MARIAN UNIVERSITY COLLEGE
(Constituent College of St. Augustine University of Tanzania)

FACULTY OF NATURAL AND APPLIED SCIENCE

BACHELOR OF SCIENCE IN MATHEMATICS AND STATISTICS
DEGREE PROGRAMME

MAY 2015
TABLE OF CONTENTS

Part One: Program Structure ........................................................................................................3
  1.0 Introduction ..........................................................................................................................3
  1.1 Name of the Degree Programme and Capacity of Student Enrollment ......................3
  2.0 Degree Program Aims ..........................................................................................................4
    2.1 Objectives .........................................................................................................................4
  3.0 Degree Regulations ..............................................................................................................4
    3.1 Entry Requirements ...........................................................................................................4
    3.2 Assessment Regulations .................................................................................................5
  4.0 Distribution of Courses and Credits ..................................................................................6
    4.1 Programme Schedule ......................................................................................................7
      4.1.1 List of Courses for BSc (Mathematics & Statistics) Programme .......................8
  5.0 Methodology .......................................................................................................................11
  6.0 Instructional Material and Equipment ..............................................................................11
  7.0 Academic Staff for the First Academic Year 2015/2016 .............................................11

Part 2: Course Descriptions .....................................................................................................13
Part One: Program Structure

1.0 Introduction

The Tanzania Education and Training Policy of 2015 as well as the Tanzania Development Vision 2025 aspire to increase the number of personnel in the various sectors of the economy in order to promote social, technological and economic development. Whereas in the past few decades the formal sector stood as the largest employer of the skilled human resource, to date the private sector is growing rapidly and is now becoming a potential employer which provides opportunities for self employment. It is envisioned that effective expansion of the private sector will be made possible by the development of science and technology.

To this end, Marian University College [MARUCO] has adopted a degree programme in Mathematics and Statistics from Mwenge Catholic University [formally Mwenge University College of Education- MWUCE] in bid to attain a well-educated Tanzanian Society in the science based disciplines. The need for this programme is based on the fact that while science is the bedrock that provides the spring board for the growth of technology; mathematics and Statistics are the gates and keys to sciences.

MARUCO will offer a three-year course in Mathematics and Statistics leading to the award of BSc in Mathematics and Statistics. Therefore, this document describes in detail the course structure of Mathematics and Statistics in the following order: Degree Programme aims and objectives, Degree Requirements including Entry Requirements, Assessment Regulations, Distribution of courses and credits, and Programme Schedule.

1.1 Name of the Degree Programme and Capacity of Student Enrollment

The name of the degree programme will be Bachelor of Science in Mathematics and Statistics (BSc. Math & Stat.).

The three (3) years programme is aimed at using mathematical and statistical knowledge and skills to solve societal problems. The projected student enrolment is given in the Table below:

<table>
<thead>
<tr>
<th>Name of the Programme</th>
<th>Number of Students per programme</th>
<th>Total enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Science in Mathematics and Statistics</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>
2.0 Degree Program Aims

The degree program to be offered will prepare students in the knowledge and skills of Mathematics and Statistics. Each i.e. Mathematics and statistics each carries the same number of credits.

2.1 Objectives

2.1.1 General Degree Program Objectives

i) To educate and train Mathematics and Statistics experts with excellent expertise in order to raise the standards of the two disciplines and especially statistics to address the needs of the nation

ii) To empower students to become high quality experts with a strong ethical dimension in their professional lives and work

iii) To process spiritual and ethical dimension to the education they offer, together with the necessary values and commitment to develop them.

iv) To produce life-learners, able to update their knowledge and skills, and adapt to the rapid social, economic and technical changes that will occur in Tanzania over the next 50 years

v) To address the lack of enough statisticians in the country. For this reason, Mathematics and Statistics Program is going to help to get enough personnel to help in various fields such as research, census, public health, in business, in education and economics.

3.0 Degree Regulations

3.1 Entry Requirements

3.1.1 General University Minimum Entry Regulations

The following are the General University Minimum Entry Regulations that shall apply:

a) Direct Entry

Applicants under this scheme must fulfill the following conditions:

- Must hold at least three „O” level credit passes in approved subjects, one of which must be English language
- Must have at least two good principal passes (D and above) in Mathematics and appropriate subjects at „A” level education and must have grade points total of not less than 3, where A=5, B=4, C=3, D=2, E=1, S=0.5 and F=0

b) Equivalent qualification entry:

Applicants must meet the following conditions before they can be selected:

- Must hold at least three „O” level credit passes in relevant subjects, one of which must be English Language
• Diploma holders may be exempted from one year of the course provided they pass the college entry examination at a credit level.

c) Mature entry
Applicants under the mature age entry schemes must fulfill the following conditions:
- Must be 25 years of age and above
- Must have either obtained at least three credits in approved subjects at „O” level or attended Form 6 at least 5 years before the year of which admission is sought
- Must have attended and passed tests in extra mural classes, residential courses or courses offered by an adult education centre in at least two subjects relevant to the courses they wish to follow
- Must have sat and passed the College mature age entry examination

3.1.2 Departmental Minimum Requirements

Category A
Direct Entry (Form 6)
a) Two principal passes at the same sitting including Advanced Mathematics. At least a subsidiary pass in General Studies.

Category B
Equivalent qualifications
Minimum of grade C in Diploma Mathematics and two years of employment

3.2 Assessment Regulations

Each course will be assessed by continuous assessment and by examination during the examination period at the end of the semester in which the course is completed. Assessment will be by a variety of methods, appropriate for the knowledge and skills required by the course – examinations, tests assignments, practical work, portfolios and dissertation. The weighting given to each of these various methods of assessment will vary with each course, and is specified in the assessment section of each course. The following are the general assessment regulations:

a. The pass grade in each assessed course is C. The weighting given to each method of assessment, which will include examinations, written papers, assignments, practical assessments, tests etc., is specified in the assessment section of each course.
b. Candidates will normally be required to pass all the courses examined during each year before proceeding to the next year of study.
c. No candidate will be allowed to sit for the final examination(s) if s/he has not attended at least 75% of the classes for that course and passed all the course work.
d. All candidates are required to be assessed in courses worth a total credit value of at least thirty credits in each academic year.
e. Failing candidates
i. Any candidate failing one or more courses will be allowed a supplementary exam(s). A pass in a supplementary exam will be recorded as no higher than grade C.

ii. A failing candidate in the first, second and third year with a grade performance average of less than 1.8 will not be allowed to proceed. S/he can repeat a year and will be discontinued if s/he fails again.

iii. A failing candidate, irrespective of year, who supplements and fails a course:
   - May, with the approval of the academic committee, be allowed to carry forward that course for assessment at the end of the following year.
   - May, with the approval of the academic committee, be allowed to repeat a year once if in the first, second or third year of study.

f. The grading system shall be as follows:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Letter Grade</th>
<th>Points</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-100</td>
<td>A</td>
<td>5</td>
<td>Excellent</td>
</tr>
<tr>
<td>60-69</td>
<td>B+</td>
<td>4</td>
<td>Very Good</td>
</tr>
<tr>
<td>50-59</td>
<td>B</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>40-49</td>
<td>C</td>
<td>2</td>
<td>Pass</td>
</tr>
<tr>
<td>35-39</td>
<td>D</td>
<td>1</td>
<td>Fail</td>
</tr>
<tr>
<td>0-34</td>
<td>E</td>
<td>0</td>
<td>Bad fail</td>
</tr>
</tbody>
</table>

**g. Calculation of grades for the final degree will be as follows:**

i. All first year courses must be passed and will be included in the calculation of the class of degree awarded.

ii. The average weighted grade (weighted according to credit value of the course) will be calculated using the points awarded for each course taken in years 1 to 3.

iii. A weighted average of all points gained from courses taken during the 1st, 2nd and 3rd year will be calculated, and the following scale shall be followed for classification:

<table>
<thead>
<tr>
<th>Points Average</th>
<th>Classification</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0-4.5</td>
<td>First class</td>
<td>A</td>
</tr>
<tr>
<td>4.4-3.5</td>
<td>Upper Second class</td>
<td>B+</td>
</tr>
<tr>
<td>3.4-2.6</td>
<td>Lower second class</td>
<td>B</td>
</tr>
<tr>
<td>2.5-2.0</td>
<td>Pass (Third Class)</td>
<td>C</td>
</tr>
</tbody>
</table>

Courses taken as “Extra” shall not be taken into account when computing classification, but they will be recorded on the academic transcript.

**4.0 Distribution of Courses and Credits**
4.1 Programme Schedule

The program for Bachelor of Science in Mathematics and Statistics will be made up of two different groups of subjects - core subjects, and professional subjects. Each subject is made up of one or more courses.

The core subjects are those taken by all undergraduates. These will be Development Studies, Social and Professional Ethics, Communication Skills (English), Basic ICT, Research Methods and Research Project. The academic subjects will be Mathematics and Statistics.

A course will be worth a minimum of half credit and a maximum of 5 credits, depending on the amount of teaching contact required by the course. A half credit course will involve 10 hours of teaching contact time, except a 2 hour practical class will be worth 1 hour of lecturing, e.g. a 1 credit course could be 10 hours of lecturing and 20 hours of practical work. A 2, 3, or 4 credits course will be multiples of this.

Students will also be expected to carry out assignments, reading and private study for each course, and as an approximate guide, the time spent by the student in this type of work should be about the same as the teaching time for that course.

Some courses require prior knowledge and experience before a particular course can be taken, and if that is the case, the courses to be studied prior to taking that course are clearly specified in the detailed course outline.

Each student is expected to accumulate a minimum of 15 credits per semester, a total of 30 credits per year, and a minimum of 132 credits over the whole 3 year program.

The Major professional subjects, studied throughout the three years, will consist of Mathematics and Statistics to a total of 120 credits. The credit value of each component of the degree program is shown in Table 1 below.

**Table 1: Credit Value of component courses of the B.Sc. (Mathematics and Statistics) Degree program**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Course</th>
<th>Credit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Subjects</td>
<td>ICT</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Communication skills</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Ethics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Development studies</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Study skills</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Mathematics for Science and Education</td>
<td>1</td>
</tr>
</tbody>
</table>

The degree program is structured such that in many subjects introductory courses are taught in the first year, with increasing specialization in subsequent years. Some courses specify that certain prior courses must have been completed before these courses can be taken, and this is indicated in the outline of each course.
4.1.1 List of Courses for BSc (Mathematics & Statistics) Programme

4.1.2 First Year
1. MTH 101: Foundations of Analysis 3 credits
2. MTH 102: Calculus I 3 credits
3. MTH 103: Linear Algebra 3 credits
4. MTH 104: Calculus II 3 credits
5. MTH 105: Measure and integration 3 credits
6. MTH 106: Computer Programming 3 credits
7. STA 101: Introduction to Statistics & Probability 3 credits
8. STA 102: Probability Distributions I 3 credits
9. STA 103: Sampling Theory and Methodology 3 credits
10. STA 104: Applied Statistics 3 credits
11. STA 105: Operations Research I 3 credits
12. STA 106: Design and Analysis of Experiments 3 credits
13. FPT 101: Field Practical Training (FPT) 5 credits

Common Core courses
1. GST 101: Basic Computer Application Programs 3 credits
2. GST 102: Communication and Academic Study Skills 3 credits

4.1.3 Second Year
1. MTH 201: Vectors and Vector Mechanics 3 credits
2. MTH 202: Ordinary Differential Equations 3 credits
3. MTH 203: Calculus III 3 credits
4. MTH 205: Abstract Algebra 3 credits
5. MTH 206: Elementary Number theory 3 credits
6. MTH 207: Partial Differential Equations 3 credits
7. STA 201: Probability Distributions II 3 credits
8. STA 202: Time Series Analysis 3 credits
9. STA 203: Regression Analysis 3 credits
10. STA 204: Categorical Data Analysis 3 credits
11. STA 205: Non Parametric Tests 3 credits
12. STA 206: Theory of Estimation 3 credits
13. FPT 201: Field Practice Training (FPT) 5 credits

