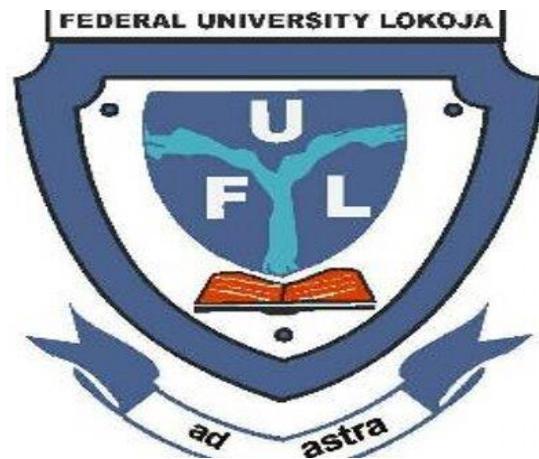


# FEDERAL UNIVERSITY LOKOJA



## DEPARTMENT OF MICROBIOLOGY FACULTY OF SCIENCES

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### B.Sc. MICROBIOLOGY STUDENT HANDBOOK

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2019/2020 – 2023/2024

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**First Published 2019**

**A publication of the Department of Microbiology**

**© Department of Microbiology,  
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## **Preface**

The students handbook primarily provides information on the requirements for studentship in the Department of Microbiology and the Federal University Lokoja. Department of Microbiology operates four-year degree programme leading to the award of Bachelor of Science in Microbiology. As a newly created course of study from the Department of Biological Sciences, Microbiology Department is set to become a full-fledged department in the Faculty of Science, Federal University Lokoja.

The curriculum in the programme were formulated in accordance with the BMASS to truly reflect the current trends in the field of microbiology and experienced lecturers have been sufficiently employed to deliver each course (lecture and practical) acceptably. The Department also parades a well-stocked laboratory manned by experienced technologists and technicians to complement course lectures so as to produced microbiologist with sound practical knowledge to compete with peers nationally and globally. The handbook outlines the entry requirements, registration, examination guidelines, detailed description of the curriculum and course credit requirement/calculations process so as to monitor their academic progress effectively for the B.Sc. Microbiology programme.

The training objective of the Department is to graduate students that will meet Nigeria's needs for Microbiology, with employment prospects in research and development, manufacturing, industries, government and private sectors of the Nigeria economy. Graduates of this Department are thus equipped with the knowledge and skills to solve problems and adapt to changes and challenges in Microbiology and related fields. The students are therefore encouraged to read this book alongside the university student handbook, so as not to breach the requirements for a successful degree programme in Microbiology, Federal University Lokoja. We wish all our students a successful period of study in this University and successful future endeavours.

Thank you.

**Dr. Alhassan A. Abdul-Rahman**

*Head of Department,*

*Department of Microbiology*

*Federal University Lokoja, Kogi Sta1.*

## Staff List

Academic Teaching Staff				
S/N	Name	Status	Qualification	Area Of Specialization
1.	Dr. A. A. Abdul-Rahman	Senior lecturer (HOD)	B. Tech. (FUTMINNA), M. Tech. (FUTMINNA), Ph. D (FUTMINNA)	Medical Microbiology
2.	Dr. G. I. Ogu	Lecturer II	B.Sc. (UNIZIK), M.Sc. (BIU), Ph.D. (UNIBEN)	Environmental & Public Health Microbiology
3.	Mr. J. A. Odoh	Assistant Lecturer	B. Sc. (KSU), M. Sc. (UNIBEN)	Medical Microbiology
4.	Mrs. E. Okolo	Assistant Lecturer	B.Sc. (KSU), M.Sc. (KSU)	Food Microbiology
5.	Mr. O. Gbolabo	Assistant Lecturer	B. Tech. (LAUTECH) M.Sc. (LAUTECH)	Microbiology/ Bacteriology
6.	Mrs. M. Y. Jibola-Shittu	Assistant Lecturer	B.Sc. (OAU), M.Sc. (UI)	Environmental Microbiology
7.	Mr. M. I. Luka,	Assistant Lecturer	B. Tech. (FUTY), M.Sc. (UJ)	Medical Microbiology
8.	Mrs. J. O. Abdulkareem	Graduate Assistant	B.Sc. (UNILR)	Microbiology
9.	Mrs. O. O. Omolehin	Graduate Assistant	B.Sc. (UNILR)	Microbiology

Technical Staff List			
S/N	Name	Rank/Designation	Qualification
1.	Mrs. Elewu, Halimat Ajibola	Assistant Chief Technologist	Science Laboratory
2.	Mrs. Yusuf, Jummai	Senior Technologist	Microbiology/Virology
3.	Mr. Enu, Kingsley Bessong	Senior Technologist	Science Laboratory Technology
4.	Mr. Udofia, Aniedi Akpan	Technologist	Microbiology
5.	Mrs. Oluwatuyi, Oluwafunbi Ademola	Technologist	Microbiology
Administrative Staff List			
S/N	Name	Designation	Qualification
1.	Mr. David Marcellinus Chikada	Admin. Assistant	B.Sc. Microbiology
2	Mr. Ahmed Abdulrahman	S. EO Admin.	HND Marketing

