIQ3*** (except SIN3014) of which at least 12 credits must be from SIN3***.
2. Students who wish to take SIN3014 or SIN3015 must pass at least 80 credits of the listed mathematics courses.
PROGRAM GOAL

To produce graduates with a sound knowledge in applied mathematics, capable of analysing and solving problems and thinking critically, able to adapt to diverse environment and contribute significantly in various professions.

PROGRAM LEARNING OUTCOMES

At the end of the program, graduates with Bachelor of Science in Applied Mathematics are able to:

1. Explain the principles and concepts of mathematics and its applications;
2. Apply the mathematical principles in solving real world problems;
3. Conduct professional activities with good social skill and demonstrate a sense of responsibility;
4. Practice characteristics associated with professionalism and ethical responsibility in the field of mathematical applications;
5. Communicate using critical thinking with effective, accurate and relevant concepts;
6. Convert problems into mathematical models, and develop scientific strategies to obtain solutions;
7. Engage in life-long learning to advance knowledge and applications of mathematics;
8. Apply managerial and entrepreneurial skills to manage resources needed to complete a task.
## LIST OF COURSES ACCORDING TO SEMESTER
(PLANNING OF COURSES)

**BACHELOR OF SCIENCE IN APPLIED MATHEMATICS**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>YEAR 1</th>
<th></th>
<th></th>
<th>YEAR 2</th>
<th></th>
<th></th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEMESTER 1</td>
<td>SEMESTER 2</td>
<td></td>
<td>SEMESTER 1</td>
<td>SEMESTER 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
<td>CREDIT</td>
</tr>
<tr>
<td>University Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GLT Communication in English</td>
<td>3</td>
<td>GLT Communication in English</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>GIG1001 / GLT1017* TITAS / Basic Malay Language*</td>
<td>2</td>
<td>GIG1002 / GIG1006* Ethnic Relations/ Introduction to Malaysia*</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIG1004 Information Literacy</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIG1005 Social Engagement</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIX1004 Statistics</td>
<td>3</td>
<td>SIX1001 Introduction to Science and Technology Studies</td>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIX1002 Ethics and Safety</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIM1001 Basic Mathematics</td>
<td>4</td>
<td>SIM1003 Calculus II</td>
<td>4</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIM1002 Calculus I</td>
<td>4</td>
<td>SIN1002 Introduction to Worksheet</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIN1001 Introduction to Computing</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>18</td>
<td>20</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>YEAR 2</th>
<th></th>
<th></th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEMESTER 1</td>
<td>SEMESTER 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
<td>CREDIT</td>
<td></td>
</tr>
<tr>
<td>University Courses</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>GIG1003 Basic Entrepreneurship Culture</td>
<td>2</td>
<td>GKN/GRK/GKV Co-Curriculum</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>GIX External Faculty Electives Course</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT1001 Probability and Statistics I</td>
<td>4</td>
<td>SIN2001 Mathematical Methods II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>SIN1003 Mathematical Methods I</td>
<td>4</td>
<td>SIN2002 Structured Programming</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>SIN2003 Basic Operational Research</td>
<td>4</td>
<td>SIN2006 Vector Analysis</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>SIM2001 Advanced Calculus</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective Courses</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Faculty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courses outside of ISM</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>18</td>
<td>18</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>
### COMPONENT

#### YEAR 3

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
<th>SEMESTER 3</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program SIN2004 Partial Differential Equations</td>
<td>4</td>
<td>SIN2005 System of Differential Equations</td>
<td>4</td>
<td>SIN3014 Industrial Training</td>
</tr>
<tr>
<td>Faculty Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIN2***/SIN3***</td>
<td>4</td>
<td>SIN2***/SIN3***</td>
<td>4</td>
<td><strong>16</strong></td>
</tr>
<tr>
<td>SIN2***/SIN3***</td>
<td>4</td>
<td>SIN2***/SIN3***</td>
<td>4</td>
<td><strong>16</strong></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>19</td>
<td>18</td>
<td>5</td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

### COMPONENT

#### YEAR 4

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program SIN2***/SIN3***</td>
<td>4</td>
<td><strong>12</strong></td>
<td></td>
</tr>
<tr>
<td>SIN2***/SIN3***</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIN2***/SIN3***</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>12</td>
<td><strong>12</strong></td>
<td></td>
</tr>
</tbody>
</table>

---

Faculty of Science Handbook, Session 2018/2019
BACHELOR OF SCIENCE IN STATISTICS
SESSION 2018/2019
(127 CREDITS)

1. UNIVERSITY COURSES (20 CREDITS)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLTxxxx</td>
<td>Communication in English</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>GKN/GKR/GKV</td>
<td>Co-curriculum</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1001</td>
<td>Islamic and Asian Civilization (TITAS)</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1002/GIG1006</td>
<td>Ethnic Relations/ Introduction to Malaysia</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1003</td>
<td>Basic Entrepreneurship Culture</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1004</td>
<td>Information Skills</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIG1005</td>
<td>Social Engagement</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>GIxxxxx</td>
<td>External Faculty Elective Course</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

2. CORE COURSES (72 CREDITS)

(I) FACULTY CORE COURSES (8 CREDITS) [TF]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIX1001</td>
<td>Introduction to Science and Technology Studies</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>SIX1002</td>
<td>Ethics and Safety</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>SIX1004</td>
<td>Statistics</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

(II) PROGRAM CORE COURSES (64 CREDITS) [TP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVEL 1 (24 Credits)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIM1001</td>
<td>Basic Mathematics</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>SIM1002</td>
<td>Calculus I</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>SIM1003</td>
<td>Calculus II</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIN1001</td>
<td>Introduction to Computing</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>SIN1002</td>
<td>Introduction to Worksheet</td>
<td>SIM1002</td>
<td>2</td>
</tr>
<tr>
<td>SIN1003</td>
<td>Mathematical Methods I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIT1001</td>
<td>Probability and Statistics I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
</tbody>
</table>

LEVEL 2 (36 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM2001</td>
<td>Advanced Calculus</td>
<td>SIM1003</td>
<td>4</td>
</tr>
<tr>
<td>SIM2002</td>
<td>Linear Algebra</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIN2001</td>
<td>Mathematical Methods II</td>
<td>SIN1003</td>
<td>4</td>
</tr>
<tr>
<td>SIN2002</td>
<td>Structured Programming</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIT2001</td>
<td>Probability and Statistics II</td>
<td>SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2002</td>
<td>Further Mathematical Statistics</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2003</td>
<td>Stochastic Processes</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2004</td>
<td>Regression Analysis</td>
<td>SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2005</td>
<td>Data Analysis I</td>
<td>SIT1001</td>
<td>4</td>
</tr>
</tbody>
</table>

LEVEL 3 (4 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIT3001</td>
<td>Introduction to Probability Theory</td>
<td>SIM2001 and SIT2002</td>
<td>4</td>
</tr>
</tbody>
</table>