Common Core courses
1. GST 201: Social and Professional Ethics 2 credits
2. GST 202: Development Studies 1 credit

4.1.4 Third Year
1. MTH 301: Topology 3 credits
2. **MTH 302**: Numerical Analysis  
3. **MTH 303**: Complex Analysis  
4. **MTH 304**: Mathematical Information Technology  
5. **MTH 305**: Graph Theory  
6. **MTH 306**: Non-Linear Programming  
7. **STA 301**: Operations Research II**  
8. **STA 302**: Mathematical Modeling Techniques**  
9. **STA 303**: Multivariate Analysis  
10. **STA 304**: Stochastic Processes  
11. **STA 305**: Quality Control Methods*  
12. **STA 306**: Research Methodology*  
13. **STA 307**: Research Project  
14. **FPT 301**: Field Practice Training (FPT)  

**NB**: * and ** are *Elective Courses* for Mathematics and Statistics respectively.

**Year I Courses**

<table>
<thead>
<tr>
<th>SEMESTER I</th>
<th>SEMESTER II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MTH 101 FOUNDATIONS OF ANALYSIS</strong></td>
<td><strong>MTH 103 LINEAR ALGEBRA</strong></td>
</tr>
<tr>
<td><strong>MTH 102 CALCULUS I</strong></td>
<td><strong>MTH 104 CALCULUS II</strong></td>
</tr>
<tr>
<td><strong>STA 101 INTRODUCTION TO</strong></td>
<td><strong>MTH 105 MEASURE AND</strong></td>
</tr>
<tr>
<td><strong>STATISTICS AND PROBABILITY</strong></td>
<td><strong>INTEGRATION</strong></td>
</tr>
<tr>
<td><strong>STA 102 PROBABILITY DISTRIBUTIONS</strong></td>
<td><strong>MTH 106 COMPUTER PROGRAMMING</strong></td>
</tr>
<tr>
<td>I</td>
<td><strong>STA 105 OPERATION RESEARCH I</strong></td>
</tr>
<tr>
<td><strong>STA 103 SAMPLING THEORY AND</strong></td>
<td><strong>STA 106 DESIGN AND ANALYSIS OF</strong></td>
</tr>
<tr>
<td><strong>METHODODOLOGY</strong></td>
<td><strong>EXPERIMENTS</strong></td>
</tr>
<tr>
<td><strong>STA 104 APPLIED STATISTICS</strong></td>
<td><strong>FPT 101 FIELD PRACTICAL</strong></td>
</tr>
<tr>
<td></td>
<td><strong>TRAINING</strong></td>
</tr>
</tbody>
</table>

**Common Core Courses**

**GST 101** Basic computer application programme  
**GST 102** Communication and Academic study skills

**Year II Courses:**

<table>
<thead>
<tr>
<th>SEMESTER I</th>
<th>SEMESTER II</th>
</tr>
</thead>
</table>

9
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 201</td>
<td>VECTOR AND VECTOR MECHANICS</td>
<td>MTH 203</td>
<td>CALCULUS III</td>
</tr>
<tr>
<td>MTH 202</td>
<td>ORDINARY DIFFERENTIAL EQUATIONS</td>
<td>MTH 206</td>
<td>NUMBER THEORY</td>
</tr>
<tr>
<td>MTH 205</td>
<td>ABSTRACT ALGEBRA</td>
<td>MTH 207</td>
<td>PARTIAL DIFFERENTIAL EQUATIONS</td>
</tr>
<tr>
<td>STA 201</td>
<td>PROBABILITY DISTRIBUTIONS II</td>
<td>STA 204</td>
<td>CATEGORICAL DATA ANALYSIS</td>
</tr>
<tr>
<td>STA 202</td>
<td>TIME SERIES ANALYSIS</td>
<td>STA 205</td>
<td>NON PARAMETRIC TESTS</td>
</tr>
<tr>
<td>STA 203</td>
<td>REGRESSION ANALYSIS</td>
<td>STA 206</td>
<td>THEORY OF ESTIMATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FPT 201</td>
<td>FIELD PRACTICAL TRAINING</td>
</tr>
</tbody>
</table>

**Common Core courses:**
GST 201: SOCIAL AND PROFESSIONAL ETHICS
GST 202: DEVELOPMENT STUDIES

**Year III Courses**

<table>
<thead>
<tr>
<th>Semester I</th>
<th>Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 301</td>
<td>MTH 304</td>
</tr>
<tr>
<td>TOPOLOGY</td>
<td>MATHEMATICAL INFORMATION TECHNOLOGY</td>
</tr>
<tr>
<td>MTH 302</td>
<td>MTH 305</td>
</tr>
<tr>
<td>NUMERICAL ANALYSIS</td>
<td>GRAPH THEORY*</td>
</tr>
<tr>
<td>MTH 303</td>
<td>MTH 306</td>
</tr>
<tr>
<td>COMPLEX ANALYSIS</td>
<td>NON LINEAR PROGRAMMING*</td>
</tr>
<tr>
<td>STA 301</td>
<td>STA 304</td>
</tr>
<tr>
<td>OPERATIONS RESEARCH II**</td>
<td>STOCHASTIC PROCESSES</td>
</tr>
<tr>
<td>STA 302</td>
<td>STA 305</td>
</tr>
<tr>
<td>MATHEMATICAL MODELING TECHNIQUES**</td>
<td>QUALITY CONTROL METHODS</td>
</tr>
<tr>
<td>STA 303</td>
<td>STA 306</td>
</tr>
<tr>
<td>MULTIVARIATE ANALYSIS</td>
<td>RESEARCH METHODOLOGY</td>
</tr>
<tr>
<td>STA 307</td>
<td>FPT 301</td>
</tr>
<tr>
<td>RESEARCH PROJECT</td>
<td>FIELD PRACTICAL TRAINING</td>
</tr>
</tbody>
</table>

**NB:** * and ** are *Elective Courses* for Mathematics and Statistics respectively.
5.0 Methodology

The mode of delivery for each course will depend on the contents and topic, but will include lectures, group work, discussions, seminar presentations, assignments, practical work in the field, together with private study and research. Given the philosophy of the degree program we believe that practical work, including fieldwork is of fundamental importance. Assessment of practical skills will be an integral part of the assessment system and will be given appropriate weighting in the assessment of each course.

Individual private study will form an important part of each course for background reading and consolidation of material presented in classes. As an estimated guide for students we recommend that the number of hours allocated for private study for each course should be equal to the number of hours of teaching for that course. This time should be used for background reading, writing up practical work, written assignments, consolidation of personal notes, and reflection on the main issues.

Each student will be required to carry out a research project during the final year. This research project will have a technical purpose Tanzanian professional system and a focus on some aspect of Math and Statistics. It is expected that the topic chosen will be one that is applicable to Tanzania needs, and leads to data gathering and analysis that sheds light on an aspect of the system that will help solve a problem or allow others to improve Mathematical and Statistical Knowledge.

6.0 Instructional Material and Equipment

The instructional materials will include handouts, lectures, reference reading lists, library visits, seminars and tutorials, practical classes and field work. Equipment such as chalkboards, whiteboards, flip charts, overhead projectors, video camera, video recorders and Television, CD ROMs and Internet sources will be required for instructional purposes. Networked computers will also be needed.

In view of the above requirements MARUCO has the minimum teaching and learning facilities to start up running the proposed degree programme.

7.0 Academic Staff for the First Academic Year 2015/2016

The following is a list of academic staff recruited by MARUCO to run the degree programme.

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Name</th>
<th>Academic Qualification</th>
<th>Academic Rank</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ms. Winfrida Mwigilwa</td>
<td>BSc Education</td>
<td>Assistant</td>
<td>Full-Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MSc Math Modelling</td>
<td>Lecturer</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Degree Details</th>
<th>Position</th>
<th>Employment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Mr. Josephat Itambu</td>
<td>BSc Maths MSc Maths and Application</td>
<td>Assistant Lecturer</td>
<td>Full-Time</td>
</tr>
<tr>
<td>3</td>
<td>Mr. Jonas E. Meyan</td>
<td>BSc Education</td>
<td>Tutorial Assistant</td>
<td>Full-Time</td>
</tr>
<tr>
<td>4</td>
<td>Mr. Leguma L. Bakari</td>
<td>BA Economics and Statistics MSc Statistics (Year 2)</td>
<td>Assistant Lecturer</td>
<td>Full-Time</td>
</tr>
<tr>
<td>5</td>
<td>Mr. Godfrey J. Saqware</td>
<td>BSc Education MA Statistics (Year 2)</td>
<td>Assistant Lecturer</td>
<td>Full-Time</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Telemu Kassile</td>
<td>BSc Math and Statistics MSc Applied Statistics PhD Econom Statistics</td>
<td>Lecturer</td>
<td>Part-Time</td>
</tr>
</tbody>
</table>

**NB:**
Other University wide common core courses such as Computer Science, Social and Professional Ethics, Communication Skills, and Development Studies are taught by staff from other Departments.
Part 2: Course Descriptions

Format
Each subject is presented using the same format. The courses are presented separately, with a summary table of main features, followed by purpose of the course, Learning Outcomes, course contents and methods, methods of assessment, and ends with references and further reading. The courses are presented in order according to their status as core subject courses, professional subject courses or academic subject courses.

Note: Elective Courses
The elective courses offered in the program of Mathematics and Statistics depend on staff expertise and student interest at the time, thus allowing a degree of specialisation, and complement knowledge and skills developed in the other courses of the major academic subject. The detailed description of the courses is as follows

First Year:

GST 101: Basic Computer Applications Programs  3 Credits
Prerequisite courses: None

Goal
To equip the student with basic knowledge and skills of Information and Communication Technology (ICT)

Learning outcomes
By the end of this course the student should be able to:
  i). Operate computer safely
  ii)...Compose letters, worksheets and handouts
  iii). Create teaching aids such as posters
  iv). Design an e-teaching sequence with a sophisticated presentation program
  v). Create, register, mark books etc. by using spreadsheet program
  vi). Present and analyze information/problem using chart and/or graphs
  vii). Demonstrate understanding on emailing to communicate and exchange documents.
  viii). Use the internet to search for genuine information and images and transfer them to a document
  ix). Demonstrate a moral and ethical approach to the use of ICT technology.

Course content
  1. Introduction to computer:
   - Opening/shutting down computer safely, create folder, renaming, cut, paste, delete, move, save the document accordingly.

  2. Microsoft Word:
• Formatting text and use variety of tools in toolbar i.e. font and paragraph, Insert and formatting various items like tables, pictures, chart, text box, word Art etc. Change page layout like orientation, color, border etc.

3. **Microsoft PowerPoint**:
   • Design slides with different background style, color, theme, Editing slide appropriately, Insert charts, graph, clip art, text box, word art and drawing different shapes, Use different animation and run the presentation

4. **Microsoft Excel**:
   • Basic spreadsheet i.e. sort, text wrapping, merge cells, Insert& deleting rows/columns etc, Format cell accordingly i.e. border, fill color etc. Design simple formula/ function to solve a particular problem., Use chart/ graph to analyze the problem

5. **Internet and Searching**:
   • Creating email address and use them to communicate, Emailing including attaching files, Searching for information/image safely, Use MARUCO website and other educational platforms to access learning materials, Impact of internet technology( viruses, untrusted information, pornography etc)

**Teaching and learning methodologies**
Lectures, e-teaching, e-learning, group coaching

**Instruction materials and Equipment**
Desktop or laptop computer, digital projector, memory sticks, software tools, internet access, educational platform BSCW and MARUCO eCampus. Manuals and work sheets

**Assessment schemes**
40% Course work
60% Final Examination

**Text Books and Journals for the Course**

**Text Books and Journals for Further Reading**

**Ms Word**

**Ms PowerPoint**

**Ms Excel**

**Internet and Searching**

**GST 102: Communication and Academic Skills  3 Credits**
*Prerequisite courses: None*

**Goal**
To develop the students oral and written English language communication skills required for university study and instruction in secondary school

**Learning outcomes**
By the end of this course the student should be able to:
i). Effectively manage his/her time, stress, study and examinations
ii). Organize and use the best environment for study
iii). Practice the basic elements of good communication
iv). Efficiently use the library and assess text books and dictionaries
v). Take meaningful notes from lectures, books and use the APA system for citation
vi). Identify plagiarism and how to avoid it
vii). Adapt the reading, listening and speed strategies
viii) Follow the writing process for assignment writing
ix). Construct a good sentence and a good paragraph
x). Use grammar properly
xi). Practice and develop public speaking and listening skills
xii). Compose and write well-organized business letters

Course content

1. Management of stress and time
   • Stress: how to relax, how diet and exercise affect stress, how to avoid procrastination
   • Time: tips for effective management

2. Examinations
   • Reducing examination stress and maintaining mental health
   • Guidelines before and during examinations-choosing questions, planning, timing.
   • Interpreting and answering examination questions more efficiently and key words.
   • Organizing answers according to types of questions

3. How to study
   • The best environment and equipment for studying. How to use worry pad. Strategies to encourage concentration. Pacing study time and taking breaks.
   • Metacognition. Skills of metacognition and applying them to learning

4. Introduction to communication skills
   • Meaning of communication skills
   • Features of communication in English
   • Effective use of communication skills in English
   • Non-verbal and visual communication techniques- sign language and body language.