## **1.0 Historical Background**

The Department of Microbiology is one of the Departments in the University. It was carved out of the Department of Biological Sciences in 2019. The Department shares the vision, mission, philosophy and core values upon which the Federal University Lokoja was established. The Department is currently running undergraduate programmes in Microbiology, and hoping to offer Postgraduate programmes in future. The programme is rich in coursework, practical, seminars and research project that expose the students to the length and breadth of Microbiology. It is hoped that after undergoing this programmes, students will be equipped with sound knowledge of providing goods and services for the benefit of mankind.

The department has a Departmental coordinator, level coordinators for the levels and examination officer all of whom are Academic staff. There are numbers of non-academic staff too belonging to technical and administrative cadre to run the departmental affairs (see the staff list section).

Courses are tailored towards exposing students to appreciate the complexities of life, the environment and the relationships between the two. Emphases are placed on the translation of knowledge to its application for enhancement of man's economy and survival. The Department has qualified and experienced lecturers employed for knowledge and skills transfer. The deliveries of course content are undertaken through lectures, mandatory practical classes, group discussions, seminars, term papers, field trips and semester examinations, and any other modes as may be prescribed by National University Commission

## **2.0 Philosophy**

The science of Microbiology in the Federal University Lokoja (FUL) is aimed at giving intensive education about life, living, structures, and as they relate with providing service and improving survival. Indeed, through the undergraduate programme, FUL hopes to identify within the socio-economic and technological dynamics of the Nigerian society. Therefore, as much as possible, the curricula of the undergraduate programme is synchronised to reflect appropriately the general developmental objectives of Nigeria. The programme is designed in such a way that our graduates shall either be capable of self-employment or be relevant to technological and industrial establishments. The practical components of the programme are of paramount importance in order that the philosophy, vision, mission and objectives of the undergraduate programmes in FUL shall be fulfilled.



### **3.0 Aim**

The Graduate of Bachelor of Science (B.Sc.) Microbiology of the Federal University Lokoja are trained and equipped to be self-reliant and productive young scientists locally and internationally.

### **4.0 General Objectives**

In pursuit of the broad goal of producing self-reliant and productive young scientists of microbiology, the following are the specific academic objectives of the undergraduate degree programmes of the department of microbiology:

- To train academically sound future researchers and intellectuals in especially in the general microbiology for microscopy and microbial culture/aseptic techniques, microbial ecology, food and industrial applications, diagnostic and isolation techniques, pharmaceutical microbiology and microbial genetics/molecular techniques.
- To contribute to discoveries and innovations in these aspects of microbiology through research.
- To provide expert counsel and public health consultancy services to local, national and international organizations on issues relating to public health diseases and safety.
- To instil qualities of self-confidence and self-reliance in prospective young Nigerian microbiologist.

### **5.0 Prospects/Employment Opportunity**

**5.1** The Graduates of B.Sc. Microbiology in Federal University Lokoja (FUL) are equipped with adequate knowledge & skills in Microbiology that will enable them to;

**5.1.1** Fit into different sectors of the economy.

**5.1.2** Be able to compete favourably with graduates of Microbiology of any university globally.

**5.1.3** Pursue Postgraduate programme in Microbiology or any other related fields

**5.2** Moreover, the graduates of B.Sc. (Hons) Microbiology have opportunities for employment in government, hospitals, public health laboratories, research laboratories, and industrial laboratories (food, dairy, chemical, pharmaceutical, and

genetic engineering companies). Students who continue beyond the B.Sc. have career opportunities in these same areas, with greater responsibilities and commensurately higher salaries, as well as in college and university teaching.

## **6.0 Programme offered and Duration**

The Department offers undergraduate courses leading to the award of the Bachelor of Science (B.Sc. Hons) Degree in Microbiology. The duration for the award of B.Sc. (Hons.) degree in Microbiology shall be for four (4) years (Eight Semesters) for Unified Tertiary Matriculation Examination (UTME) candidates and three (3) years (6 Semesters) for Direct Entry (DE) candidates. However, students that fail to graduate within the normal number of sessions will not be allowed to exceed a total of six (6) years (12 Semesters), if admitted through the UTME and five (5) years (10 Semesters) if admitted through DE.

## **7.0 Admission and Graduation Requirements**

In addition to the general requirements for admission into the University, candidates intending to study **B.Sc. Microbiology** must fulfil any of the conditions below;

### **7.1 4-years Full-Time Programme**

#### **7.1.1 UTME Entry Requirements:**

- All admissions into the University shall be through the Joint Admissions and Matriculation Board (JAMB). The subject combinations for those seeking admission to the department shall be Physics, Chemistry and Biology and English language. The minimum score for entry shall be as stipulated by the university admissions committee.
- For admission to 100 Level (via UTME), candidates must obtain at least five (5) credits at SSCE (or equivalent) in relevant subjects at not more than 2 sittings including credit passes in English, 3 Mathematics, Physics, Chemistry and Biology; and attain acceptable point in UTME in relevant subjects.