3. ELECTIVE COURSES (35 CREDITS)

(I) PROGRAM ELECTIVE COURSES (at least 28 CREDITS) [EP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIT2006</td>
<td>Non-parametric Statistics</td>
<td>SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIN3014</td>
<td>Industrial Training</td>
<td>SIM2002</td>
<td>5</td>
</tr>
<tr>
<td>SIN3015</td>
<td>Mathematical Science Project</td>
<td>SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIT3002</td>
<td>Introduction to Multivariate Analysis</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3003</td>
<td>Computer Intensive Methods in Statistics</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3004</td>
<td>Applied Stochastic Processes</td>
<td>SIT2003</td>
<td>4</td>
</tr>
<tr>
<td>SIT3005</td>
<td>Time Series and Forecasting Methods</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3006</td>
<td>Further Topics in Regression Analysis</td>
<td>SIT2001 and SIT2004</td>
<td>4</td>
</tr>
<tr>
<td>SIT3007</td>
<td>Data Analysis II</td>
<td>SIT2001 and SIT2005</td>
<td>4</td>
</tr>
<tr>
<td>SIT3008</td>
<td>Introduction to Survey Sampling</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3009</td>
<td>Statistical Process Control</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3010</td>
<td>Introduction to Data Mining</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3011</td>
<td>Bioinformatics</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3012</td>
<td>Design and Analysis of Experiments</td>
<td>SIT1001 and SIT2004</td>
<td>4</td>
</tr>
<tr>
<td>SIT3013</td>
<td>Analysis of Failure and Survival Data</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3014</td>
<td>Introduction to Bayesian Statistics</td>
<td>SIT2001</td>
<td>4</td>
</tr>
</tbody>
</table>

(II) FACULTY ELECTIVE COURSES (7 CREDITS) [EF]

* Courses Offered by Other Institute/Department within the Faculty of Science
* Refer to the Faculty Elective Courses lists other than from the Institute of Mathematical Sciences but within the Faculty of Science
The exact number of elective courses of department offered in each year may be different, depending on the availability of manpower. Core courses in Bachelor of Science in Mathematics, Bachelor of Science in Applied Mathematics or Bachelor of Actuarial Science can also be taken as elective courses of department for this program. Please refer to the respective programs.

**Attention:**

1. Students who wish to specialize in Bachelor of Science in Statistics must take at least 20 credits from courses with codes SIT3*** (not including SIN3014) listed in this program.
2. Students who wish to take SIN3014 or SIN3015 must pass at least 80 course credits listed in this program.
PROGRAM GOAL

To produce graduates with a sound knowledge of mathematics and statistics, thinking critically, solving problems, capable to adapt to diverse environment and capable of life-long learning.

PROGRAM LEARNING OUTCOMES

At the end of the program, graduates with Bachelor of Science in Statistics are able to:

1. Explain the principles and concepts of mathematics and statistics;
2. Apply the mathematical and statistical principles in solving real world problems;
3. Conduct professional activities with good social skill and demonstrate a sense of responsibility;
4. Practice characteristics associated with professionalism and ethical responsibility in analyzing real life phenomena;
5. Communicate using critical thinking with effective, accurate and relevant concepts, and exhibit team work and leadership skills;
6. Convert problems into mathematical and statistical models, and develop scientific strategies to obtain solutions;
7. Engage in life-long learning to advance knowledge and applications of mathematics and statistics;
8. Apply managerial and entrepreneurial skills to manage resources needed to complete a task.
### BACHELOR OF SCIENCE IN STATISTICS

#### LIST OF COURSES ACCORDING TO SEMESTER

**(PLANNING OF COURSES)**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>YEAR 1</th>
<th></th>
<th></th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SEMESTER 1</td>
<td>SEMESTER 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
</tr>
<tr>
<td>University Courses</td>
<td></td>
<td>GLT Communication in English</td>
<td>3</td>
<td>GLT Communication in English</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIG1001 / GLT1017* TITAS / Basic Malay Language*</td>
<td>2</td>
<td>GIG1002 / GIG1006* Ethnic Relations / Introduction to Malaysia*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIG1004 Information Literacy</td>
<td>2</td>
<td>GIG1005 Social Engagement</td>
</tr>
<tr>
<td>Faculty Courses</td>
<td>Year 2</td>
<td>SIX1001 Introduction to Science and Technology Studies</td>
<td>3</td>
<td>SIX1004 Statistics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIX1002 Ethics and Safety</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Program Courses</td>
<td>Year 2</td>
<td>SIM1001 Basic Mathematics</td>
<td>4</td>
<td>SIM1003 Calculus II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIM1002 Calculus I</td>
<td>4</td>
<td>SIT1001 Probability and Statistics I</td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td>Year 2</td>
<td>18</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>YEAR 2</th>
<th></th>
<th></th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SEMESTER 1</td>
<td>SEMESTER 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
</tr>
<tr>
<td>University Courses</td>
<td>Year 2</td>
<td>GIG1003 Basic Entrepreneurship Culture</td>
<td>2</td>
<td>GKN/GRK/GKV Co-Curriculum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GIIXxxxx External Faculty Electives Course</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Core Courses Program</td>
<td>Year 2</td>
<td>SIN1001 Introduction to Computing</td>
<td>2</td>
<td>SIN1002 Introduction to Worksheet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIN1003 Mathematical Methods I</td>
<td>4</td>
<td>SIN2001 Mathematical Methods II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIM2001 Advanced Calculus</td>
<td>4</td>
<td>SIN2002 Structured Programming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIT2005 Data Analysis I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Elective Courses Faculty Program</td>
<td>Year 2</td>
<td>18</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>
### Faculty of Science Handbook, Session 2018/2019

#### Component: Core Courses (Year 3)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM2002</td>
<td>Linear Algebra</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SIT2003</td>
<td>Stochastic Processes</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SIT2004</td>
<td>Regression Analysis</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SIT3001</td>
<td>Introduction to Probability Theory</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

#### Component: Elective Courses (Year 3)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIT3***</td>
<td>Courses outside of Institute</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

#### Component: Core Courses (Year 4)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM2002</td>
<td>Linear Algebra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT2003</td>
<td>Stochastic Processes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT2004</td>
<td>Regression Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT3001</td>
<td>Introduction to Probability Theory</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Component: Elective Courses (Year 4)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIT3***</td>
<td>Courses outside of Institute</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SIT3***</td>
<td></td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SIT3***</td>
<td></td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

### Total Credit

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>
# BACHELOR OF ACTUARIAL SCIENCE
## SESSION 2018/2019
### (145 CREDITS)

## 1. UNIVERSITY COURSES (22 CREDITS)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLTxxxx</td>
<td>Communication in English</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>GKN/GKR/GKV</td>
<td>Co-curriculum</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1001</td>
<td>Islamic and Asian Civilization (TITAS)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1002/</td>
<td>Ethnic Relations/</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1006</td>
<td>Introduction to Malaysia</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1003</td>
<td>Basic Entrepreneurship Culture</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1004</td>
<td>Information Skills</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIG1005</td>
<td>Social Engagement</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>GIxxxx</td>
<td>External Faculty Elective Course</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

## 2. CORE COURSES (83 CREDITS)

### (I) FACULTY CORE COURSES (8 CREDITS) [TF]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIX1001</td>
<td>Introduction to Science &amp; Technology Studies</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SIX1002</td>
<td>Ethics and Safety</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>SIX1004</td>
<td>Statistics</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