5. Using books
   • Strategies for effective reading: skimming, scanning and SQ3R
• Surveying text for their usefulness and relevance to purpose: title, blurb, publication details, preface, contents, index, references, bibliography
• Using a dictionary effectively. Understanding commonly used codes. Using grammar information to help correct sentence errors. Using phonetic spelling to aid pronunciation and stress.

6. Note taking
• Strategies for effective note taking—lists, diagrams, layout of page (Cornell system), use of abbreviation, summarizing synthesis, key words.
• Note taking techniques
• Note taking in lecture and speeches
• Note taking from books
• Characteristics of good notes
• Documentation of sources using APA
• Plagiarism and why it must be avoided at all costs

7. Reading skills
• Intermediate application of reading strategies. Skimming and scanning, intensive reading, contextual guessing.
• Further reading and understanding of different genres and diverse texts, particularly subject specific text
• Individual reading practice
• Understanding technical vocabulary

8. Listening skills
• Listening comprehension
• Listening for gist
• Accuracy in listening and giving feedback
• Understanding formal and informal speech
• Intensive listening

9. Writing and oral assignment
• The writing process
• Identification of main types of essays
• How to write term paper, presentation papers, seminar papers
• Platform and oral skills for seminar presentations—presentation, discussion, voice, body language, controlling nervousness

10. Sentence and paragraphs
• Features of a good sentence/good paragraph
• How to construct a good sentence/good paragraph

11. Grammar
• Parts of speech
• Punctuation marks
• Verb tenses and subject verb agreement
• Articles
12. Oral skills
- Presentation: confidence building, public speaking, formal presentation
- Pronunciation: pitch, intonation, tone and stress patterns
- Conversation: tag question and echo tags
- Discussion: undergraduate level discussion
- Academic discourse. Subject specific vocabulary

13. Business letter writing
- Need for a business letter
- Kinds, format, features and functions of a business letter.

Teaching methodologies
Lectures, practical activities

Instructional materials and equipment
Chalkboard, OHP, computer with LCD projector for power point demonstrations, exercises

Assessment methods
Observation, written exercises, homework, quiz, attitudes, questionnaire, written or oral questioning, worksheet, checklists.

Assessment scheme
Practical assignment 40%
Final examination 60%

Text Books and Journals for the Course

Text Books and Journals for Further Reading

MTH 101: Foundations of Analysis 3 credits
Prerequisite courses: None

Goal
To equip the student with the basic mathematical ideas in the area of analysis and its application in the formal study of the central foundations of Mathematics

Learning Outcomes
By the end of the course the student should be able to:
1) Carry out operations involving sets and to apply set theories to solve mathematical problems involving sets
2) Apply different number systems and work with them
3) Determine logical equivalences and valid arguments by applying truth tables and the algebra of propositions
4) Use and distinguish between the various methods of proof including mathematical induction
5) Apply concepts of limits, continuity and uniform continuity

Course Content
1) **Sets, Relations, Functions and Groups**: sets, subsets, set operations, Venn diagrams, Algebra of sets, Relations, Equivalent Relations and Partition, Functions and Groups
2) **Number systems and Cardinality**: natural numbers, integers, rational, real and complex numbers. Commutative, associative and distribution laws. Closure under arithmetic operations. Completeness and complete ordered fields, Cardinal Numbers, Infinite sets, Infinite Cardinal Numbers
3) **Logic**: propositions, logical connectives (negation, conjunction, disjunction, conditional, biconditional, parentheses), truth tables, tautologies, contradictions, logical equivalences, algebra of propositions, validity of arguments, quantifiers
4) **Proofs**: mathematical statements, methods of proof, mathematical induction
5) **Continuity**: Introduction, The real Number System, Sequences, Continuous Functions.

Teaching Methodologies
Lectures, seminars, Individual, partner and small group works

Instructional Materials and Equipment
Chalkboard, coloured chalks, OHP power point, screen, worksheets, charts

Assessment
Assignments, tests, group work, presentations

Assessment scheme
1) Assignments (20%)
2) Timed tests (20%)
3) End of course examination (60%)

Textbooks Journals for the course

**Textbooks and Journals for further reading**

**MTH 102: Calculus I**

*3 credits*

*Pre requisite course: None*

**Goal**
To equip the learner with skills and knowledge to solve problems related to differentiation of functions and its applications.

**Learning Outcomes**
By the end of this course, the student should be able to:
1. Differentiate simple expressions from first principle
2. Differentiate polynomials, trigonometric, exponential, logarithmic and composite functions.
3. Perform implicit differentiation
4. Apply differentiation knowledge to solve various life problems like those related to maximum and minimum values, rates of change in velocity and acceleration, estimation of errors and comprehensive graphing.

**Course content**
1. Derivatives
   - Slope of a curve and the derivative of a function
   - Differentiation from first principle
   - Second derivative of a function
   - The mean value and the extreme value theorems.
2. Differentiation of various functions
   - Differentiation formulae
   - Differentiation of trigonometric and composite functions
   - Implicit differentiation
   - Higher derivatives
3. Application of the derivatives
   - Maxima and minima problems
   - Rates of change
   - Estimations of errors
   - Comprehensive graphing
   - Definite Integrals
   - Fundamental theorem of calculus
   - The computational of areas as limits
   - The area under the curves

**Teaching methodologies**
Lectures, Group discussion, presentations and independent study

**Instructional materials and equipments**
Chalkboard, Overhead projectors, computers, Calculators, worksheets

**Assessment**
Assignments, tests, group work, presentations

**Assessment scheme**
Presentations – 20%
Written tests – 20%
End of semester examination – 60%

**Textbooks for the course**

**Textbooks and Journal for further reading**

**MTH 103: Linear Algebra** 3 credits

*Prerequisite courses: None*

**Goal**
To equip the student with the skill to solve real-life problems using the knowledge of linear systems, vector spaces and linear transformation.

**Learning Outcomes**
By the end of this course the student should be able to:
- Solve systems of linear equations using various methods
- Evaluate determinants
- Apply linear transformations
- Use eigenvectors and eigenvalues to determine whether a given matrix is diagonalizable
- Explain the concept of vector spaces and their properties
Course Content
1. **Systems of linear equations**: homogeneous and non-homogeneous systems, matrix form, solution by row reduction (Gauss and Gauss-Jordan elimination methods) and their applications
2. **Matrices**: definitions, properties of matrix operations, special types, elementary row operations, reduction to row echelon forms, computation of the inverse matrix by elementary row operations, rank of matrix
3. **Determinants**: definition, evaluating of determinants by row and column, properties, finding the inverse of a matrix by using the determinant, Cramer’s rule
4. **Linear transformations and Eigenvectors and Eigenvalues**: definitions and properties, Kernel and Range, linear transformations from $\mathbb{R}$ to $\mathbb{R}$, matrices of linear transformations, similarity, characteristic equation, diagonalization, eigenvectors and linear transformations, complex eigenvalues.
5. **Vector spaces and Orthogonality**: definition and examples, Subspaces, Linear Independence, Basis and Dimension, Change of Basis, Row Space and Column Space, the scalar Product in $\mathbb{R}$, Orthogonal Subspaces, Inner Product Space, Least Squares Problems, Othonomal Sets, The Gram-Schmidt Orthogonalisation process

Teaching Methodologies
Lectures, seminars, individual and small group work

**Instructional materials and equipment**
Chalkboard, coloured chalks, OHP, screen, worksheets

**Assessment**
Assignments, tests, group work, presentations

**Assessment scheme**
Written assignments 20%
Written tests 20%
Final examination 60%

**Textbooks for the course**

**Textbooks and Journal for further readings**

**MTH 104: Calculus II** 3 credits
*Prerequisite course: MTH 102 Calculus I*
Goal
To equip the learner with the knowledge of calculus, sequence and its application in solving real – life problems

Learning outcomes
By the end of this course the student should be able to:
1) Explain different techniques that can be used to integrate transcendental functions
2) Integrate various functions by direct substitution, by parts, by trigonometric substitution, by partial fraction, or by mixed bag strategy
3) Apply definite integrals to solve real life / physical problems; example, problems related to volumes of revolution, arc lengths, surface of revolutions, mass and centre mass.
4) Evaluate improper integrals
5) Exhibit comprehension of sequence and series.

Course content
1. Integration
   • Anti –derivates and Indefinite integration
   • Integration by substitution change of variables
   • Area ,Riemann Sums and the Definite integrals
   • The Fundamental Theorem of Calculus
   • Improper integrals

2. Further techniques of Integration
   • Review of elementary Integration formulae and techniques
   • Integration by parts
   • Integration by Trigonometric substitution
   • Integration by Partial fraction decomposition
   • Integration of Inverse functions (Exponential, logarithmic, and trigonometric functions)
   • Mixed bag strategy (Strategy for dealing with integrals of Miscellaneous types )

3. Application of the Definite Integral
   • Volumes of revolution (Disc /washer method & Shell method)
   • Arc lengths and Surface of revolution
   • Mass and Centre of mass problems
   • Area of a region between two curves (point of Intersection and Sketch)

4. Sequences and Series
   • Infinite sequences and series
   • Convergence and Divergence of series
   • Maclaurin”s and Taylor series
   • Differentiation and Integration of power series
   • Applications of Taylor polynomials and Taylor series.
Teaching Methodologies
Lectures, Seminar presentations, Independent studies and group tasks.

Assessment
Assignments, tests, group work, presentations

Assessment scheme
Seminar presentations  20%
Tests 20%
End of semester examination  60%

Instructional materials and equipment
Worksheets, chalkboard, Mathematical packages eg Autograph, Overhead projectors, computers, Calculators, worksheets.

Textbooks for the course

Textbooks and Journal for further readings

MTH 105: Measure and Integration       3 Credits
Prerequisite courses: None

Goal
To introduce the concept of measure, its properties and its use in the general theory of abstract integration as introduced by Riemann and Lebesgue

Learning Outcomes
By the end of this course the student should be able to:

- Apply their set theoretical knowledge in solving problems on measures on R and indeed on any arbitrary set
- Explain the basis of integration as a basic mathematical tool both from Lebesgue”s and Riemann”s view
- Enumerate the merits of Lebesgue integration over Riemann integration
- Explain why some functions are Lebesgue intergrable but not Riemann intergrable
- Apply concepts gained in this course to other mathematical areas like measure and probability
- Study more advanced courses in measure theory and/or related areas

Course Contents
• **Outer Lebesgue measure in R:** properties, Lebesgue and Borel measurable subsets of R, Lebesgue and Borel measure on R and their conditional continuity from above and below

• **Completeness:** completeness of the Lebesgue measure, non-completeness of the Bores measure, Lebesgue measurable functions on R and their combination

• **Lusin’s theorem:** Lebesgue integral on R, advantages of the Lebesgue integration theory over Riemann integration functions, dominated convergence theorem, convergence in measure, uniform convergence, Egoroff’s theorem and Riesz’s theorem

**Teaching Methodologies**
Lectures, presentation, library research, seminars, individual and small group works.

**Instructional materials and equipment**
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

**Assessment scheme**
Written assignments 20%
Written tests 20%
Final examination 60%

**Text books and Journals for the course**

**Text books and Journals for the further reading**

**MTH 106: Computer Programming** 3 credits
*Prerequisite courses: None*

**Goal**
To familiarize the learner with various computer languages and problems solving methodologies

**Learning Outcomes**
By the end of this course the student should be able to describe the basic concepts of programming and problem solving using a high level programming language

**Course Content**
• **Introduction to Computer:** Definition, Historical background of the computer, Computer generation, Computers language translators (compiler, interpreter and assembler)
• **Programming languages:** Introduction to structured programming
• **Problem solving methodologies:** Algorithms, Flowchart and Pseudo-code
• **Programming in Pascal and simple application:** Variables and Data types, Decision making, Control structure, Procedure and Functions, String, Array.