### **7.2 3-years Full-Time Programme (DE)**

- 7.2.1** For admission by direct entry into 200 Level, candidates shall, in addition to having five (5) SSCE credits (as stated in iii above), obtain at least two (2) A' level (or its equivalent) passes in relevant subject(s), or possess ND, NCE, HND, with upper credit; or a good first degree (with a

minimum of second class lower division) in another field as the case may be.

**7.2.2** Credit passes in English Language and Mathematics shall be compulsory for admission into all courses;

**7.2.3** Those who meet the requirements for admission shall be subjected to screening interview to be conducted by the University; and

**7.2.4** The University shall not accept transfer students until after at least the first two years of its existence.

### **7.3 Requirements for Graduation**

The graduation requirement for B.Sc. (Hons) Microbiology is shown below:

	<b>100 Level</b>	<b>200 Level</b>	<b>300 Level</b>	<b>400 Level</b>	<b>Total</b>
<b>Core courses</b>	40	34	25	35	134
<b>Electives</b>	5	8	4	8	25
<b>Total</b>	45	42	29	43	159

The above summary table shows that for a student to graduate he/she needs to register a total of at least **159** credit units of which **134** credits must be core.

### **8.0 Requirement for Award of Degree**

For a candidate to be eligible for the award of a degree of B.Sc. in Microbiology, the candidate must have successfully completed all prescribed courses as contained in the course description. The minimum number of units for the award of degree shall be 157 units and 126 units for a **4-year** and **3-year** degree programme respectively. These consist of:

#### **8.1 4-years Degree Programme**

Compulsory courses:	119 units
GST courses:	15 units
Elective courses:	25 units
<b>Total:</b>	<b>159 units</b>

#### **8.2 3-years Degree Programme (DE)**

Compulsory courses:	96 units
GST courses:	15 units
Elective courses:	17 units
<b>Total:</b>	<b>128 units</b>

## 9.0 Registration of Courses

### 9.1 General Registration Guidelines

- a. Student must be aware of time schedule for registration and has to be in possession of proper identification at all times.
- b. Student has to consult with his level coordinator before filling the course registration form.
- c. Unrestricted elective courses chosen outside those listed must be approved by the Department.
- d. At the point of registration, a student is expected to pay NAMS and FOSSA dues and settle other charges as may be required from time to time.
- e. De-registration of undergraduate project is not allowed beyond the second semester.
- f. Registration problems associated with ill-health may be entertained (if supported with medical report that is authenticated by the University Health Service).
- g. A student is regarded as bonafide only when the necessary registration forms have duly been submitted to the Departmental Registration Officer. Students are therefore advised to strictly adhere to registration guidelines in their own interest.

### 9.2 Classification of Registration Courses

- **Compulsory Courses (C):** These are courses that must be passed and used in computing the final result irrespective of the number of attempts so long as the programme permits.
- **Elective Courses (E):** These are courses which are chosen by a student according to his/her interest and on advice or guidance of his/her course adviser, in addition to those he must take to complete his/her degree requirement. It is advisable to pass the Electives because it will be used for computation of result include the so-called optional courses.
- **Pre-requisite:** These courses must be taken and passed before the student can register for a more advanced course

### 9.3 Work Load

A Student shall normally in any Semester be allowed to register for and take a minimum of 15 units and a maximum of 24 units. This means that no student can be credited less

than 30 units or more than 48 units at the end of each academic year. Note that a course that carries 3 units implies a 3 hours of lecture and 1 hour of tutorial per week

#### **9.4 Deferment**

A student who, for a good cause, wishes to defer a semester or a whole session must put a formal application to the Vice Chancellor through the Head of Department and the Dean of Faculty for consideration and approval by the Senate. This must be done in good time for such request to be tendered for consideration and final approval.

Deferment can be sought on the following ground:

- i) Admission related issue
- ii) Ill health
- iii) Emotional stress
- iv) Other special circumstances

#### **10.0 Examination Guidelines**

Examinations are normally held at the end of each semester. Examinations may take the form of written papers, oral examinations, practical, the submission of projects, and any combination of these or any other form approved by Senate. The Continuous Assessment (C.A.) of course work is normally included in determining examination results.

##### **a. Eligibility to write End of Semester Examination**

In order to be eligible for admission into any examination, a student must have been registered for the course unit to be examined and must have fulfilled the University requirements concerning residence, fees or other related matters. At least 75% attendance is required in all classes, tutorials, laboratories, etc. to qualify to sit for examinations.