### (II) PROGRAM CORE COURSES (75 CREDITS) [TP]

#### LEVEL 1 (17 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM1001</td>
<td>Basic Mathematics</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIM1002</td>
<td>Calculus I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIN1002</td>
<td>Introduction to Worksheet</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIM1003</td>
<td>Calculus II</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIQ1001</td>
<td>Introduction to Accounting</td>
<td>SIM1002</td>
<td>4</td>
</tr>
</tbody>
</table>

#### LEVEL 2 (26 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM2001</td>
<td>Advanced Calculus</td>
<td>SIM1003</td>
<td>4</td>
</tr>
<tr>
<td>SIN2002</td>
<td>Structured Programming</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIT1001</td>
<td>Probability and Statistics I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIT2001</td>
<td>Probability and Statistics II</td>
<td>SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIQ2001</td>
<td>Microeconomics</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIQ2002</td>
<td>Macroeconomics</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIQ2003</td>
<td>Financial Mathematics and Derivatives</td>
<td>SIM1002</td>
<td>4</td>
</tr>
</tbody>
</table>

#### LEVEL 3 (16 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIQ3001</td>
<td>Actuarial Mathematics I</td>
<td>SIQ2003</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3002</td>
<td>Portfolio Theory and Asset Models</td>
<td>SIQ2003</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3003</td>
<td>Actuarial Mathematics II</td>
<td>SIQ3001</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3004</td>
<td>Mathematics of Financial Derivatives</td>
<td>SIQ3003</td>
<td>4</td>
</tr>
</tbody>
</table>

#### LEVEL 4 (16 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIQ3005</td>
<td>Life Insurance and Takaful</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3006</td>
<td>Risk Theory</td>
<td>SIT2001 and SIQ2003</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3007</td>
<td>Industrial Training</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

## 3. ELECTIVE COURSES (40 CREDITS)

### (I) PROGRAM ELECTIVE COURSES (at least 31 CREDITS) [EP]

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE NAME</th>
<th>PRE-REQUISITE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIN1003</td>
<td>Mathematical Methods I</td>
<td>SIM1002</td>
<td>4</td>
</tr>
<tr>
<td>SIM2002</td>
<td>Linear Algebra</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIN2001</td>
<td>Mathematical Methods II</td>
<td>SIN1003</td>
<td>4</td>
</tr>
<tr>
<td>SIN2003</td>
<td>Basic Operational Research</td>
<td>SIM1001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2002</td>
<td>Further Mathematical Statistics</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2003</td>
<td>Stochastic Processes</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT2004</td>
<td>Regression Analysis</td>
<td>SIT1001</td>
<td>4</td>
</tr>
<tr>
<td>SIN3015</td>
<td>Mathematical Science Project</td>
<td>SIM2002</td>
<td>4</td>
</tr>
<tr>
<td>SIT3003</td>
<td>Computer Intensive Methods in Statistics</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3004</td>
<td>Applied Stochastic Processes</td>
<td>SIT2003</td>
<td>4</td>
</tr>
<tr>
<td>SIT3005</td>
<td>Time Series and Forecasting Methods</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIT3006</td>
<td>Further Topics in Regression Analysis</td>
<td>SIT2001 and SIT2004</td>
<td>4</td>
</tr>
<tr>
<td>SIT3010</td>
<td>Introduction to Data Mining</td>
<td>SIT2001</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3008</td>
<td>Foundation of Islamic Finance</td>
<td>SIN2002</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3009</td>
<td>Pension Mathematics</td>
<td>SIQ3001</td>
<td>4</td>
</tr>
<tr>
<td>SIQ3010</td>
<td>Survival Model</td>
<td>SIT2001</td>
<td>4</td>
</tr>
</tbody>
</table>
(II) FACULTY ELECTIVE COURSES (9 CREDITS) [EF]
* Courses Offered by Other Institute/Department within the Faculty of Science
* Refer to the Faculty Elective Courses lists other than from the Institute of Mathematical Sciences but within the Faculty of Science

1. The exact number of courses (as shown above) that will be offered for any year may be different, depending on the availability of manpower.
2. Core courses under Bachelor of Science in Mathematics, Bachelor of Science in Applied Mathematics or Bachelor of Science in Statistics may also be taken by a student in Bachelor of Actuarial Science program as Program Elective Courses. Please refer to the relevant programs.
3. Actuarial students must take at least 110 of credits before undergoing the practical training (SIQ3007).
4. Actuarial students are also encouraged to take CIX2001 (Financial Management) and CIC2001 (Basic Corporate Finance) as Program Elective Courses.

Attention:
Courses with codes SIQ**** except SIQ2003 are exclusive for students in Bachelor of Actuarial Science.
PROGRAM GOAL

To produce graduates with sound knowledge in the actuarial field through exploration in the theoretical and application of mathematics, statistics, economics and finance, able to think critically in problem solving as well as capable to increase competitiveness in the national and international level.

PROGRAM EDUCATIONAL OBJECTIVES

1. To prepare the students with theoretical and practical aspects as well as special skills in the actuarial field. (PO1, 2, 6)
2. To build actuarial ethics and professionalism required by the students in research and employment through effective communication. (PO3, 4, 5)
3. To train the students to work independently as well as in a team to organise knowledge and practical skills as enhancement of competitiveness. (PO1, 2, 7, 8)

PROGRAM LEARNING OUTCOMES

At the end of the program, graduates with Bachelor of Actuarial Science are able to:

1. Explain the principles and concepts of actuarial science, finance, statistics and mathematics;
2. Apply actuarial science, finance, statistics and mathematics concepts to solve real-world problems;
3. Conduct professional activities with good social skills and demonstrate a sense of responsibility;
4. Practice characteristics associated with professionalism and ethical responsibility in analyzing real life phenomena;
5. Communicate using critical thinking with effective, accurate and relevant concepts, and exhibit team work and leadership skills;
6. Convert problems into actuarial, financial, statistical and mathematical models, and develop scientific strategies to obtain solutions;
7. Engage in life-long learning to advance knowledge and applications of actuarial science, finance, statistics and mathematics;
8. Apply managerial and entrepreneurial skills to manage resources needed to complete a task.
### LIST OF COURSES ACCORDING TO SEMESTER
(PLANNING OF COURSES)

**BACHELOR OF ACTUARIAL SCIENCE**

#### YEAR 1

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University Courses</strong></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>GLT Communication in English</td>
<td>3</td>
<td>GLT Communication in English</td>
</tr>
<tr>
<td></td>
<td>GIG1001 / GLT1017* TITAS / Basic Malay Language*</td>
<td>2</td>
<td>GIG1002 / GIG1006* Ethnic Relations/ Introduction to Malaysia*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GIG1004 Information Literacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GIG1005 Social Engagement</td>
</tr>
<tr>
<td><strong>Core Courses</strong></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td><strong>Faculty</strong></td>
<td>SIX1001 Introduction to Science and Technology Studies</td>
<td>3</td>
<td>SIX1004 Statistics</td>
</tr>
<tr>
<td></td>
<td>SIX1002 Ethics and Safety</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td>SIM1001 Basic Mathematics</td>
<td>4</td>
<td>SIM1003 Calculus II</td>
</tr>
<tr>
<td></td>
<td>SIM1002 Calculus I</td>
<td>4</td>
<td>SIG1001 Introduction to Accounting</td>
</tr>
<tr>
<td><strong>TOTAL CREDIT</strong></td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