**Teaching Methodologies**
Lectures, Presentation, library research, seminars, individual and small group work and practical

**Instructional materials and equipment**
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables, Turbo Pascal

**Assessment**
Practical assignments 20%
Written tests 20%
Final examination 60%

**Text books and Journals for courses**

**Text books and Journals for further reading**

**STA 101: Introduction to Statistics & Probability** 3 Credits
*Prerequisite Courses: None*

**Goal**
To introduce students to the basic Statistics ideas and Probability theory

**Learning outcomes**
By the end of the course the student will be able to:
• Describe the basic terminologies used in Statistics
• Draw frequency distribution curves and graphs
• Calculate measures of central tendency, dispersion, partition values and measures of association
• Solve basic probability problems using the laws of probability and the Bayes theorem.

**Course content**
1) Basic concepts of Statistics, Data collection & presentation
   • Frequency distributions: Ungrouped and grouped Frequency distributions

26
- Graphical methods: Histogram, Frequency Polygon, Frequency curve and the Ogive.

2) Measures of Central tendency: The Arithmetic mean, Geometric mean, Harmonic mean, Median and Mode.

3) Measures of Dispersion: The range, Quartile deviation, Mean absolute deviation and standard error

4) Partition values: Quartiles, Deciles and Percentiles. Measures of relationship and association: Skewness & Kurtosis, Correlation and Regression

5) Probability: Laws of probability, conditional probability and the Bayes’ theorem.

Teaching methodologies
Lectures, seminars, individual, partner and small group work

Instructional materials and Equipments
Chalkboard, coloured chalks, OHP, Screen, worksheets

Assessment
1) Assignments 20%
2) Timed tests 20%
3) End of course examination 60%

References

STA 102: Probability Distributions I 3 Credits
*Prerequisite Course: STA 101- Introduction to Statistics & Probability*

Goal
To introduce the student to Univariate and bivariate probability distribution functions

Learning Outcomes
By the end of the course, the student should be able to:
- Define the various terms used in probability and statistics
- Define the different distribution functions
- Derive the expectation, variance and the m.g.f.s of the probability distribution functions
- Apply the statistical knowledge in solving real life problems
Course content
1) Concept of random variables: Discrete and continuous random variables
   • Probability distribution functions of random variables.
   • Moments and moment generating functions of random variables
2) Univariate probability distribution functions (Discrete & Continuous): Moments
   and Moment generating functions
3) Bivariate probability distribution functions (Discrete & Continuous): Joint,
   marginal and conditional distributions. Bivariate Expectation & variance. Bivariate
   conditional Expectation & variance. Stochastic independence, Bivariate Moment
   generating functions.
4) Bivariate Normal distribution

Teaching methodologies
Lectures, seminars, individual, partner and small group work

Instructional materials and Equipment
Chalkboard, coloured chalks, OHP, screen, computers, worksheets

Assessment
1. Assignments 20%
2. Tests 20%
3. End of course examination 60%

References
   7th Edition. London; Pearson education International
3. Ross, S.M (2009). Introduction to Probability & Statistics for Engineers and Scientists,
5. Ramachandran M. K & Tsokos P. C (2009). Mathematical Statistics with Applications,

STA 103: Sampling Theory and Methodology 3 Credits
Prerequisite Course: STA 101- Introduction to Statistics & Probability

Goal
To deepen understanding of sampling process and create students’ awareness of the
sampling methodology in mathematical researches.

Learning outcomes
By the end of the course the student will be able to:
• explain various concepts related to sampling theory and methodology
• applying probability and non-probability sampling designs in real survey
• tackle problems involving simple, systematic, stratified and cluster sampling

Course content
1) The objective sampling in surveys. Elementary Sampling theory, the main concepts and definitions. The main parameters of estimation, accuracy measures of estimators. Probability and non probability sampling.
3) Stratified sampling design. allocation of the sample size and estimators
4) Systematic sampling
5) One stage and two stage cluster sampling.

Teaching methodology
Lectures, seminar presentations, independent studies, and real surveys

Instructional materials and Equipment
Chalkboard and overhead projector

Assessment
1. Assignments 20%
2. Tests 20%
3. End of course examination 60%

References

STA 104: Applied Statistics  3 Credits
Prerequisite Course: STA 101- Introduction to Statistics & Probability

Goal
To help students understand statistical inference and application of probability distributions to real life problems.

Learning outcomes
By the end of the course the learners should be able to;
• Apply discrete and continuous probability distributions to real life problems
• Solve problems involving one- & two- sample inference and multiple comparisons
• State the Neyman-Pearson Lemma and calculate the power of a test
Tackle problems involving analysis of variance.

**Course content**
- Probability distribution functions and their applications- Binomial, Poisson, and Normal distributions
- Test of Hypothesis: Simple and composite hypothesis, Critical regions, Null and alternative hypotheses, Types and size of errors in hypothesis testing, The Neyman-Pearson Lemma, The power function of a test, Likelihood Ratio Test
- One and two sample inference in the Z and t-tests. F-test and Chi-square test.
- Analysis of Variance techniques. One-way and two-way analysis of variance (ANOVA)

**References.**

**STA 105: Operations Research I** 3 Credits
*Prerequisite course: None*

**Goal**
To introduce the students to mathematical techniques like linear programming, transportation networks and graphs used in the determination of optimal allocation of resources.

**Learning Outcomes**
By the end of this course the students should be able to:
- Formulate simple linear programming models in agriculture and economics for given data and solve them to obtain optimal solutions
- Draw and use networks to solve simple transportation problems and determine maximal flow in networks
- Solve simple problems involving allocation and planning through the use of graphs

**Course Content**
Formulation of Linear optimization programs; Graphical solution of Linear Programming (LP); Convex analysis in Euclidean space \( E^n \); The Simplex algorithm, Two phase Simplex, revised Simplex; Duality and its economic interpretation and application; Transportation and assignment problems; Fundamentals of Graph theory. Basics of Sensitivity Analysis. Models from agricultural economics: regional planning and resource allocation

**Teaching Methodologies**
Lectures, library research, seminars, individual and small group work
**Instructional materials and equipment**
Chalkboard, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

**Assessment**
Written assignments 20%
Written tests 20%
Final examination 60%

**References.**

**Text books and Journals for further reading**

**STA 106: Design and Analysis of Experiments  3 Credits**
*Prerequisite courses: None*

**Goal**
To introduce the students to the principles of experimentations and analysis of variance of various experimental designs

**Learning Outcomes**
By the end of this course the student should be able to construct simple experimental designs as well as simple factorial designs and carry out an analysis on them.

**Course Content**
- Principles of experimentation: randomization, replications, local control, techniques of error control
- Analysis of variance: fixed, random and mixed model, application to simple experimental design, completely randomized blocks & Randomized Complete Block Designs, Latin squares & Graeco-Latin squares Designs. Construction of orthogonal Latin squares
- Missing plot techniques: RCBD and Latin square designs
- Simple factorial designs and their analysis: with and without confounding (Factors with 2 levels only)
- Analysis of PBIB designs and BIB designs (Techniques only)
Teaching Methodologies
Lectures, library research, seminars, individual and small group work

Instructional materials and equipment
Chalkboard, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

Assessment
Written assignments 20%
Written tests 20%
Final examination 60%

Text books and Journals for courses

Text books and Journals for further reading

FPT 101 Field Practical Training (FPT) 5 credits

A. Introduction:
- The Mathematics Department at Marian University College (MARUCO) will organize FPT program for first year students taking Bachelor of Science in Mathematics and Statistics Program. The program will be done during the long vacation and is not accompanied with Course Work. The Mathematics Department and/or students are responsible for choosing the field stations.
- The duration of the FPT is five consecutive weeks (35 days). It carries five (5) credits.

B. Prerequisite Courses:
Statistics courses of First Year.

C. Goal:
- To enable the students to acquire work experience related to their studies and enable them acquire techniques of solving problems in the community.
• To Establish and maintain close contacts between employers and MARUCO and between MARUCO and the ministry responsible for labor.

D. Learning outcomes:
By the end of the course the students should be able to:
• Apply or learn the practical applications of the theory they learn at the university in solving real life problems.
• Minimize over-emphasis on theory and thus give some weight to practical work experience.

E. Activities in the field:
• Visiting offices in town, e. g. Municipal, Diocesan, to learn how statistical data collected and processed. However, it is not easy to cover the whole nation.
• Students have to be attached to offices in town e. g. Municipal Council Offices or the Diocesan Office for five weeks, to learn how statistical data collected and processed under the guidance of experienced statisticians. However, it is not easy to cover the whole nation.
• At the end of the FPT session, each student has to write a report on the activities undertaken during the FPT

NB:
1) The FTP report must be typed double line space. The report should be about 15 – 20 pages long including tables, graphs, charts, appendixes and references.
2) The report should have among others, the following sections:
   a) Table of contents.
   b) Acknowledgements.
   c) Introduction: Mission, objectives and roles of the organization. d) Assigned tasks/activities.
   e) Case study: a detailed discussion of one special case encountered at work and how it was dealt with.
   f) Skills and competencies acquired.
   g) Theoretical implications: How are the assigned Task/activities comply with or contradict some of the theories/approaches learnt in class.
   h) Problems encountered: Administrative, organizational and systematic problems.
   i) Conclusions and recommendations. j) References (where applicable).
   k) Appendices (where necessary).
The students will need to be briefed on these sections of the report after the program is accepted and passed by the academic committee of MARUCO

F. Assessment:
The grading will be based on the following:
   a. Field Training Officer”s Assessment,
b. Student’s logbook. It contains student’s daily activities and outcomes.
c. Student’s final report and
d. University Supervisor’s report.

The score sheet for the distribution of the marks will be as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Punctuality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Demonstrate standard of responsibility in the fieldwork station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Demonstrate standard of co-operation in the fieldwork station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Demonstrate standards of efficiency in the fieldwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Demonstrate observation of professional code of conduct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Demonstrated ability to execute tasks as assigned in the field station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Accuracy of the task executed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Observation of professional dressing code</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Demonstration of positive attitudes towards work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Demonstration of acceptable action in the field station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Understanding of the task assigned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Handling and care of office equipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Ability to work in difficult situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Ability to work under minimum supervision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Demonstration of satisfaction in customer care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Overall rating of the students job performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Field assessment score \( \frac{\text{Total Score}}{80} \times 30\%

Assessor’s general remarks:

.................................................................................................................................

.................................................................................................................................

Assessor’s Details: Name...............................................................................................

Position.........................................................................................................................

Signature.............................................Date.................................

......................................................... Official Stamp

**Letter grade:**

70 – 100:    A  Excellent
60 – 69:     B+  Very Good
50 – 59:     B  Good
40 – 49:     C  Pass
35 – 49:     D  Fail
G. Responsibilities of students:
Being an image of the university, a student doing FPT is expected to:
- Show high standards of responsibility in the field work station.
- Show high standards of cooperation in the field work station.
- Show high standards of efficiency in the field work station.
- Uphold to the code of professional conduct.
- Arrive at the field work station on time.
- Avoid misdemeanour (negative attitudes and unacceptable actions)
- Execute tasks given by supervisors, fill in the log book, and carry out any responsibilities relevant to the FPT.