##### **b. Examination Conducts**

1. A student must be at the examination venue at least thirty (30) minutes before time of the examination. A student is admitted within thirty (30) minutes after the examination had commenced but shall not be allowed extra time. On no account shall a student be allowed to leave the venue during the first hour or the last fifteen (15) minutes of the examination. A student must handover his/her scripts to the invigilator before leaving if he/she does not intend to come back.
2. A student who leaves the examination room shall not be admitted back unless he/she has been continually under the surveillance of an invigilator/Assistant invigilator.

3. A student shall come along with his/her ID card and Examination Card in each examination and display them conspicuously on his desk. Each student shall complete an Attendance List bearing his name and matriculation number by signing, which shall be passed round during each examination.
4. No book, printed paper or written document or unauthorized materials shall be allowed into an examination room by any student, except as stated in the rules of the examination paper. A student must not during an examination directly or indirectly give assistance to any other student or permit any other student to copy from or otherwise use his papers. Similarly, a student must not directly accept assistance from any other student or use any other student's paper.
5. If any student is suspected to have infringed on any of the above provisions or in any way to have cheated or disturbed the conduct of the examinations, a report shall be made as soon as possible from the Department to the Faculty Examination Officer and the Dean. The Dean will cause the circumstances to be investigated and reported to the Board of Examiners. The student involved shall be allowed to continue with the examination provided he does not cause any disturbance, however, the Board of Examiners may subsequently recommend to the Faculty Board and Senate whether his paper should be accepted and as to any other action that shall be taken on the matter.
6. A student shall write his examination number and not his name distinctly in the space provided at the top of the cover of every answer booklet or separate sheet of paper. The use of scrap paper is strictly prohibited as all rough work must be done in the answer booklet which must be submitted to the invigilator. Except for printed question paper, student may not remove from the examination room mutilate or any paper or other materials supplied. At the end of the time allotted for the examination, each student shall cease from writing when instructed to do so and shall gather his scripts together for collection by the invigilator.

**c. Discipline**

The examination regulation set out above binds all students, the breach of which carries serious punishments prescribed below;

**i) Expulsion from the University.**

The following offences shall carry the punishment of expulsion.

- a) Impersonation at examinations. This may involve exchange of examination number, name/answer sheets or intentional use of someone else's examination number.
- b) Exchange of relevant materials in examination hall which may involve the exchange of question papers containing relevant jotting and materials.
- c) Exchange of answer scripts.
- d) Introduction of foreign materials to the examination hall.

ii) **Rustication for one academic year**

The following offences shall carry the punishment of rustication for one academic session

- a) Non-submission or incomplete submission of answer scripts.
- b) Collaboration/copying from each other.

iii) **Written Warning**

- a. The following offences shall attract a written warning:
- b. Speaking/conversation during examination
- c. Writing on question papers.

## **11.0 Grading System**

Each course is normally examined at the end of the Semester in which it is offered. Students' progress is assessed through continuous assessment (i.e. by way of test, written assignments, and other appropriate methods) consisting of 40% during the Semester. Examination at the end of the Semester carries 60%. Thus, the totality of every grade in each course is based on 100% marks. The score from each course is assigned appropriate letter grade as follows:

**Table 1: Grading system and class of degrees**

(i) Credit Units	(ii) Percentile Scores	(iii) Letter Grades	(iv) Grade Points (GPA)	(v) Grade Point Average (GPA)	(vi) Cumulative Grade Point Average (CGPA)	(vii) Class of Degree
Vary according to contact hours assigned to each course per week per semester and according to work load carried by student	70 – 100	A	5	Derived by multiplying (i) and (iv) and dividing by Total Credit Units	4.50 – 5.00	First Class
	60 – 69	B	4		3.50 – 4.49	2 <sup>nd</sup> Class Upper
	50 – 59	C	3		2.40 – 3.49	2 <sup>nd</sup> Class Lower
	45 – 49	D	2		1.50 – 2.39	Third Class
	40 – 44	E	1		1.00 – 1.49	Pass Degree
	0 – 39	F	0			

### 11.1 Clear Academic Standing, Warning, Probation And Withdrawal

The academic standing of a student is being determined by the Cumulative Grade Point Average (CGPA). The minimum CGPA is 1.00.

#### a) Clear Academic Standing

For a student to be on Clear Academic Standing, he/she should have a CGPA of not less than 1.00.

#### b) Warning

A student is warned if his/her CGPA drops below the minimum tolerable CGPA for the first time. This warning is usually in the form of verbal advice by the Level Coordinator and the student should be made to be fully aware of the implication of dropping below the minimum tolerable CGPA in the next semester examinations.

#### c) Academic Probation

A student will be placed on Academic Probation if he/she fails to maintain minimum CGPA of 1.00 at the end of the session. The probationary status of a student shall be reversed if the student maintains a CGPA of at least 1.00 in any subsequent semester after the first year. The responsibility to reverse the probationary status rests with the student. A preliminary notice of poor academic standing shall be given to a student in writing by the University.



#### d) Withdrawal for Academic Failure

A student shall be required to withdraw for academic failure if he/she at the end of session fails to maintain a CGPA of 1.00 in two (2) consecutive Academic Sessions.