#### YEAR 2

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University Courses</strong></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>GIG1003 Basic Entrepreneurship Culture</td>
<td>2</td>
<td>GKN/GRK/GKV Co-Curriculum</td>
</tr>
<tr>
<td></td>
<td>GIX External Faculty Electives Course</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GIX External Faculty Electives Course</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Core Courses</strong></td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td>SIM2001 Advanced Calculus</td>
<td>4</td>
<td>SIN2002 Structured Programming</td>
</tr>
<tr>
<td></td>
<td>SIQ2001 Microeconomics</td>
<td>3</td>
<td>SIQ2002 Macroeconomics</td>
</tr>
<tr>
<td></td>
<td>SIQ2003 Financial Mathematics and Derivatives</td>
<td>4</td>
<td>SIT2001 Probability and Statistics II</td>
</tr>
<tr>
<td></td>
<td>SIT1001 Probability and Statistics I</td>
<td>4</td>
<td>SIN1002 Introduction to Worksheet</td>
</tr>
<tr>
<td><strong>Elective Courses</strong></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Faculty</strong></td>
<td></td>
<td>FACULTY ELECTIVE COURSES</td>
<td>3</td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td></td>
<td>CIX2001 Financial Management</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL CREDIT</strong></td>
<td></td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>COMPONENT</td>
<td>YEAR 3</td>
<td>YEAR 4</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEMESTER 1</td>
<td>SEMESTER 2</td>
<td>SEMESTER 1</td>
</tr>
<tr>
<td></td>
<td>COURSE</td>
<td>CREDIT</td>
<td>COURSE</td>
</tr>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>SIQ3001</td>
<td>Actuarial Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>SIQ3002</td>
<td>Portfolio Theory and Asset Models</td>
<td>4</td>
</tr>
<tr>
<td>Elective Courses</td>
<td>Faculty</td>
<td>FACULTY ELECTIVE COURSES</td>
<td>3</td>
</tr>
<tr>
<td>Program</td>
<td>SIM/SIN/SIQ/SIT 2/3***</td>
<td>4</td>
<td>SIM/SIN/SIQ/SIT 2/3***</td>
</tr>
<tr>
<td></td>
<td>CIC2001</td>
<td>Basic Corporate Finance</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>SIQ3005</td>
<td>Life Insurance and Takaful</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>SIQ3006</td>
<td>Risk Theory</td>
<td>4</td>
</tr>
<tr>
<td>Elective Courses</td>
<td>Faculty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>SIM/SIN/SIQ/SIT 2/3***</td>
<td>4</td>
<td>SIM/SIN/SIQ/SIT 2/3***</td>
</tr>
<tr>
<td></td>
<td>SIM/SIN/SIQ/SIT 2/3***</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>TOTAL CREDIT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institute/Department</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------</td>
<td>-------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Institute of Biological Sciences</td>
<td>SIX1006</td>
<td>Malaysian Flora</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SIX1007</td>
<td>Malaysian Fauna</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SIX1008</td>
<td>Bio Computing</td>
<td>2</td>
</tr>
<tr>
<td>Department of Chemistry</td>
<td>SIX1009</td>
<td>Basic Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>Department of Geology</td>
<td>SIX1010</td>
<td>Earth’s Ecosystem</td>
<td>2</td>
</tr>
<tr>
<td>Department of Physics</td>
<td>SIX1011</td>
<td>Contemporary Physics</td>
<td>2</td>
</tr>
<tr>
<td>Department of Science and Technology</td>
<td>SIX1012</td>
<td>Logical Thinking in Science</td>
<td>3</td>
</tr>
</tbody>
</table>

* 9 credits for Bachelor of Actuarial Science.
INSTITUTE OF MATHEMATICAL SCIENCES

The Institute of Mathematical Sciences (ISM) was established as a department in the Faculty of Science when the University of Malaya was founded in Kuala Lumpur in 1959. It has grown into three branches, i.e., pure mathematics, applied mathematics, and statistics.

For the 2018/2019 session, ISM offers the following four first degree programs:

- Bachelor of Science in Mathematics
- Bachelor of Science in Applied Mathematics
- Bachelor of Science in Statistics
- Bachelor of Actuarial Science

The four Bachelor of Science programs are set up to provide more opportunities for an undergraduate to major in the field of mathematics according to his or her interests. All these programs will assist to fulfill the vacancies of skilled workforce in science and technology in the public and private sectors in line with Malaysia's aspiration to become a developed nation.

STAFF

ISM has a group of experienced lecturers in teaching. They are also active in doing research and have been publishing many writings in local and international journals. The research activities encompass a broad spectrum, from findings and knowledge which are abstract in nature, to those with direct applications in the industry. ISM also strives to establish and forge a close relationship with industry and other research institutions. This strengthens the quality of teaching and supervising of projects/theses for students in bachelor’s, master’s and doctoral levels.

HEAD:
Associate Prof. Dr. Wan Ainun Mior Othman, BSc (UNCC), MSc (N Carolina State), PhD (USM)

DEPUTY HEAD:
Associate Prof. Dr. Deng Chai Ling, BSc, MSc, PhD
Dr. Siti Suzlin Supadi, BSc, MSc, PhD

PURE MATHEMATICS UNIT

COORDINATOR (B.Sc. in MATHEMATICS):
Dr. Kong Kok Bin, BSc, MSc, PhD

PROFESSORS:
Dr. Angelina Chin Yan Mui, BSc, MSc, PhD(O’id)
Dr. Suzeini Abd Halim, BSc(UNSW), PhD(Wales)

ASSOCIATE PROFESSORS:
Dr. Chooi Wai Leong, BSc, MSc, PhD
Dr. Deng Chai Ling, BSc, MSc, PhD
Dr. Kong Kok Bin, BSc, MSc, PhD

LECTURERS:
Dr. Loo Tee How, BSc, MSc, PhD
Mr. Mohamad Bakri Zubir, BSc, MSc(Exeter)
Dr. Ong Siew Hui, BSc, MSc, PhD
Dr. Oon Shea Ming, BSc, MSc, PhD(UHP)
Dr. Tan Ta Sheng, BA, CASM, MMath, MA, PhD(Cambridge)

APPLIED MATHEMATICS UNIT

COORDINATOR:
Dr. Zailan Siri, BSc, MSc(UPM), PhD(UK)

PROFESSORS:
Dr. Kurunathan Ratnavelu, BSc, MSc, PhD(Flinders), CPhys, MInstP, FASc
Dr. Mohd Omar, BSc, MSc(Hull), PhD(Exeter)

ASSOCIATE PROFESSOR:
Dr. Wan Ainun Mior Othman, BSc(UNCC), MSc(N Carolina State), PhD(USM)

LECTURERS:
Dr. Amizah Matip, BSc, (UA) Msc, PhD(UK)
Dr. Kumaresan Nallasamy, PhD(GRU, India)
Dr. Kwa Kiam Heong, Bsc, MSc, PhD(Ohio State)
Dr. Noor Fadiya Mohd Noor, BSc(UTM), MSc(UTM), PhD(UK)
Dr. Siti Suzlin Supadi, BSc, MSc, PhD
Dr. Zailan Siri, BSc, MSc(UPM), PhD(UK)