The students should be told about the above responsibilities during orientation.
Remarks:
- A student will not be allowed to graduate until one clears the course within the maximum allowable time of one’s degree program i.e. 5 years
- Should a student change field work station, it is the responsibility of the student to communicate such information to the Office of the Deputy Principal of Academic Affairs explaining the reason for the change and the new field station as soon as possible. Failure to do so may lead to do so may lead to fail the FPT.
- A student who fails will have to undergo a supplementary training period during the vacation of the third year or thereafter so long as one does not exceed the maximum allowable time of one’s degree (currently 5 years of the program of the usual 3 years) at one’s own cost.

Second Year

GST 201: Social and Professional Ethics  3 Credits
Prerequisite courses: None

Goal
To equip the student with ethical concepts and principles for dealing with the rapid social changes, the ingredients of professional ethics of the society provide a forum to discuss the ethical basis of a code of conduct for professionals as well as the importance of being models of behaviour for other people in the society.

Learning outcomes
By the end of the course the student should be able to:
1. Define ethics and explain basic ethical terms such as ethos, goodness, and happiness
2. Explain the characteristics of a good society and State
3. Examine the main implications of ethical theories and demonstrate an understanding of the importance of the good life both for the individual and society
4. Relate between a code of ethics and professional conduct
5. Explain why certain acts are unacceptable within the context of a code of professional conduct
vi. Explain situations that need to be analysed in terms of professional ethical issues in the society
vii. Analyse the role of professionals in defending the rights of individuals within the society
viii. Define the concept of professionalism in education and analyse some of the factors that can lead to corruption within educational systems and institutions
ix. Develop moral and professional values: honesty, tolerance, respect, fear of God and other social values.

Course Content
2. Basic Ethical concepts – ethos, conscience, happiness, hedonism, virtue, value.
3. The meaning of a good act; discussion of hedonism, utilitarianism, happiness, a good society, a good State, ingredients of a civil society, the person and society and various ethical theories
4. Sexuality and family life; authority and obedience in social context; some principles of social order
6. Work and the meaning of work ethic, Duties of workers
7. Case study: Professionalism: rise and fall of professionalism in Tanzania
8. Code of ethics and conduct for public service in Tanzania
9. Confidentiality and honesty in personal and professional life

Teaching Methodologies
Lectures, group discussions and class presentation, visiting educationalists

Instructional Materials
Chalkboard, OHP, video player and TV

Methods of Assessment
Observation, oral/written questions during the lesson, worksheets, quizzes and tests, take-homes for presentation.

Scheme of Assessment
20% Written assignments
20% Written tests
60% Final examination

Text Books and Journals for the Course
Text Books and Journals for Further Reading

GST 202: Development Studies 3 Credits
Prerequisite courses: None

Goal
The goal is to equip the student with basic knowledge of the development process in Tanzania and make him/her realise how education has been a tool to save it.

Learning outcomes
By the end of this course the student should be able to:
   i). Discuss development issues and be able to teach a topic on development in General Studies in Secondary Schools
   ii). Account for the impact of science and technology in improving human resources and needs
   iii). Analyze the factors socio-economic development influencing a developing country-Tanzania.
   iv). Evaluate political and economic decisions made in Tanzania and other countries with respect to development
   v). Critically appraise the effectiveness of multinational corporations and NGOs working in Tanzania and international organizations.
   vi). Discuss and evaluate gender issues.
   vii). Discuss and analyze the impacts globalization in terms of socialist/market economies
   viii). Explain economic production and appreciate the importance of work in development
   ix). Define investment and explain challenges faces by both public and private investments
   x). Explain how international cartels operate.
xi). Classify different forms of government and analyse the constitution of United Republic of Tanzania
xii). Describe how a local governments functions and its challenges
xiii). Elaborate the duties and rights of a citizen
xiv). Tolerate and respect others
xv). Analyse and compare parliamentary systems of Tanzania, USA, UK.
xvi). Explain the composition and structure of the executive and how it functions
xvii). Demonstrate the basic legal proceedings in criminal justice process.
xviii). Define democracy and assess its applicability in democratic activities.
xix). Discuss the steps in carrying out elections and challenges involved in this process.
xx). Explain the role of mass media in developing Tanzania
xxi). Apply the basics of management and conservation of our environment

Course Contents
1. The nature of development.
2. Human needs, resources for development, science and technology appropriate for development, economic surplus.
3. Socio-economic development in Tanzania
   - Health and Disease control;
   - Reproductive Health and Related services, STD, HIV/AIDS.
   - Population dynamics.
4. Policy Issues in Tanzania- Poverty and unemployment
5. Role of local and international organisations
   - U.N.
   - NGOs, local and international
   - CBOs
   - GATT World Bank, IMF
6. Gender Issues and women empowerment
8. Economic production.
10. International trade.
    - Regional integration- SADC/OAU
    - International co-operations- foreign policy, international peace and understanding, UNO
11. Government
    - Forms and branches of government
    - The constitution of Tanzania
    - Political pluralism
12. Local government
13. Citizenship and civil rights
14. Family and parenthood
15. Parliament- role of parliament, opposition parties in parliament
16. The executive
17. The Judiciary
18. Democracy
19. Elections in Tanzania
20. Mass media
21. Environmental education

Teaching Methodologies
Lectures, Class discussions, Guest Speakers, tour visits, presentations, group work.

Instructional Materials and Equipment
Chalkboard, chalks, CD ROM, OHP, video player and TV. Newspapers, magazines and journals

Methods of Assessment
Observation, written exercises, homework, quiz, attitudes, questionnaire, written or oral questioning, worksheet, checklists.

Scheme of Assessment
Written essay 20%
Seminar paper 20%
Final examination 60%

Text Books and Journals for the Course
2. General Studies Module-TIE DSM

Text Books and Journals for Further Reading
   Modernization in South Africa.
3. The Guardian Weekly: Feature Essays on Related Topics
4. The United Republic of Tanzania, (1997). The Tanzania Investment Act

MTH 201: Vectors and Vector Mechanics  3 Credits

Goal
To deepen knowledge of polar coordinates, conic sections and vectors in space and their applications

Learning outcomes
By the end of the course the student should be able to:
1. Demonstrate knowledge of polar coordinates and conic sections
2. Use dot products, scalar products and scalar triple products to solve problems using vectors in \( \mathbb{R}^3 \)
3. Develop the ability to derive some solvable Mathematical formulation of Physical problems in Mechanics
4. Define Newton’s and Keppler laws of motion and use them to solve problems of particle motion

Course Content
1. Polar coordinates: areas of regions using polar coordinates, tangent lines to curves, lengths of curves
2. Conic sections: parabolas, ellipses, hyperbolas, rotation of axis, polar equations of conic sections
3. Vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$: geometric vectors, vectors in coordinates systems, dot and cross product of vectors, lines and planes in $\mathbb{R}^3$, scalar triple product
4. Vector mechanics: vector differentiation, velocity and acceleration of objects in space, motion in a straight line, relative motion, projectile motion on non-inclined plane, Newton and Keppler’s laws of motion, power, energy, momentum
5. Applications of vectors in kinematics and mechanics

Teaching Methodologies
Lectures, seminars, presentation, Individual, partner and small group work

Instructional Materials and Equipment
Chalkboard, coloured chalks, OHP, screen, models, computer, worksheets

Assessment
Assignments, tests, group work, presentations

Assessment scheme
- Assignments (20%)
- Timed tests (20%)
- End of course examination (60%)

Textbooks for the course

Textbooks for further reading
6. Web-sites and CD ROMs
7. Autograph package

**MTH 202: Ordinary Differential Equations**  
3 credits Prerequisite courses- MTH 102: Calculus I, MTH 104: Calculus II

**Goal**
To engage the student in logical and critical thinking as well as to acquire a proficiency in the topics covered in the ordinary differential equations.

**Learning Outcomes**
By the end of this course the student should be able to:
- Use separation of variables to solve differential equations
- Solve first order differential equations with constant coefficients
- Apply methods of solving first order differential equations in physical problems
- Demonstrate skills in using numerical methods to solve first order and initial value problems
- Apply the Laplace transform in working with differential equations
- Translate written languages into mathematical statements, interpret information, analyze given information and formulate appropriate mathematical statements.
- Identify methods for finding particular solutions to PDEs that are needed in physical applications.
- Show how the right choice of initial and boundary conditions can give a particular solution to a PDE.

**Course Content**
1. **First Order Ordinary Differential Equations**: definition and classification of differential equations, order, degree, linearity, solution of first order ordinary differential equations, separation of variable, homogenous equations, exact equations, Bernoulli equation, applications (Examples include; physical process, Chemical process like radioactive process and Biological process), application to Eigen Values.
2. **Second and higher order linear ordinary differential equations**: Real roots, Complex roots, existence and uniqueness theorem, method of undetermined coefficient, variation of parameters, Cauchy-Euler equations, applications, linear constant coefficient differentials of order $n$, Difference Equations, Linear independence and the Wronskian method of order reduction
3. **Numerical methods**: for first order initial-value problems
Teaching Methodologies
Lectures, seminars, individual and small group work

Instructional materials and equipment
Chalkboard, coloured chalks, OHP, screen, worksheets

Assessment methods
Assignments, tests, group work, presentations

Assessment scheme
Written assignments 20%
Written tests 20%
Final examination 60%

Textbooks for the course


MTH 203: Calculus III 3 credits
Prerequisite courses- MTH 104: Calculus II & MTH 201: Vectors and Vector Mechanics

Goal
To equip the student with basic concepts, techniques and applications of differential and integral calculus of several variables

Learning outcomes
By the end of the course the student should be able to:
1. Demonstrate understanding of functions of several variables
2. Demonstrate understanding of space coordinates their interpretation and related graphs
3. Apply differential and integral calculus to various functions
4. Apply Green’s, Stoke’s and Gauss theorems to evaluate surface integrals

Course Content
1. Functions of several variables: definition, functions of two variables and level curves, functions of three variables and level surfaces and quadratic surfaces, cylindrical and spherical coordinates in R³
2. Differential calculus of several variables: differentiation of functions of several variables, partial derivatives, directional derivatives and gradients, tangent planes and normals, extrema, Lagrange multipliers
3. Integral calculus of several variables: double and triple integrals, centre of mass, moments of inertia / rotation about a fixed axis, surface area, application of triple integrals
4. Vector integral calculus: line integrals and physical applications, surface and volume integrals, Green’s Theorem
5. Integral theorems: the Gauss divergence and Stoke’s theorems, change of variables in multiple integrals, applications of integral transformations.