### 12.0 Computation of Results

The following terminologies and abbreviations are commonly used in the computation of results.

1. **Total Registered Credit Units (TRCU):** This is the summation of the Units' load of all courses offered during the semester. For example, a student who is taking 3 courses of 3 Units each as presented in Table 2,  $hTRCU = 3 \times 3 = 9$  units.
2. **Total Credit Passed (TCP):** This is the sum of product of the course units and the grade points in each for the semester Table 2 ).
3. **Grade Point Average (GPA):** Total Credit Passed (TCP) divided by the Total Registered Credit Unit (TRCU).  $TCP = (3 \times 5) + (3 \times 4) + (3 \times 2) = 33$
4. **Cumulative Credit Point Average (CCPA):** This is the summation of Total Credit Passed (TCP) over all semester from the beginning to date

### 12.1 Numerical Example and Computation

#### 200 Level Scores

Course Code	TRUC = 6	SCORE	POINT	TCP	GPA
MCB 220	2	72 A	5	$2 \times 5 = 10$	TRUC = $2 + 2 + 2 = 6$ TCP = $10 + 6 + 8 = 24$ GPA = $TCP/TRCU = 24/6 = 4.00$
MCB 222	2	55 C	3	$2 \times 3 = 6$	
MCB 224	2	61 B	4	$2 \times 4 = 8$	

#### 300 Level Scores

Course Code	TRUC = 6	SCORE	POINT	TCP	GPA
MCB 301	2	65 B	4	$2 \times 4 = 8$	TRUC = $2 + 2 + 2 + 2 = 8$ TCP = $8 + 4 + 6 + 10 = 28$ GPA = $TCP/TRCU = 28/6 = 3.50$
MCB 303	2	48 D	2	$2 \times 2 = 4$	
MCB 305	2	53 C	3	$2 \times 3 = 6$	
MCB 307	2	74 A	5	$2 \times 5 = 10$	

$$\checkmark \text{ CGPA for } 200 - 300 \text{ L} = \frac{\text{TCP } 200\text{L} + \text{TCP } 300\text{L}}{\text{TRUC } 200\text{L} + \text{TRUC } 300\text{L}} = \frac{24+28}{6+8} = \frac{52}{14} = 3.71$$

$$** \text{ Note CGPA for } 200 - 300 \text{ L is not } \frac{\text{GPA } 200\text{L} + \text{GPA } 300\text{L}}{2} = \frac{4.00+3.50}{2} = \frac{7.5}{2} = 3.75$$

### **13.0 Illness**

While on campus, a student who falls sick should seek for immediate medical attention at the University Health Service. When necessary, the University Health Service may refer serious case elsewhere for further treatment. Whenever the medical condition of a student necessitates absence from academic activities, the Head of Department should accordingly be notified in writing and upon resumption for normal academic work, appropriate medical report must be presented. Any student who falls ill during an examination should immediately seek medical attention at the University Health Service and has to obtain appropriate medical report and forward it to the Department (HOD) as soon as possible. If the sick student must seek for further medical assistance outside the University Health Service, the Department (HOD) must be formally informed in writing before leaving the University or Lokoja. Outside the University Campus or Lokoja (e.g., while at home or holidays) if as a result of ill-health, a student is likely to be late for registration, the Department must be informed early enough. Upon resumption, supporting evidence(s) (e.g. medical report which has to be authenticated by the University Health Services) must be presented.

### **14.0 Course Structure**

The duration of the B.Sc. (Hons.) Microbiology programme is four years. There are two semesters of formal University Studies in each academic session. At 300 Level, a student is expected to go for a six (6) months Students Industrial Work Experience Scheme (SIWES) after completion of the first semester courses, at the end of which he/she has to write, present and defend a report on what he/she learnt in the industry. At 400 Level, each student undertakes a one-year project in any field of interest besides the usual prescribed courses. A report on the project is also to be presented and defended.

The following gives a detailed breakdown of the courses in the curriculum on a semester-by-semester basis.

<b>100 LEVEL FIRST SEMESTER COURSES (B.Sc. MICROBIOLOGY)</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
GST 101	Communication in English & use of Library	2	C	-
GST 103	Nigerian Peoples and Culture	2	C	-
GST 107	Philosophy, Logic and Human Existence	2	C	-
BOT 101	Plant Biology	2	C	O'L Biology
ZOO 101	Animal Biology	2	C	O'L Biology
CHM 161	Experimental Chemistry I	1	C	O'L Chemistry
CHM 113	Introductory Physical Chemistry	3	C	O'L Chemistry
PHY 161	General Physics Practical I	1	C	O'L Physics
PHY 131	Heat and Properties of Matter	2	C	O'L Physics
MTH 101	Sets and Number System	2	C	O'L Maths
CSC 101	Introduction to Computer Science	2	E	-
GEO 103	Man's Physical Environment I	1	E	O'L Geography
PHY 111	Mechanics	2	E	O'L Physics
	<b>SUB TOTAL</b>	<b>24</b>		