STATISTICS AND ACTUARIAL SCIENCE UNIT

COORDINATOR (B.Sc. in STATISTICS):
Dr. Ng Kok Haur, BSc(UPM), Msc(UPM), PhD(HKU)

COORDINATOR (B. ACTUARIAL SCIENCE):
Dr. Koh You Beng, BSc(USM), MSc(USM), PhD(HKU)

PROFESSORS:
Dr. Ibrahim Mohamed, BSc(Bristol), MSc(Reading), PhD(UITM)
Dr. Nor Aishah Hamzah, BSc(Southampton), MSc(Leeds), PhD(Bristol), DipEd(UK), MIS(UK)

ASSOCIATE PROFESSOR:
Mr. Abdul Hadi Yaakub, BSc(Nevada), MSc(Illinois)

LECTURERS:
Dr. Adriana Irawati Nur Ibrahim, BSc(USM), MSc(USM), PhD(Bath)
Dr. Dharini Pathmanathan, BSc, MSc, PhD(UM)
Dr. Khang Tsung Fei, BSc, MSc(UM), PhD(NUS)
Dr. Lim Sok Li, BEd(USM), MSc(USM), PhD(UK)
Dr. Mohd Azmi Haron, BSc, MBA(UPM), PhD(UPM)
Dr. Ng Choung Min, BSc(UTM), MSc, PhD
Dr. Ng Kok Haur, BSc(UPM), MSc(UPM), PhD
Dr. Nur Anisah Mohamed, BSc, MSc(UM), PhD(Newcastle)
Dr. Rossita Mohamad Yunus, BSc, MSc(UM), PhD(USQ)
Dr. Shafiful Anuar Abu Bakar, BSc(UITM), MSc(Heriot-Watt), PhD(Manchester)

COORDINATOR (B.Sc. Ed. Mathematics):
Mr. Mohamad Bakri Zubir, BSc, MSc(Exeter)

RESEARCH AREAS

Research areas at ISM include:

- group theory, ring theory, multilinear algebra, graph theory,
- matrix theory, combinatorial graph theory, social network analysis,
- supply chain management, operations research, numerical analysis, robust statistics, probability distribution theory, nonlinear time series, image processing, regression analysis, and statistical quality control.
COMPUTER FACILITIES

Currently, ISM has a computer lab equipped with 10 laptops, 17 workstations, 101 desktops, 3 laser printers, 1 colour printer, and 4 heavy duty dot matrix printers, all of which being interconnected in a network system. The lab is also equipped with 4 LCD projectors, 1 visualizer, and 3 scanners. The lab utilizes state-of-the-art software such as Matlab (with various toolboxes), SPSS, Mathematica, Math Type, Minitab, Visual C++, DEV C++, and S-PLUS. In addition, three of the lecture halls and tutorial rooms are each equipped with a LCD projector and a visualizer.

BACHELOR OF SCIENCE PROGRAMS

Please refer to Program Structure for courses.

FURTHER DEGREE

Apart from teaching and supervising at the bachelor’s level, the staff members of the institute also supervise research projects that lead to Master’s and doctorate degrees in the three branches of mathematics.

JOB OPPORTUNITIES

The learning of mathematics will help increase one’s skills in problem solving and analysis. It trains one’s mind to manipulate information, to form accurate, complicated and abstract ideas and to enable one to discern complicated arguments. The training to think quantitatively, logically and analytically in problem solving may prove valuable in one’s chosen career. Since the use of mathematics is all encompassing in human endeavour, a graduate’s career opportunities are almost limitless and not only confined to teaching and research. Many graduates from this Institute have been employed in the financial sectors (banking, accountancy and insurance for instance), management, business, industry and computing sectors.

SYNOPSIS OF COURSES

SIX1004 STATISTICS (FACULTY OF SCIENCE)

Introduction to statistical analysis; Experimental and observational studies; Display and organization of data; Descriptive statistics; Population and samples; Sampling methods; Basic probability theory; Useful probability distributions: Binomial, Poisson and normal; Sampling distributions; Central Limit Theorem; Parameter estimation and confidence intervals; Hypothesis testing for mean, proportion and association in one and two populations; Chi-squared tests and Fisher’s exact test; One factor Analysis of Variance; Simple linear regression.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
PS, CS3, CT

References:


SIM1001 BASIC MATHEMATICS


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CTPS3, LL2

References:

SIM1002 CALCULUS I


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CTPS3, LL2

References:

SIM1003 CALCULUS II


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References:

SIM2001 ADVANCED CALCULUS


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References:

SIM2002 LINEAR ALGEBRA

Vector spaces and subspaces, basis and dimension, the row space and column space, rank and nullity. Linear transformations, kernel and range, composition and isomorphism, matrix representation, similarity and diagonalizability, Cayley-Hamilton Theorem.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References:

SIM2003 INTRODUCTION TO COMBINATORICS

Ordered and equivalence relations, binomial and multinomial theorems, recurrence relations, principle of inclusion and exclusion, Latin squares, magic squares, basic properties of graphs, circuits and cycles in graphs, trees and their applications.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References:
SIM2004 ALGEBRA I


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CTPS3, LL2

References:

SIM2005 INTRODUCTION TO ANALYSIS


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References:

SIM2006 COMPLEX VARIABLES


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CTPS3, LL2

References:

SIM2007 APPRECIATION OF MATHEMATICS

Students will be put into groups. Each group will be given 2 mathematical tasks to work on. These tasks will come from a variety of topics selected from, but not limited to: algebra, geometry, combinatorics, applied and computational mathematics, probability and statistics, science & technology, mathematics and society, management science, finance mathematics, actuarial sciences, history and philosophy. Students collectively will use tools/elements of mathematics to undertake each task. In undertaking these tasks, students are required to carry out to a certain extend some literature survey, background reading and explore some elementary research problems. During guided learning sessions, students are also expected to critique, analyse, argue logically and deduce findings. Each group is required to produce and present reports for the tasks given.

Assessment:
Coursework: 100%

Medium of Instruction:
English

Soft Skills:
CS4, TS3, LL2, EM2, LS2

SIM2008 THEORY OF DIFFERENTIAL EQUATIONS

The existence and uniqueness theorem. Solutions to the system of linear differential equations with constant coefficients. Automatic linear system and linear approximation of dimension two, types of critical points, stability.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPSS, LL2

References:
SIM2009 GEOMETRY

Euclidean Geometry, congruence, parallelism, similarity, isometry, Incidence geometry of the sphere, motions of the sphere.

Assessment:
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction: English

Soft Skills: CS3, CTPS3, LL2

References:

SIM3001 GRAPH THEORY

Graph theory and its applications.

Topics will be selected from the following: Eulerian graphs, trees, planar graphs, graph colouring and chromatic polynomials, Hamiltonian graphs, matching theory, directed graphs and the shortest path problem, network theory.

Assessment:
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction: English

Soft Skills: CTPS3, LL2

References:

SIM3002 COMBINATORIAL MATHEMATICS

Theory of Enumeration: Topics will be chosen from: Permutation and Combination, advanced counting numbers, generating functions, principle of inclusion and exclusion.