Teaching Methodologies
Lectures, seminars, Individual, partner and small group work

Instructional Materials and Equipment
Chalkboard, coloured chalks, OHP, screen, autographs, worksheets

Assessment methods
Assignments, tests, group work, presentations

Assessment scheme
1. Assignments (20%)
2. Timed tests (20%)
3. End of course examination (60%)

Textbooks for the course

Textbooks for further reading

Web-sites and CD ROMs
Autograph package

**MTH 205: Abstract Algebra**  
*3 credits*

*Prerequisite courses:* MTH 103: Linear Algebra, MTH 202: Elementary Number Theory

**Goal**
To engage the student in abstract knowledge of Algebra

**Learning Outcomes**
By the end of this course the student should be able to:
1. Distinguish between Homomorphism and Isomorphism
2. Define polynomial rings, Maximal and prime ideals and Irreducible polynomials
3. Solve problems involving group, Ring and Field theory

**Course Content**
1. Group Fundamentals: Groups and subgroups, Permutation Groups, Homomorphism, The Isomorphism Theorems, Direct products
2. Ring Fundamentals: Basic definitions and properties, Polynomial Rings, Maximal and prime Ideals, Irreducible Polynomials
3. Field Fundamentals: Field extensions, Splitting Fields, Algebraic Closures, Separability, Normal extensions

**Teaching Methodologies**
Lectures, seminars, individual and small group work.

**Instructional materials and equipment**
Chalkboard, coloured chalks, OHP, screen, worksheets

**Assessment methods**
Assignments, tests, group work, presentations

**Assessment scheme**
Written assignments 20%
Written tests 20%
Final examination 60%

**Textbooks for the course**

**MTH 206: Elementary Number Theory** 3 Credits

*Prerequisite courses: None*

**Goal**
To introduce the classical and modern properties of integers, Diophantine equations and finite arithmetic

**Learning Outcomes**
By the end of this course the student should be able to solve linear Diophantine equations, congruencies and Pythagorean triples

**Course Content**
- **Ring of Integers**: divisibility with remainder, prime numbers and their distribution
- **Euclid’s proof**: infinite many prime numbers, Euclid’s algorithms for finding greatest common divisors, unique factorization, congruencies, residue classes and integers (mod n)
- **Theorem**: Primitive roots and indices, linear Diophantine equations, Pythagorean triples, Fermat’s last criterion, Legendre symbol and the reciprocity law, quadratic fields, norm and trace, arithmetic in quadratic fields, units and Pell’s equation

**Teaching Methodologies**
Lectures, Presentation, library research, seminars, individual and small group work

**Instructional materials and equipment**
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

**Assessment scheme**
Written assignments 20%
Written tests 20%
Final examination 60%

**Text books and Journals for the course**

45
Text books and Journals for further reading

**MTH 207: Partial Differential Equations**  
**3 Credits**
*Prerequisite courses: MTH102- Calculus I, MTH 104- Calculus II & MTH 105: ODE*

**Goal**
To introduce students to partial differential equations and their applications.

**Learning Outcomes**
By the end of this course the student should be able to:
- Use separation of variables to solve differential equations
- Solve first order partial differential equations and apply them to solve real life problems
- Demonstrate skills in using numerical methods to solve first order and initial value problems
- Find the particular solutions to PDEs that are needed in physical applications.
- Show how the right choice of initial and boundary conditions can give a particular solution to a PDE.
- Apply partial differential equations to solve problems involving the Wave and Heat equations

**Course Content**
1. Continuity
2. First Order Partial Differential Equations: Characteristic/auxiliary equations, Boundary conditions and Formation of PDE, Non-linear first order PDEs, Separation of Variables
4. Initial conditions and Boundary conditions, Homogeneous Function: Euler’s theorem of Homogeneous functions, Composite Functions: Differentiation of composite functions
5. Taylor’s Theorem for functions of two variables. Maxima and minima of functions of two variables
6. Lagrange’s method of undetermined multipliers

**Teaching Methodologies**
Lectures, seminars, individual and small group work

**Instructional materials and equipment**
Chalkboard, coloured chalks, OHP, screen, worksheets
Assessment methods
Assignments, tests, group work, presentations

Assessment scheme
Written assignments 20%
Written tests 20%
Final examination 60%

References

STA 201: Probability Distributions II 3 Credits
Prerequisite Course: STA 102- Probability Distributions I

Goal
To extent the knowledge of bivariate probability distributions functions to multivariate probability distributions theory

Learning Outcomes
By the end of the course the learners should be able to;

• Find the distributions of random variables, linear & quadratic functions
• Find the characteristic function and Order statistics of random variables
• Derive the Student-t & F-distributions
• State and proof the Chebychev”s Inequality and the Central limit Theorem

Course content
1) Multivariate distribution Theory; Marginal & conditional distributions
2) Distributions of random variables and linear & quadratic functions: Change of variables/ Transformation technique, Cumulative distribution function technique and the Moment generating functions technique. Chi- square distribution , Student-t-distribution, F-distribution
3) Chebychev”s Inequality
4) Characteristic Functions
5) Order statistics
6) Central Limit Theorem ;The weak & Strong Laws of Large numbers

References

STA 202: Time Series Analysis  3 Credits
Prerequisite courses: None

Goal
To introduce the student to methods of analyzing time series data

Learning Outcomes
By the end of this course the student should be able to:

- Isolate the components of a time series namely: trend, seasonal components, cyclic components and random components, using linear time invariant filters
- Use the isolated components for prediction purposes
- Identify after de-trending, the type of series by using correlogram and spectrogram analysis techniques

Course Content
- Economic time series: the four components of an economic time series, stationary time series, use of filter in time series analysis
- Smoothing Methods
- Method of moving averages: variate difference method
- Autoregressive processes: correlogram, periodogram and spectrogram analysis, prediction theory
- The Box-Jenkins Forecast procedure

Teaching Methodologies
Lectures, Presentation, library research, seminars, individual and small group work

Instructional materials and equipment
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

Assessment scheme
Written assignments 20%
Written tests 20%
Final examination 60%

Reference

Text books and Journals for further reading

STA 203: Regression Analysis 3 Credits
*Prerequisite Courses: STA 104- Applied statistics and MTH 103- Linear Algebra*

Goal
To apply regression concept to predict the outcomes of certain phenomenon in real life situations e.g the relationships that exist between demand of given product in the market and the income levels.

Learning outcomes
By the end of this course the student should be able to:
- Calculate the coefficients in both simple and multiple regression and draw regression line from given data
- Perform statistical inference on the regression parameters.

Course content
- Simple Linear Regression: The simple linear regression model; Assumptions on the simple Linear Regression Model, Fitting Line of best fit by Least squares , Scatter diagram. Inferences on the Least square estimators/ parameters. Estimation and prediction of the response variable using the fitted line. Correlation analysis and the coefficient of Determination. The ANOVA for the simple regression model
- Multiple Linear Regressions: The multiple regression model. Method of least squares of estimation the coefficients. Interpreting the Partial Regression Coefficients. Inference on the parameters. The coefficient of Determination. The ANOVA for the multiple regression models. Matrix Notation for Linear Regression
- A Polynomial Regression model
- Logistic Regression
- Regression Diagnostics

Teaching Methodologies
Lectures, seminars individual and small group work,
Instructional materials and equipment
Chalkboard, coloured chalks, OHP, screen, Worksheets

Assessment Scheme
- Written assignments 20%
- Written tests 20%
- Final examination 60%

Reference

STA 204: Categorical Data Analysis  3 Credits
Prerequisite Course: STA 104- Applied Statistics

Goal
To introduce the student to the categorical/ enumerated data analysis techniques

Learning Outcomes
By the end of this course the student should be able to:
- Carry out inferences for population proportions in a Two-by-Two contingency Table and Three-Way Contingency Tables
- Perform Chi-square Tests of Independence and test Independence for ordinal Data, Exact Inference for small samples

Course content

Teaching Methodologies
Lectures, Presentation, library research, seminars, individual and small group work

Instructional materials and equipment
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

**Assessment scheme**
Written assignments 20%
Written tests 20%
Final examination 60%

**Reference**

**STA 205: Non Parametric Tests  3 Credits**
Prerequisite Course: STA 104- Applied Statistics

**Goal**
To introduce the student to the Non-parametric methods/tests

**Learning Outcomes**
By the end of this course the student should be able to:
- Describe distribution -free statistical methods for testing non-parametric hypothesis
- Perform one and two sample sign test
- carry out statistical inferences using Wilcoxon Signed Rank test, Wilcoxon Rank Sum Tests, Mann-Whitney U-Test, the Kruskal-Wallis H- Test, Spearman rank Correlation coefficient test and Run Test for Randomness
- describe the advantages and disadvantages of Non parametric methods
- Sign Test: Single sample sign test and paired sample sign test.
- Kendall’s Spearman’s rank Correlation coefficient test.
- Run Test for Randomness.
- Sequential test procedure.
- Goodness of fit problems: The Chi-square and Kolmogorov-Smirnov tests and independence in bivariate samples.
- Advantages and Disadvantages of Non parametric methods

**Teaching Methodologies**
Lectures, Presentation, library research, seminars, individual and small group work
**Instructional materials and equipment**
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

**Assessment scheme**
Written assignments 20%
Written tests 20%
Final examination 60%

**Reference**

**STA 206: Theory of Estimation** 3 Credits
*Prerequisite Courses: STA 104- Applied Statistics*

**Goal**
To introduce the students to the techniques of methods of estimation and the properties of estimators

**Learning Outcomes**
By the end of the course the learners should be able to;
- Define consistent, unbiased, efficient & sufficient estimators.
- Obtain estimators using various methods: likelihood function, moments, and Least squares.
- State Cramer-Rao & Rao- Blackwell Inequalities
- Obtain the Point, Interval and Bayesian estimates of various distributions

**Course content**
- Methods of obtaining Point estimators; Methods of moments, Maximum Likelihood estimation and Method of Least squares
- Best linear unbiased estimators (BLUE), Cramer –Rao inequality, Fisher”s information & Minimum Variance Best Unbiased estimators (MVBE), Rao-Blackwell Theorem
- Interval estimation, Bayesian estimators

**Teaching Methodologies**
Lectures, seminars individual and small group work,
Instructional materials and equipment
Chalkboard, coloured chalks, OHP, screen, Worksheets

Assessment Scheme
- Written assignments 20%
- Written tests 20%
- Final examination 60%

Reference

FPT 201: Field Practical Training (FPT) 5 credits

H. Introduction:
- The Mathematics Department at Marian University College (MARUCO) will organize a FPT program for Second year students taking Bachelor of Science in Mathematics and Statistics Program. The program will be done during the long vacation and is not accompanied with Course Work. The Mathematics Department and/or students are responsible for choosing the field stations.
- The duration of the FPT is five consecutive weeks (35 days). It carries five (5) credits.

I. Prerequisite Courses:
Statistics courses of the Second Year.

J. Goal:
- To enable the students to acquire work experience related to their studies and enable them acquire techniques of solving problems in the community.
- To Establish and maintain close contacts between employers and MARUCO and between MARUCO and the ministry responsible for labor.

K. Learning outcomes:
By the end of the course the students should be able to:
- Apply or learn the practical applications of the theory they learn at the university in solving real life problems.
- Minimize over-emphasis on theory and thus give some weight to practical work experience.
I. Activities in the field:
- Work with their mentors (statisticians found in the visited offices) and learn how statistical data are collected and processed.
- At the end of the FPT session, each student has to write a report on the activities undertaken during the FPT.

NB:
- The FTP report must be typed double line space. The report should be about 15 – 20 pages long including tables, graphs, charts, appendixes and references.
- The report should have among others, the following sections:
  ✓ Table of contents.
  ✓ Acknowledgements.
  ✓ Introduction: Mission, objectives and roles of the organization.
  ✓ Assigned tasks/activities.
  ✓ Case study: a detailed discussion of one special case encountered at work and how it was dealt with.
  ✓ Skills and competencies acquired.
  ✓ Theoretical implications: How are the assigned Task/activities comply with or contradict some of the theories/approaches learnt in class.
  ✓ Problems encountered: Administrative, organizational and systematic problems.
  ✓ Conclusions and recommendations.
  ✓ References (where applicable).
  ✓ Appendices (where necessary).

M. Assessment:
The grading of the FPT report will be based on the following criteria:
✓ Field Training Officer’s Assessment,
✓ Student’s logbook which contains student’s daily activities and outcomes.
✓ Student’s final report and
✓ University Supervisor’s report.

The score sheet for the distribution of the marks will be as follows:
Name of the student:

Name of the institution: .................................................................

Project Title:

Date for the arrival of the students at the station:

Each aspect must be assessed on five points scale: 5- Very good, 4-good, 3-average, 2- poor, 1-very poor.
<table>
<thead>
<tr>
<th>SN</th>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Punctuality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Demonstrate standard of responsibility in the fieldwork station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Demonstrate standard of co-operation in the fieldwork station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Demonstrate standards of efficiency in the fieldwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Demonstrate observation of professional code of conduct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Demonstrated ability to execute tasks as assigned in the field station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Accuracy of the task executed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Observation of professional dressing code</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Demonstration of positive attitudes towards work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Demonstration of acceptable action in the field station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Understanding of the task assigned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Handling and care of office equipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Ability to work in difficult situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Ability to work under minimum supervision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Demonstration of satisfaction in customer care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Overall rating of the students job performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Field assessment score \( \frac{\text{Total (x)}}{80} \times 30\% \\
Assessor’s general remarks:
..............................................................................................................................
.  
..............................................................................................................................
.
Assessor’s Details: Name..............................................................................
Position..............................................................................
Signature..............................................................................
Date Official Stamp..............................................................................