*Student is at liberty to register a minimum of 3 credits units of electives (E) this semester*

<b>100 LEVEL SECOND SEMESTER COURSES (B.Sc. MICROBIOLOGY)</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
GST 102	Communication in English	2	C	-
GST 104	Communication in French/Arabic	1	C	-
GST 110	History and Philosophy of Science	1	C	-
BIO 102	Introductory Ecology	2	C	'O'L Biology
BTC 104	Cytology, Genetics and Evolution	2	C	O'L Biology
CHM 134	Introductory Organic Chemistry	3	C	O'L Chemistry
CHM 162	Experimental Chemistry II	1	C	O'L Chemistry
STA 112	Probability Theory	3	C	O'L Maths
PHY 122	Electricity and Magnetism	2	C	O'L Physics
MCB 112	Introduction to Microbiology	2	C	O'L Biology
MTH 102	Algebra	2	C	O'L Maths
GEO 102	Man, Location and Resources	2	E	O'L Geography
GEO 106	Introductory Environmental Science	2	E	O'L Geography
CHM 124	Introductory Inorganic Chemistry	3	E	O'L Chemistry
	<b>Sub Total</b>	<b>23</b>		

*Student is at liberty to register a minimum of 2 credits units of electives (E) this semester*

**Total Units of Core Courses 19 + 21 = 40**

**Total Units of Elective Courses 3 + 2 = 5**

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**Total = 45**

<b>200 LEVEL FIRST SEMESTER COURSES (B.Sc. MICROBIOLOGY)</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
GST 205	Environmental Health	1	C	-
BCH 251	Chemistry of Macromolecules	3	C	-
BIO 211	General Ecology	2	C	BIO 102
BIO 203	Biological Techniques	2	C	
MCB 211	General Microbiology	3	C	
MCB 213	Principles of Sterilization, Disinfection & Chemotherapy	2	C	
ZOO 201	Invertebrata	2	C	ZOO 101
BOT 201	Cryptogramic Botany	2	E	
BOT 203	Medicinal plants	2	E	
CHM 223	Basic Inorganic Chemistry	2	E	CHM 124
	<b>SUB TOTAL</b>	<b>21</b>		

**\*\*\*Student is at liberty to register minimum of 4 credit units of electives**

<b>200 LEVEL SECOND SEMESTER COURSES (B.Sc. MICROBIOLOGY)</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
GST 202	Peace and Conflict Resolution	2	C	-
GST 204	Entrepreneurial Skills	2	C	
BCH 252	Metabolism of Macromolecules	3	C	-
BTC 212	Introductory Developmental Cell Biology	2	C	
MCB 220	Microbial Ecology	2	C	
CHM 236	Organic Chemistry	2	C	CHM 134
MCB 222	Basic Techniques in Microbiology	2	C	
MCB 224	Microbial Taxonomy & Nomenclature	2	C	
MCB 226	Introduction to Food Technology	2	E	
BIO 202	General Physiology	2	E	
ZOO 202	Vertebrata	2	E	
	<b>SUB-TOTAL</b>	<b>23</b>		

**Student is at liberty to register minimum of 4 credit units of electives**

**Total Units of Core Courses 17 + 17 = 34**

**Total Units of Elective Courses 4 + 4 = 08**

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**Total = 42**

**300 LEVEL FIRST SEMESTER COURSES (B.Sc. MICROBIOLOGY)**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
MCB 310	Field Course I	1	C	
BIO 305	Biostatistics & Research Methodology	2	C	
MCB 315	Microbial Genetics and Molecular Biology	3	C	
MCB 301	Introductory Virology	2	C	
MCB 303	Immunology & Immunochemistry	2	C	
MCB 305	Soil Microbiology	2	C	
MCB 307	Microbial Physiology and Metabolism	2	C	
MCB 309	Food Microbiology	3	C	
MCB 313	Mycology	2	C	
MCB 317	Introduction to Mushroom Growing Technology	2	E	
MCB 319	Water Treatment and Analysis	2	E	
ZOO 305	Biology of Tropical Parasites	2	E	
	<b>SUB-TOTAL</b>	<b>23</b>		

*Student is at liberty to register minimum of 4 credit units of electives*

**300 LEVEL SECOND SEMESTER COURSES (B.Sc. MICROBIOLOGY)**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
MCB 300	Students Industrial Work Experience Scheme (SIWES)	6	C	Must have earned up to 60 at the end 2 <sup>nd</sup> semester 200 level