Combinatorial Designs: Topics will be chosen from: Block designs, balanced incomplete block designs, Steiner triple system, Hadamard matrices, pigeonhole principle and Ramsey theory for graphs.

Assessment:
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction: English

Soft Skills: CS3, CTPS3, LL2

References:

SIM3003 NUMBER THEORY

Prime Numbers, The Division Algorithm and Unique Factorization Theorem for Integers, Linear Diophantine Equations, Theory of congruence and the Chinese Remainder Theorem, RSA encryption, Quadratic reciprocity and the Legendre symbol, Arithmetic functions, Primitive roots.

Assessment:
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction: English

Soft Skills: CS3, CTPSS, LL2

References:

SIM3004 ADVANCED LINEAR ALGEBRA

Inner product spaces, the Gram-Schmidt orthogonalization process and orthogonal complements, Orthogonal operators, unitary operators, self-adjoint operators and positive definite operators. Dual spaces, bilinear forms, Diagonalization of symmetric bilinear forms, real quadratic forms. Triangularization theorem, primary decomposition theorem, Jordan canonical forms.

Assessment:
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction: English

Soft Skills: CS3, CTPS3, LL2

References:

**SIM3005 MATRIX THEORY**


**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS3, LL2

**References:**

**SIM3006 ALGEBRA II**

Groups-Isomorphism theorems. Permutation groups. Group actions, p-groups.


**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS3, LL2

**References:**

**SIM3007 RING THEORY**

Ring, subrings and ideals, modules, internal direct sum, external direct product, nil and nilpotent ideals, prime and maximal ideals, Jacobson and prime radicals, semiprimitive and semiprime rings, rings with chain condition, primitive rings, group rings.

**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**SIM3008 GROUP THEORY**

The three isomorphism theorems. Cyclic groups. Direct product of groups. Introduction to the three Sylow's Theorem. Classification of groups up to order 8. Finitely generated abelian groups. Nilpotent groups and Soluble groups

**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CTPS3, LL2

**References:**

**SIM3009 DIFFERENTIAL GEOMETRY**


**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS3, LL2

**References:**

SIM3010 TOPOLOGY


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction: English

Soft Skills: CTPS3, LL2

References:

SIM3011 COMPLEX ANALYSIS


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction: English

Soft Skills: CTPS3, LL2

References:

SIM3012 REAL ANALYSIS


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction: English

Soft Skills: CTPS3, LL2

References:

SIM3013 PROBABILISTIC METHODS IN COMBINATORICS

The probabilistic method and its applications in combinatorics. The topics are selected from: The basic probabilistic methods applied on graphs, tournaments, and set systems; the use of linearity of expectation for Hamiltonian paths and splitting graphs; alterations for lower bound of Ramsey numbers, independent sets, packing and recolouring; the second moment methods; random graphs – threshold functions, subgraphs, clique number and chromatic number; the Lovász Local Lemma and its applications.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction: English

Soft Skills: CTPS3, LL2

References:

SIN1001 INTRODUCTION TO COMPUTING

MATLAB - Matlab environment, matrices, constants and variables, operation, built-in functions, output format, plot graphs, expressions and logical data, branches and loops, scripting, user-defined functions. Application of selected mathematical problems.

Assessment
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills: CTPS3, LL2

References:
SIN1002 INTRODUCTION TO WORKSHEETS

Basics of Spreadsheet, entering labels, numbers and formulae. Absolute & relative addressing. Excel functions. Graph plotting, use of solvers. Applications to some selected mathematical problems

Assessment
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CTPS3, LL2

References:

SIN1003 MATHEMATICAL METHODS I

First order ODE: Definitions, solution concepts, valid solution intervals. Solutions to variable separable equations. Linear equations, Bernoulli, exact and non-exact, homogeneous equations. Some applications of first order ODE.

Linear ODE with second and higher order: Definitions, solution concepts, linear independence, Wronskian. Solution to homogeneous and non-homogeneous equations. Method of undetermined coefficient, Variation of parameters. Series solution of ordinary differential equations, Frobenius’s method, Legendre and Bessel’s equations. Some applications of second order ODE.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTPS3, LL2

References:

SIN2001 MATHEMATICAL METHODS II

Computer arithmetic: floating-point numbers, round off error, machine precision, overflow/underflow, numerical cancellation, truncation error.

Taylor polynomial and limits.

Interpolation: Lagrange interpolation, Divided differences, Hermite interpolation, cubic spline interpolation


Numerical differentiation: Forward, backward and central finite difference.

Numerical Integration: Rectangular, trapezoidal, Simpson’s, Romberg’s. Composite methods.


Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
C3, TS2, CTPS3, LL2

References:

SIN2002 STRUCTURED PROGRAMMING


Introduction to user-defined data types – structures and classes.

Applications to numerical methods: integer- and floating point arithmetic, root-finding, solution of ordinary differential equations. Use of random number generators.

Assessment
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
English

Soft Skills:
CS3, CPTPS3, LL2

References:

SIN2003 BASIC OPERATIONAL RESEARCH

Introduction to the problems in operational research, modelling, formulation and examples. Linear programming, transportation and assignment problems. Integer programming, game theory and dynamic programming.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References:

SIN2004 PARTIAL DIFFERENTIAL EQUATIONS

Fourier series. Introduction to partial differential equations, Method of characteristic, Separation of variables, Laplace transform method.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS3, CTPS3, LL2

References:

SIN2005 SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS


Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS4, CTPS5, TS2, LL2

References:

SIN2006 VECTOR ANALYSIS


Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS3, CTPS3, LL2

References:

SIN2007 MANAGEMENT MATHEMATICS

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia

Soft Skills:
CS3, CTPS3, LL2

References

SIN2008 OPTIMIZATION TECHNIQUE

Unconstraint optimization, necessary and enough conditions for optimality. Constraint optimization. Type of constraint. Special technique for solving non-linear problem.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CTPS3, LL2, CS3

References

SIN2009 COMPUTER GRAPHICS


Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS3, TS3, LL2, LS2

References

SIN3001 INTRODUCTION TO QUANTUM MECHANICS WITH COMPUTERS


Assessment
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3, LL2

References

SIN3002 CRYPTOGRAPHY

Basic concept of cryptography, data security, complexity theory and number theory. Encryption algorithms: Secret key cryptography, public key cryptography, hash functions. Quantum cryptography. Applications of cryptographic algorithms.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS3, CTPS3, LL2

References

**SIN3003 COMPUTATIONAL FLUID DYNAMICS**


**Assessment**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
Bahasa Malaysia/English

**Soft Skills:**
CS4, CT/PS5, TS2, LL3

**References**

**SIN3004 ANALYSIS OF MATHEMATICAL MODELS**


**Assessment**
- Continuous Assessment: 50%
- Final Examination: 50%

**Medium of Instruction:**
Bahasa Malaysia/ English

**Soft Skills:**
CS4, CT/PS5, TS2, LL2

**References**

**SIN3005 NUMERICAL METHODS AND ANALYSIS**

Approximation methods: Discrete least square approximation, orthogonal polynomials, Chebyshev polynomials.