**Letter grade:**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>B+</td>
<td>Very Good</td>
</tr>
<tr>
<td>60</td>
<td>B</td>
<td>Good</td>
</tr>
<tr>
<td>50</td>
<td>C</td>
<td>Pass</td>
</tr>
<tr>
<td>40</td>
<td>D</td>
<td>Fail</td>
</tr>
<tr>
<td>35</td>
<td>F</td>
<td>Bad Fail</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**N. Responsibilities of students:**

Being an image of the university, a student doing FPT is expected to:
- Show high standards of responsibility in the fieldwork station.
- Show high standards of cooperation in the fieldwork station.
- Show high standards of efficiency in the fieldwork station.
- Uphold to the code of professional conduct.
• Arrive at the fieldwork station on time.
• Avoid misdemeanor (negative attitudes and unacceptable actions)
• Execute tasks given by supervisors, fill in the logbook, and carry out any responsibilities relevant to the FPT.

Remarks:
• A student will not be allowed to graduate until one clears the course within the maximum allowable time of one”s degree program i.e. 5 years
• Should a student change field work station, it is the responsibility of the student to communicate such information to the Office of the Deputy Principal of Academic Affairs explaining the reason for the change and the new field station as soon as possible. Failure to do so may lead to do so may lead to fail the FPT.
• A student who fails will have to undergo a supplementary training period during the vacation of the third year or thereafter so long as one does not exceed the maximum allowable time of one”s degree (currently 5 years of the program of the usual 3 years) at one”s own cost. For more, consult the Prospectus of Marian University College 2011/2012, No.11.8 on pg.56

Third Year

MTH 301: Topology 3 Credits
Prerequisite Courses: None

Goal
To equip the student with the knowledge of Topology and its application in solving real life problems

Learning outcomes
By the end of this course the student should be able to:
   i) Define basic Topological terminologies
   ii) Define compact space, metric space and Banach space
   iii) Solve problems involving Topological properties

Course Content
1. Point Set Topology Basics; Topological properties, connectedness, separable spaces, Bounded Functions as Metric spaces
2. Compact spaces; compactness in metric spaces, locally compact spaces
3. Metric and Normed Spaces
4. Banach Spaces

Teaching Methodologies
Lectures, seminars, Individual, partner and small group work

Instructional Materials and Equipment
Chalkboard, coloured chalks, worksheets, OHP screen, computers, autographs

56
Assessment methods
Assignments, tests, group work, presentations

Assessment scheme
- Assignments 20%
- Written tests 20%
- Examination 60%

Course textbooks

Textbooks & Journals for further reading

MTH 302: Numerical Analysis 3 credits
Pre requisite course: None

Goal
To equip the learner with necessary knowledge and skills required to solve mathematical problems which are related to numerical analysis.

Learning Outcomes
By the end of this course the students should be able to:
1. Determine the level of accuracy of numerical approximations.
2. Solve non linear equation by different methods
3. Calculate roots of functions using iterative procedures
4. Apply forward –backward formula to perform numerical differentiation
5. Apply various techniques to perform numerical integration
6. Illustrate / demonstrate how various mathematical packages can be used to perform numerical calculations.

Course Content
1. Sources of errors
• Round-off errors, Absolute errors and percentage errors.
• Effects of errors on the basic operations of arithmetic
• Statistical treatment of errors

2. Solution of Non Linear Equations
   • Need for numerical solution
   • Definition and location of root
   • Order of Convergence of the Iterative methods.

3. Numerical Differentiation
   • Definition and properties of Forward, Backward and Shift Operators
   • Forward/Backward –difference formula
   • Derivatives from Langrage”s Interpolating polynomials: Three-point formulas and Five–point formulas.
   • Construction of Difference Tables
   • Use of Difference Tables to detect / correct errors

4. Numerical Integration
   • Newton–Cotes formulas
   • Trapezoidal rule
   • Simpson”s three –eights rule
   • Composite trapezoidal rule
   • Composite Simpson”s rule

5. Interactive Computing – the use of Mathematical packages ( eg MATLAB, MAPPLE, AUTOGRAPH, MATHEMATICA) in finding roots of a polynomial or performing numerical integration.

Teaching Methodologies
Lectures, Seminar presentations, Independent studies and group tasks.

Assessment methods
Assignments, tests, group work, presentations

Assessment scheme
Seminar presentations 20%
Tests 20%
End of semester examination 60%

Instructional materials and equipment
Worksheets, chalkboard, Mathematical packages e.g. Autograph, Overhead projectors, computers, Calculators, worksheets.

Text books for the course

**Textbooks for further reading**
2. Limited.

**MTH 303: Complex Analysis** 3 Credits

*Prerequisite Courses: MTH 104- Calculus II*

**Goal**
To equip the student with basic knowledge of complex numbers to complex variables and its relevance in science subjects or in life.

**Learning Outcomes**
By the end of the course the students should be able to:
- Solve complex number problems of Advanced level
- Explain the concept of continuity and differentiability of complex functions
- Describe functions of complex variables
- Solve the problem of analytic and harmonic functions
- Evaluate complex integrals using Green”s theorem and Cauchy Integral formula
- Apply Cauchy, Laurent and residue theorems to solve various numerical problems of complex variables

**Course Content**
1. Complex numbers: operations of complex numbers, Argand diagram, argument and modulus, De Moivre”s theorem, locus, Euler”s formula, relationship between complex numbers and trigonometric functions
2. Complex functions: Limits, continuity, L” Hospital rule
3. Complex differentiation: Derivatives, analytic functions, Cauchy – Riemann equations, Harmonic functions, gradient, divergence, curl and Laplacian
4. Complex integration: Line integrals, Green” theorem Cauchy”s theorem, Cauchy – Goursat theorem, Cauchy”s integral formula
5. Infinite series: Laurent series, Taylor series convergence.
6. Residual theorem: calculation of residuals, application of residuals, singularities, poles

**Teaching Methodologies**
Lectures, seminars, individual, partner and small group work.

**Instructional materials and Equipments**
Chalkboard, coloured chalks, OHP, Calculators, Computer

**Assessment**
Assignments, tests, group work, presentations

**Assessment scheme**

1) Assignments 20%
2) Timed tests 20%
3) Final examination 60%

**Textbooks for the Course**


**Textbooks for further readings**


**MTH 304: Mathematical Information Technology** 3 Credits

**Prerequisite courses: MTH 106 Computer Programming**

**Goal**

Provides an introduction to the use of Mathematical and Statistical software for solving scientific problems Information Technology in Mathematical Science

**Learning Outcomes**

By the end of the module the students should be able to use statistical & mathematical softwares such as SPSS, STATA, Epi info, Nudist, Maple or MathCad or MathLab to analyse data.

**Course Content**

- Basic IT skills
- Data handling and analysis using statistical package for example Spreadsheet and SPSS: Getting data into SPSS and looking at it, descriptive statistics, random variation, confidence intervals, simple hypotheses, fitting linear models.
- Introduction to symbolic computation, defining functions and manipulating expressions, differentiating, integrating and plotting, loops and conditionals, solving problems with MAPLE, MATHLAB, and MATHCAD :
- Introduction to other mathematical package such as Autograph.

**Teaching Methodologies**

Lectures, Presentation, library research, seminars, individual and small group work, practical
Instructional materials and equipment
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers,
calculators and mathematical tables, computer, statistical and mathematical packages
SPSS, MathLab etc.

Assessment
Practical assignments 20%
Written tests 20%
Final examination 60%

Reference
1. The university has a site license for Maple and students may put it up on their own
machines.
3. Discovering Statistics Using SPSS (Introducing Statistical Method) by Andy P.
Field (Jan 23, 2009)

MTH 305: Graph Theory* 3 Credits
Prerequisite courses: None

Goal
To help the student to solve graph theoretical problems

Learning Outcomes
By the end of this course the students should be able to:
• Apply the basic competence in graph theory
• Explain the uses and importance of graphs

Course Content
1 The basics of graphs: Introduction to graphs, multigraphs, the koeinsberg bridges,
bipartite graphs, directed and undirected, graph representation, matrices of graphs,
incidence matrix, circuit matrix, adjacency matrix, cut matrices, isomorphism
2 Paths: Walks, paths and circuits, Euler paths and circuits, Eulerian graph,
Hamiltonian paths and circuits, directed Hamiltonian graphs, directed graphs,
graphs and relations, directed trees, shortest paths and transitive closure
3 Trees, Spanning Trees and connectivity: Introduction to trees, application of
trees, trees traversal, spanning trees, depth first search, breadth-first search,
minimum cost spanning trees and forests, cuts sets and cuts, cycle basis,
connectivity, connectedness and components of a graph, operations on graphs, cut
vertices and separable graphs, special graphs
4 Rooted trees: terminology, properties, the number of binary trees
5 Planer graphs, homomorphic graphs, colouring and chromatic number: Planar
graphs, Euler’s formula, Kuratowski’s theorem, graph coloring, the four colour
theorem, the chromatic number application of graph coloring, matchings cliques
and independent sets

Teaching Methodologies
Lectures, presentation, library research, seminars, individual and small group works.
Instructional materials and equipment
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

Assessment Scheme
Written assignments 20%
Written tests 20%
Final examination 60%

Text books and Journals for the course

Text books and Journals for further reading

MTH 306: Non Linear Programming* 3 Credits
Prerequisite course: MTH 105- Operations Research I

Goal
To equip the student with the knowledge and skills required to solve problems which are related to optimization theories and methods in Non Linear Programming.

Learning outcomes
By the end of the course, the students should be able to:
- Use stand-alone or C Non Linear Programming solvers to solve problems coded in FORTRAN or C.
- Use the Fortran, Excel Solver and GAMS to solve various non linear programming problems
- Explain the relative advantages and limitations of the Excel Solver and GAMS tools
- Develop his/her skills as a modeller by formulating a variety of problems
- in several modelling languages
- Apply Non Linear Programming knowledge in solving real life problems
- Describe various principles of good modelling

Course Content
1. Theories related to non-linear programming
- Derivation and uses of the Kuhn-Tucker theory
- First order necessary conditions for optimality
- Second order optimality conditions
- Constrained Optimization Optimality Conditions;
- Convex Unconstrained Optimization Optimality Condition

62
• Interior-Point Methods for Linear Optimization;
• Analysis of Convex Sets
• Lagrange and conic duality theory
• ...Saddle points and the Lagrangian dual problem.
• Basic convexity results
• Convergence and rate of convergence results for various algorithms.

2. Algorithmic methods
   • Interior-point algorithms and theory
   • Projection Methods for Equality Constrained Problems
   • Generalized Reduced Gradient (GRG)
   • Successive Quadratic Programming (SQP)
   • Successive Linear Programming (SLP)
   • Penalty and Barrier Methods, Exact and Inexact
   • Interior Point Methods.

3. Applications
   • Use of stand-alone FORTRAN or C NLP solvers to solve problems coded in
     FORTRAN or C.
   • Use of Excel Solver and GAMS to solve non linear programming
   • Relative advantages and limitations of the above tools.
   • Important current NLP application areas such as :
     - Gasoline blending, refinery models
     - Electric power: hydroelectric planning, optimal load flows
     - Financial applications: Markowitz asset allocation, multiperiod, robust
       optimization
     - Optimal control
     - Water resources models
     - Others of interest to the class.