*No elective course available*

**Total Units of Core Courses 06 + 19 = 25**

**Total Units of Elective Courses 4 = 4**

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**Total = 29**

<b>400 LEVEL FIRST SEMESTER COURSES (B.Sc. MICROBIOLOGY)</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>STATUS</b>	<b>PRE-REQUISITES</b>
MCB 410	Field Course 11	1	C	
MCB 401	Industrial Microbiology 1	2	C	
MCB 403	Environmental Microbiology	3	C	
MCB 405	Pharmaceutical Microbiology	3	C	
MCB 407	Pathogenic Mycology	2	C	
MCB 409	Seminar & Scientific Writing	2	C	
MCB 411	Parasitology	2	C	
MCB 413	Virology and Tissue Culture	2	C	
BTC 409	Bioinformatics	2	E	
MCB 415	Principles of Environmental Impact Assessment	2	E	
MCB 417	Microbial Bioremediation	2	E	
	<b>SUB TOTAL</b>	<b>23</b>		

*Student is at liberty to register minimum of 4 credit units of electives.*

<b>400 LEVEL SECOND SEMESTER COURSES (B.Sc. MICROBIOLOGY)</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT UNIT</b>	<b>REMARKS</b>	<b>PRE-REQUISITES</b>
MCB 420	Research Project	6	C	
MCB 402	Public Health Microbiology	2	C	
MCB 404	Pathogenic Bacteriology	3	C	
MCB 406	Analytical Microbiol & Quality Control	3	C	
MCB 408	Industrial Microbiology 11	2	C	
MCB 412	Petroleum Microbiology	2	C	
BOT 402	Plant Pathology	2	E	BOT 202
MCB 414	Waste and waste Management	2	E	
CHM 422	Food Chemistry	2	E	
	<b>SUB TOTAL</b>	<b>24</b>		

*Student should register minimum of 4 credit units of electives.*

**Total Units of Core Courses 17 + 18 = 35**

**Total Units of Elective Courses 4 + 4 = 8**

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**Total = 43**

## **15.0 Undergraduate Syllabus for B.Sc. (Hons) Microbiology)**

### ***MCB 112 Introduction to Microbiology ((2Credi Units)***

Historical aspects of Microbiology. Scope of Microbiology. Forms and functions of different microbial groups (Algae, Bacteria, Fungi, Protozoa and Viruses). General characteristics of microorganisms. Role of microorganisms in medicine, agriculture and industry. Introduction to biosafety and biosecurity

### ***MCB 211 General Microbiology (3 Credit units)***

Tools and techniques in microbiology. Structure of and comparison of prokaryotic and eukaryotic cells; Systematic classification of bacteria, fungi and viruses as well as their morphology, ecological and economic importance; Bacterial, fungal and protozoan nutrition, metabolism and growth. Antigens and antibodies. Microbial variation and heredity. *Pre-requisite MCB 112.*

### ***MCB 213 Principles of Sterilization, Disinfection and Chemotherapy (2 Credit Units)***

A review of methods used for sterilization and disinfections, Definition of terms, criteria and viability for sterilization and disinfection, Exponential kinetics, physical and chemical agents, inactivation of viruses, classification, disruption and the action of chemotherapeutic agents, Drug resistance and susceptibility testing.

### ***MCB 220 Microbial Ecology (2 Credit Units C)***

Microorganisms and ecological theory. Symbiosis and the different types that exist. Mechanisms of adaptation of microorganisms to their environment. An overview of occurrence of microorganisms in soil, water and air. Impact assessment of microbial contamination of soil, water, and air in relation to the deterioration of the environment. Growth of microbes on cell surfaces- Biofilm and its importance. Biogeochemical cycling.

### ***MCB 222 Basic Techniques in Microbiology (2 Credit units)***

Culturing of microorganisms; preparation of media for microbial growth. Isolation of pure culture; streaking, pour plates etc.; sub culturing procedures. Staining techniques for differentiation of microorganisms. Enumeration of microorganisms, direct and indirect procedures. Identification of microorganisms to include colonial and cellular morphology and biochemical procedures.

***MCB 224    Microbial Taxonomy and Nomenclature (2 Credit units)***

Introduction and overview. Microbial identification, naming and classification. Systematics and new molecular techniques. Domains of living organisms- Eubacteria, Archaea and Eukarya. Taxonomic ranking, Classification Systems- Natural and Phenetic systems. Numerical Taxonomy. Major Characteristics Used in Taxonomy. Major Characteristics Used in Taxonomy. Classical characteristics and Genetic characteristics.

***MCB 226    Introduction to Food Science and Technology (2 Credit Units)***

Review of global food situation with special emphasis on Nigeria. Introduction to the microflora of foods. Physical, chemical and biological principles of food processing and preservation. Introduction to the concept of engineering units and dimensions applicable to the food industry

***MCB 310    Field Course 1 (1 Credit units)***

***MCB 315    Microbial Genetics and Molecular Biology (3 Credit Units).***

Genetic studies of microorganisms (Griffith's experiment, Avery's experiment Hershey and Chase T2 phage life cycle , Beadle and Tatum hypothesis); Metabolic pathways, genes and chromosomes, nucleic acids, DNA replication theories (conservative, semi-conservative, and dispersive theories ), transcription and translation, gene expression and regulation, locating and isolating genes and regulation, gene sequencing, protein synthesis. Recombinant DNA technology, locating and isolating genes( from donor to host, DNA vector , gene cloning controlling gene expression DNA profiling and DNA fingerprinting.