**Assessment**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
English

**Soft Skills:**
CS3, CT/PS3, LL2

**References**

**SIN3006 PRODUCTION AND INVENTORY SYSTEM**

The importance of inventory in management. Advanced EOQ models. Inventory model for time-dependent demand: linear increase or decrease cases. Exact and approximate methods by minimizing ordering and holding costs. Applications to real-world problems.

**Assessment**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
Bahasa Malaysia

**Soft Skills:**
CS3, CT/PS3, LL2

**References**

**SIN3007 HEURISTIC METHODS**


**Assessment**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
Bahasa Malaysia/English

Assessment
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction:
- Bahasa Malaysia/English

Soft Skills:
- CS4, CTPS3, LL2, TS2

References

SIN3011 SCIENTIFIC COMPUTING


Assessment
- Continuous Assessment: 40%
- Final Examination: 60%

Medium of Instruction:
- English

Soft Skills:
- CS3, CTPS3, TS2, LL2, LS2

References
SIN3012 MECHANICS

Newton's laws of motion, central forces, motion in a plane (cartesian, polar coordinates), conservative forces, conservation of energy and momentum, small oscillations, stable and unstable equilibriums.

Lagrangian mechanics: constraints, generalized coordinates, principle of least action, Euler-Lagrange equations.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS4, LL2

References

SIN3013 FOURIER AND WAVELETS ANALYSIS

Functions and Function Spaces, Fourier Transform, Sampling, Orthogonal Wavelet Systems, Multi-resolution Analysis (MRA), Discrete Wavelet Transform, Continuous Wavelet Transform, Wavelet Toolbox, Applications to data compression, de-noising and others.

Assessment
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
English

Soft Skills:
CTPS3, LL2

References

SIN3014 INDUSTRIAL TRAINING

Candidates are required to spend minimum 10 weeks working with selected companies in selected areas of industry.

Assessment
Continuous Assessment: 100% S/U

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS4, CTPS3, TS2, LL2, EM2, LS3

References
University of Malaya Guidebook for Industrial Training

SIN3015 MATHEMATICAL SCIENCE PROJECT

Subject to supervising lecturer

Assessment
Continuous Assessment: 100%

Medium of Instruction:
Bahasa Malaysia/English

Soft Skills:
CS4, CTPS4, TS2, LL2

References
Refer to the lecturer.

SIG1001 INTRODUCTION TO ACCOUNTING

Basic principles of accounting -- including the role of accounting standards. Different types of business entity. Basic structure of company accounts. Interpretation and limitation of company accounts.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTPS1, LL1

References

SIG2001 MICROECONOMICS

Fundamental principles of economics; price theory which covers the demand model, supply model and equilibrium point; shape of demand curve and consumer behavior; substitution effects and income; shape of supply curve and behavior of firms; theory of production and cost of production; analysis of competitive markets in the short term; monopoly and oligopoly.

Assessment
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English
SIQ2002 MACROECONOMICS

Macroeconomic issues and problems; fundamental concepts of national income; method of calculating national income; simple Keynesian model; derivation of IS curve, LM curve, aggregate demand curve, and aggregate supply curve; relationship between interest rates, monetary demand, consumption and investments; relationship between price levels, monetary demand, aggregate demand and aggregate supply in a Keynesian model.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTPS2, LL1

References:

SIQ2003 FINANCIAL MATHEMATICS AND DERIVATIVES

Time Value of Money: simple interest, compound interest, present and accumulated values, nominal rate of interest, force of interest, equation of value.

Annuities: annuity immediate, annuity due, perpetuity, m-thy annuity, continuous type annuity, deferred annuities, varying annuities.

Instalments: Amortization, sinking funds, amortization with continuous payments.

Bonds: Types of bonds, pricing formula, callable and serial bonds, other securities.

Cash flows: Discounted cash flows, internal rate of return, money-weighted and time weighted rate of return.

Term Structure of Interest Rate: Yield curves, spot and forward rates, duration, convexity, immunization.

Introduction to Derivatives: Forward and futures, short and long positions, arbitrage, put and call options, put-call parity, swaps, put-call parity, hedging.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIQ3001 ACTUARIAL MATHEMATICS I

Survival distributions: lifetime probability functions, force of mortality, moments and variance, parametric survival models, percentiles, recursions, fractional ages, select and ultimate life tables.

Life Insurances: continuous type life insurances, discrete type life insurances, probabilities, percentiles, recursive formula, m-thy payments, varying insurance.

Life Annuities: continuous type life annuities, discrete type life annuities, expectation and variance, probabilities, percentiles, recursive formulas, m-thy payments, varying annuities.

Premiums: expectation and variance of loss random variable, fully continuous and discrete premiums, semicontinuous premiums, m-thy premiums, gross premiums, probabilities, percentiles.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIQ3002 PORTFOLIO THEORY AND ASSET MODELS

Utility theory: Features of utility functions, expected utility theorem, risk aversion.

Stochastic dominance: Absolute, first and second order stochastic dominance.

Measures of investment risk: Variance, semi-variance, probability of shortfall, value-at-risk, expected shortfall.

Portfolio theory: Mean-variance portfolio, diversification, efficient frontier, optimal portfolio selection, efficient portfolio identification.

Models of asset returns: Single-index models, fitting a single index model, multi-index models.

Efficient market hypothesis

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIQ3003 ACTUARIAL MATHEMATICS II

Reserves: fully continuous and discrete reserves, semicontinuous reserves, prospective and retrospective reserves, expense reserves, variance of loss, special formulas, recursive formulas.

Markov Chains: discrete and continuous Markov chains, Kolmogorov’s forward equations, premiums and reserves using Markov chains, multiple-state models.

Multiple Decrement Models: discrete and continuous decrement models, probability functions, fractional ages, multiple and associated single decrement tables, uniform assumption.

Multiple Life Models: joint life, last survivor and contingent probabilities, moments and variance of multiple life models, multiple life insurances and annuities.

Unit-linked contracts and profit tests: Emerging costs, profit testing for conventional and unit-linked contracts.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIQ3004 MATHEMATICS OF FINANCIAL DERIVATIVES

Introduction to derivatives: Call and put options, forwards, futures, put-call parity.


Hedging: Market making, delta hedging, Black-Scholes partial differential equation, delta-gamma-theta approximation

Exotic options: Asian options, barrier options, compound options, gap options, all-or-nothing options, exchange options.

Brownian motion and Itô’s lemma: Brownian motion, Itô’s lemma, Sharp ratio, martingale representation theorem

Term structure of interest rate: Vasicek model, Cox-Ingersoll-Ross model, Black-Derman-Toy binomial tree

Models for credit risk: Structural, reduced form and intensity based models, Merton model, valuing credit risky bonds

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIQ3005 LIFE INSURANCE AND TAKAFUL

Insurance products and unit-linked insurance; Group Life insurance; Operation of a Life Insurance company: underwriting, claims, marketing and distribution methods; Profit testing; Takaful insurance; Regulations: Insurance Act, taxation and role of Bank Negara.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTPS1, LL2

References:


**SIQ3006 RISK THEORY**

Loss distributions: Claim frequency and claim severity distributions, creating new distributions, parameter estimation methods, goodness-of-fit tests, risk sharing arrangements.