Text books for the course

Textbooks for further reading

**STA 301: Operations Research II**  **3 Credits**

*Prerequisite courses: STA 105- Operations Research I*

**Goal**

To introduce the students to more complex algorithms, Optimizations and transportation problems and their areas of applications

**Learning Outcomes**

By the end of this course the students should be able to:

- Determine the shortest path connecting two points and shortest itinerary
- Draw a project network for given project data clearly identifying activities and events and obtain the critical path
- Crash some critical activities to meet the project deadline wherever possible
- Schedule the vehicles such as buses and lorries for a transport company so as to minimise operational costs

**Course content**

Sensitivity analysis and parametric programming, Optimality and degeneracy, Rules for basic feasible solution, balanced and unbalanced transportation problems, assignment problem, Goal programming and its applications. Critical Path methods and PERT Method. Maximal flow algorithm, Maximal flow and minimum cut theorem, shortest path problem; Dijkstra, Floyd's algorithms, network optimization, Dynamic and integer programming

**Teaching Methodologies**

Lectures, library research, seminars, individual and small group work

**Instructional materials and equipment**

Chalkboard, *coloured chalks, OHP, screen, worksheets, computers, calculators and Mathematical tables*

**Assessment scheme**

Written assignments 20%
Written tests 20%
Final examination 60%

**References.**

STA 302: Mathematical Modelling Techniques**  3 Credits
Prerequisite courses: None

Goal
To introduce the concept of mathematical modelling and their limitations

Learning Outcomes
By the end of this course the student should be able to apply and validate simple mathematical model to real life situations

Course Content
- Mathematical models: stochastic and deterministic model techniques, advantages, classification, limitations
- Deterministic models population: from models, epidemiological models, financial models and so on
- Stochastic models: Markov Chains, Poisson process and their general queuing and reliability processes
- Simulations and Validations of simple stochastic and deterministic models

Teaching Methodologies
Lectures, library research, seminars, individual and small group work

Instructional materials and equipment
Chalkboard, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

Assessment scheme
Written assignments 20%
Written tests 20%
Final examination 60%

References

Text books and Journals for further reading
1. Kenya Journal of Science and technology
STA 303: Multivariate Analysis    3 Credits
Prerequisite courses: STA 104-Applied Statistic, MTH 103-Linear Algebra

Goal
To expose students to methods for analysing multivariate data

Learning outcomes
By the end of the course the students should be able to:
- Describe multivariate statistical methods
- Appreciate the need for multivariate methods
- Summarize multivariate data in a form useful for decision making
- Apply various multivariate methods to practical problems
- Use relevant statistical software to perform multivariate analysis and interpret the results

Course content
1) Multivariate data: data matrix, calculation of summary statistics, mean vectors, covariance and correlation matrices, test for mean vector
2) Multivariate inference about the mean vector: One sample Hotelling T-test, Testing equality of two population means
3) Canonical Correlations and elements of Multivariate analysis of variance.
4) Factor Analysis.

Teaching methodologies
Lectures, seminars, individual and small group work

Instructional materials and Equipment
Chalkboard, coloured chalks, screen, worksheets, overhead projector (OHP), Autographs.

Assessment Scheme
- Written assignments 20%
- Written tests 20%
- Final exams 60%

Reference
4. CD”s ROMS and Websites

STA 304: Stochastic Processes    3 Credits
Prerequisite courses: MTH 103: Linear Algebra

Goal
To expose the student to stochastic modelling techniques
Learning Outcomes
By the end of this course students will be able to:

- Classify a stochastic process as discrete or continuous with respect to time and state space
- Apply the theory of Markov Chains to modelling of manpower and education systems
- Apply other stochastic processes in modelling of real life problems such as generalized Poisson systems and queuing systems

Course Content
- **Random phenomenon in time and space**: Bernoulli processes, Poisson process, stochastic process in discrete and continuous time
- **Markov Chains**: the Markov property, discrete time and Markov chain
- **Stationary distribution**: classification of states, absorption probabilities, expected times of transitions, application in educational and manpower planning
- **Random walk**: Generating functions, recurrent events, pure birth process, birth process, birth and death, Queuing models, Poisson input, negative exponential service stability

Teaching Methodologies
Lectures, Presentation, library research, seminars, individual and small group work

Instructional materials and equipment
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

Assessment
Written assignments 20%
Written tests 20%
Final examination 60%

Reference

Text books and Journals for further reading

STA 305: Quality Control Methods 3 Credits
*Prerequisite Courses: STA 103- Sampling Theory & Methodology

Goal
To introduce the students to Quality control methods and acceptance sampling

67
Learning Outcomes
By the end of the course, the students should be able to:-
- Explain the importance of quality control in an industry
- Define the basic terms/concepts used in Quality control
- Differentiate the various types of control charts and how they are used.
- Apply statistical knowledge in solving problems in real life situation.

Course content
- Theoretical basis of quality control in industry; Tolerance limits
- Different types of control charts: X and R charts, P and C charts, Group control charts
- Acceptance sampling: Single, double and sequential plans; OC and ASN functions; sampling by attributes and variables.
- Use of Dodge-roaming and other tables

Teaching Methodologies
Lectures, seminars individual and small group work,

Instructional materials and equipment
Chalkboard, coloured chalks, OHP, screen, Worksheets

Assessment Scheme
- Written assignments 20%
- Written tests 20%
- Final examination 60%

Reference

STA 306: RESEARCH METHODOLOGY
Lecture hours: 45

PURPOSE
To enable the students draft researches protocols effectively and apply the techniques of data collection, data analysis and report writing.
OBJECTIVES
At the end of this course, the student should be able to:
1. Explain basic concepts of research
2. Identify research problems
3. Prepare research proposals.
4. Collect and analyses data
5. Differentiate research designs
6. Explain sampling techniques
7. Write a concept paper and research report [decision-oriented report, survey-based report or algorithmic research report]

COURSE CONTENTS
1. Basic concepts of research. Nature and purposes of research, Meaning of Research, types of research, Research paradigms, Areas of research in statistics and mathematics.
2. Research Processes
3. Literature Review
4. Research designs
5. Sampling design: steps in sampling designs ,criteria for selecting the sampling procedure, types of sample designs
6. Methods of data collection : Collection of primary data , observation method , interview method , collection of data through questionnaires ,Focus group discussions, case study method, collection of secondary data ,guidelines for using questionnaires, Focus Group discussions and interviews.
7. Data processing and Analysis
8. Basics in Research Proposal development
9. Data Interpretation and Report writing

Teaching methodologies
Lectures, seminars, library research, individual and group works, guest speakers

Instructional materials and equipments
White/chalk board, white board markers /chalks, screen, overhead projector (OHP)

Assessment scheme:
Written assignments and tests (40 %) Final research report (60%)

Textbooks for the course


**STA 307: Research Project  5 Credits**

**Goal**
To enable the learner demonstrate ability to use mathematics and statistics to solve real life problems

**Learning Outcomes**
At the end of this course, the students should be able to demonstrate practical mathematical and statistical skills in applied in their projects.

**Course Content**
Students will undertake a project in their area of specializations. This may include an industrial attachment as is appropriate. At the end of the course, the students are expected to submit and present the short report that should include:

- An introduction to nature of the problem
- An overview of the work done and deduced results as is appropriate
- A short conclusion and suggestion on further work in the area of study

**Teaching Methodologies**
Lectures, presentation, library research, seminars, individual and small group works.

**Instructional materials and equipment**
Chalkboard, transparencies, coloured chalks, OHP, screen, worksheets, computers, calculators and mathematical tables

**Assessment Scheme**
Final work 100%

**Reference**
2. All the Statistics courses covered above

**Text books and Journals for further reading**
1. Any relevant Statistic, Probability and Mathematics Journals
2. Any other relevant Statistics textbooks
FPT 301: Field Practical Training (FPT) 5 credits

O. Introduction:
- The Mathematics Department at Marian University College (MARUCO) will organize a FPT program for Third year students taking Bachelor of Science in Mathematics and Statistics Program. The program will be done during the long vacation and is not accompanied with Course Work. The Mathematics Department and/or students are responsible for choosing the field stations.
- The duration of the FPT is five consecutive weeks (35 days). It carries five (5) credits.

P. Prerequisite Courses:
Statistics courses of the Third Year.

Q. Goal:
- To enable the students to acquire work experience related to their studies and enable them acquire techniques of solving problems in the community.
- To Establish and maintain close contacts between employers and MARUCO and between MARUCO and the ministry responsible for labor.

R. Learning outcomes:
By the end of the course the students should be able to:
- Apply or learn the practical applications of the theory they learn at the university in solving real life problems.
- Minimize over-emphasis on theory and thus give some weight to practical work experience.

S. Activities in the field:
- Work with their mentors (statisticians found in the visited offices) and learn how statistical data are collected and processed.
- At the end of the FPT session, each student has to write a report on the activities undertaken during the FPT.

NB:
- The FTP report must be typed double line space. The report should be about 15 – 20 pages long including tables, graphs, charts, appendixes and references.
- The report should have among others, the following sections:
  ✓ Table of contents.
  ✓ Acknowledgements.
  ✓ Introduction: Mission, objectives and roles of the organization.
  ✓ Assigned tasks/activities.
  ✓ Case study: a detailed discussion of one special case encountered at work and how it was dealt with.
  ✓ Skills and competencies acquired.
✓ Theoretical implications: How are the assigned Task/activities comply with or contradict some of the theories/approaches learnt in class.
✓ Problems encountered: Administrative, organizational and systematic problems.
✓ Conclusions and recommendations.
✓ References (where applicable).
✓ Appendices (where necessary).

T. Assessment:
The grading of the FPT report will be based on the following criteria:
✓ Field Training Officer’s Assessment,
✓ Student’s logbook which contains student’s daily activities and outcomes.
✓ Student’s final report and
✓ University Supervisor’s report.
The score sheet for the distribution of the marks will be as follows:
Name of the student:
.................................................................................................................................
Name of the institution:
.................................................................................................................................
Project Title:
.................................................................................................................................
Date for the arrival of the students at the station:
.................................................................................................................................
Each aspect must be assessed on five points scale: 5- Very good, 4-good, 3-average, 2- poor, 1-very poor.

<table>
<thead>
<tr>
<th>SN</th>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Punctuality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Demonstrate standard of responsibility in the fieldwork station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Demonstrate standard of co-operation in the fieldwork station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Demonstrate standards of efficiency in the fieldwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Demonstrate observation of professional code of conduct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Demonstrated ability to execute tasks as assigned in the field station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Accuracy of the task executed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Observation of professional dressing code</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Demonstration of positive attitudes towards work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Demonstration of acceptable action in the field station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Understanding of the task assigned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Handling and care of office equipments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Ability to work in difficult situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Ability to work under minimum supervision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Demonstration of satisfaction in customer care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Overall rating of the students job performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Field assessment score \[\frac{\text{Total Score}}{80} \times 30\%\]
Assessor’s general remarks:
...........................................................................................................................................

Assessor’s Details: Name.........................................................
Position.................................................................
Signature................................................
Date...........................................Official Stamp.................................

Letter grade:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 – 100</td>
<td>A</td>
</tr>
<tr>
<td>60 – 69</td>
<td>B+</td>
</tr>
<tr>
<td>50 – 59</td>
<td>B</td>
</tr>
<tr>
<td>40 – 49</td>
<td>C</td>
</tr>
<tr>
<td>35 – 39</td>
<td>D</td>
</tr>
<tr>
<td>0 – 34</td>
<td>F</td>
</tr>
</tbody>
</table>

U. Responsibilities of students:
Being an image of the university, a student doing FPT is expected to:
- Show high standards of responsibility in the fieldwork station.
- Show high standards of cooperation in the fieldwork station.
- Show high standards of efficiency in the fieldwork station.
- Uphold to the code of professional conduct.
- Arrive at the fieldwork station on time.
- Avoid misdeemeanour (negative attitudes and unacceptable actions)
- Execute tasks given by supervisors, fill in the logbook, and carry out any responsibilities relevant to the FPT.

The students should be told about the above responsibilities during orientation.

Remarks:
- A student will not be allowed to graduate until one clears the course within the maximum allowable time of one’s degree program i.e. 5 years.
- Should a student change field work station, it is the responsibility of the student to communicate such information to the Office of the Deputy Principal of Academic Affairs explaining the reason for the change and the new field station as soon as possible. Failure to do so may lead to do so may lead to fail the FPT.
- A student who fails will have to undergo a supplementary training period during the vacation of the third year or thereafter so long as one does not exceed the maximum allowable time of one’s degree (currently 5 years of the program of the usual 3 years) at one’s own cost.