Aggregate risk models: Individual risk models, collective risk models, reinsurance.

Run-off triangle: Chain ladder method, average cost per claims method, Bornheutter-Ferguson method.

Credibility theory: Bayesian credibility methods, credibility premium formula, empirical Bayes credibility theory.

**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS2, CTPS3

**References:**

**SIQ3007 INDUSTRIAL TRAINING**

Subject to the training offered by the relevant company.

**Assessment:**
- Continuous Assessment: 100%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS4, CTPS3, TS3, LL2, KK1, EM2, LS1

**SIQ3008 PENSION MATHEMATICS**

Economic and social security: Pensions and their variants; Pension system in Malaysia; Employee Provident Fund (EPF); Social Security Organization (SOCSO); Government pension scheme; Annuity scheme; Modeling pension plans using mathematical software; International pension legislation and regulation; Malaysia regulatory framework related to retirement.

**Assessment:**
- Continuous Assessment: 50%
- Final Examination: 50%

**Medium of Instruction:**
- English

**References:**
assumptions, maximum likelihood estimator for the rate of mortality, Poisson models.

Graduation and statistical tests: methods of graduating crude estimates, Chi-square test, standardised deviation test, sign test, grouping of sign test, serial correlations test.

Exposed to risk: Exact exposed to risk, approximate exposed to risk using census data.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTAPS3

References:

SIT1001 PROBABILITY AND STATISTICS I


Continuous random variables and its mathematical expectation. Continuous distributions: uniform, exponential, gamma, chi-squared and Normal distributions.

Distribution of function of one random variable.


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTAPS2, EM2

References:

SIT2001 PROBABILITY AND STATISTICS II


Biased and unbiased estimators. Method of moments. Method of maximum likelihood. Confidence interval for: mean, proportion and variance of single population; difference between two means, difference between two proportions and ratio of variances.

Hypothesis testing for: mean, proportion and variance of single population; difference between two means, difference between two proportions and ratio of variances. Chi-square goodness-of-fit tests and contingency tables.


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTAPS3

References:

SIT2002 FURTHER MATHEMATICAL STATISTICS

The exponential family; sufficient, complete and ancillary statistics; Minimum variance unbiased estimators; Sufficient statistics and best estimators; Bayesian estimation; Delta method for asymptotic approximation; Distributions of special quadratic forms; One and two factors analysis of variance; Linear regression theory and inference of parameters; Correlation analysis in bivariate normal distribution; Sequential probability ratio test.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTAPS3, TS2, LL2

References:
SIT2003  STOCHASTIC PROCESSES


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTMPS3

References:

SIT2004  REGRESSION ANALYSIS

Simple linear regression: Estimation, hypothesis testing, analysis of variance, confidence intervals, correlation, the residuals, prediction. Model inadequacies, diagnostic, heterogeneity of variance, nonlinearity, distributional assumption, outliers, transformation. Selected topics on matrix theory and multivariate normal distribution: An introduction to multiple linear regression.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTPS3, EM1

References:

SIT2005  DATA ANALYSIS I

Statistical Analysis for mean, variance, count and proportion: Hypothesis testing, confidence interval and tests of independence.

Statistical analysis for regression and Correlation: continuous response data, simple and multiple linear model.

Statistical tests: Goodness of fit tests, ANOVA, Nonparametric test

Assessment:
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
English

Soft Skills:
CS3, CTMPS3

References:

SIT2006  NON-PARAMETRIC STATISTICS

Statistical hypotheses, binomial test, runs test, sign test, contingency tables, median test, chi-square Goodness of Fit test, median test, some methods based on ranks.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTMPS2, EM2

References:

SIT3001  INTRODUCTION TO PROBABILITY THEORY

An introduction to concepts and fundamentals of measure theory essential for a rigorous approach to the basics of probability.

Sequences and series of functions and sets, convergence, limit inferior and limit supremum.


SIT3002 INTRODUCTION TO MULTIVARIATE ANALYSIS


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIT3004 APPLIED STOCHASTIC PROCESSES


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIT3005 TIME SERIES AND FORECASTING METHODS

Introduction to time series: data, properties, examples.

Introduction to forecasting: Forecasting methods, errors in forecasting, choosing a forecasting technique.

Time series regression: Modelling trend, detecting autocorrelation, type of seasonal variation, modelling seasonal variation, growth curve models, handling first-order autocorrelation

Averaging methods: Moving average, Simple exponential smoothing, tracking signals, Holt’s method, Holt-Winters Methods, damped trend exponential method.

Box-Jenkins Methods: Stationary data and non-stationary data, difference, autocorrelation function and partial autocorrelation functions, non-seasonal modeling (ARIMA), diagnostic checking, forecasting.

ARCH and GARCH models.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIT3006 FURTHER TOPICS IN REGRESSION ANALYSIS

Multiple Linear Regression Model: Simultaneous Inference, criteria for selecting model, influence diagnostics and multicollinearity. Introduction to logistic regression and Poisson regression: maximum likelihood estimates of the parameters, lack of fit test, tests based on deviance and score.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS2, CTPS2

References:

SIT3007 DATA ANALYSIS II

Introduction to different kind of data; Generalizing the linear regression models including nonlinear regression model, linear regression in time series data, logistic regression and Poisson regression models for categorical response data and selected topics

Practical survey sampling: Selected case study, design of study, questionnaires, collecting data, data analysis, oral and written presentation

Statistical consulting: Theoretical and practical aspects of statistical consulting, Communication skill

Report writing

Assessment:
Continuous Assessment: 50%
Final Examination: 50%

Medium of Instruction:
English

Soft Skills:
CS4, CTPS3, TS5

References:


SIT3008 INTRODUCTION TO SURVEY SAMPLING

Techniques of statistical sampling with applications in the analysis of sample survey data. Topics include simple random sampling, stratified sampling, systematic sampling, cluster sampling, two-stage sampling and ratio and regression estimates.

Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIT3009 STATISTICAL PROCESS CONTROL


Assessment:
Continuous Assessment: 40%
Final Examination: 60%

Medium of Instruction:
English

Soft Skills:
CS3, CTPS3

References:

SIT3010 INTRODUCTION TO DATA MINING

Description: Introduction to statistical methods and tools for analysis of very large data sets and discovery of interesting and unexpected relationships in the data.

Data preprocessing and exploration: data quality and data cleaning. Data exploration: summarizing and visualizing data; principal component, multidimensional scaling. Data analysis and uncertainty: handling uncertainty; statistical inference; sampling.

Statistical approach to data mining and data mining algorithms: Regression, Validation; classification and clustering: k-means, CART, decision trees; Artificial Neural

**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS3

**References:**

**SIT3012 DESIGN AND ANALYSIS OF EXPERIMENTS**


**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS3

**References:**

**SIT3013 ANALYSIS OF FAILURE AND SURVIVAL DATA**


**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS2

**References:**

**SIT3014 INTRODUCTION TO BAYESIAN STATISTICS**


**Assessment:**
- Continuous Assessment: 40%
- Final Examination: 60%

**Medium of Instruction:**
- English

**Soft Skills:**
- CS3, CTPS3

**References:**