***MCB 301    Introductory Virology (2 Credit Units)***

General properties of viruses, Bacteriophages, Viral replication and genetics, Pathogenesis of viral infections, Viral immunology, Brief study of viruses of medical and veterinary importance including viruses that cause diseases in plants.

***MCB 303    Immunology/Immunochemistry (2 credit units)***

Basic concepts of immunology, structure of antigens and antigenic determinants, cellular responses, Genetic stimulation, Structure and classification of immunoglobulins, antigen and antibody interactions, roles of lymphoid tissues and thymus in immune responses, Immunology of infections.



***MCB 305 Soil Microbiology (2 Credit Units)***

The characteristics of soil environment, microbial flora and fauna of soil, microbial activities in soil. Effects of soil conditions and soil management of soil pathogens, effects of pesticides on soil microorganisms. Selected crop diseases caused by soil pathogens, control of soil pests and pathogens. Biogeochemical cycles with emphasis on Nitrogen, Carbon, and Sulphur cycles. Biodegradation of complex materials e.g. lignin, hemicelluloses, plastics and pesticides by soil microorganisms.

***MCB 307 Microbial Physiology and Metabolism (2 Credit Units)***

Microbial growth, Dynamics of growth and growth measurements, effects of physical factors on microbial growth e.g. pH, temperature, oxygen need and water etc. Microbial enzymes: classification, properties, mode of action, mode of production and regulation, Microbial photosynthesis, Microbial respiration, Transport across membrane, Microbial fermentations, Biochemical pathways, Microbial preservation.

***MCB 309- Food Microbiology (3 Credit Units)***

Microbial flora of foods, physical and chemical factors affecting microbial growth on Foods, microbial spoilage of foods, microorganisms involved in processing local foods e.g. garri, akamu etc, food poisoning, food contamination and food borne diseases, food preservation techniques, fermented foods, microbiological examination of foods, microbiological standards of foods, Microbiology of dairy industry.

***MCB 313/BOT 305 Mycology (2 Credit Units)***

General features of fungi, fungal classification, growth and life cycles, The phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes, Primary apical growth, intercalary growth, deformation growth and secondary growth, Fine structures of fungal cells, Environmental control of fungal growth, Economic importance of fungi.

***MCB 317 Introduction to Mushroom Growing Technology (2 Credit Units)***

Biology, ecology and economic importance of mushrooms. Collection, identification and preservation of mushroom. History of mushroom cultivation. Spawn production and cropping.

***MCB 319 Water Treatment and Analysis (2 Credit Units)***

Sources of natural water and standard specifications for quality of water for different applications; Physical, chemical and biological characteristics of water and wastewater;

Chemical processes for water treatment; Domestic wastewater treatment; Methods of water treatment; Sludge: treatment and disposal; Water chemistry and analysis: pH, acidity and alkalinity, dissolved oxygen and oxygen demand, total organic carbon, metals, dissolved salts, trace organics, PAHs; Radioactivity and radionuclides in water; Water survey and sampling.

***MCB 300 Student Industrial Work Experience (SIWES) 6 Credit Units***

Students will be posted to industrial establishments such as industries, research institutes, and pharmaceuticals, medical, industrial, food and agricultural establishments for a period of six months of supervised training. Seminar on the scheme will be presented to the Departmental Board of Examiners and a report is submitted for grading.

***MCB 410 Field Course 11 (1 Credit units)***

***MCB 401 Industrial Microbiology 1 (2 Credit Units)***

Nature of industrial microbiology and microorganisms of industrial importance, Aspects of the biology of moulds, yeasts, bacteria and actinomycetes Fermentation technology Culture techniques and maintenance of selected cultures Mutation, strain selection and development, hybridization and media formulation and economics, Optimization of fermentation media at laboratory scale; fermenter design operation Antifoams Aspects of biochemical engineering Patents and patent laws.

***MCB 403 Environmental Microbiology (3 Credit Units)***

Air micro flora, techniques in microbiological analysis of air, control of microorganisms in air, air pollutants and their effect on environment, aquatic microbiology, distribution of microorganisms in an aquatic environment, the role and importance of aquatic microbial ecosystems, techniques for the study of aquatic microorganisms, microbiology of domestic water and sewage, water purification, determination of sanitary quality of domestic water, water borne diseases, international standards for water used in drinking, cooking and bathing, sewage and its characteristics, sewage treatment and disposal, microorganisms and sewage treatment procedures.

***MCB 405 Pharmaceutical Microbiology (3 Credit Units)***

Scope of pharmacology, laws regulating the production and sale of drugs, various Sources of drugs and importance of microorganisms, microorganisms in drug spoilage, Microbiological standards in a pharmaceutical industry, antibiotics production from molds and bacteria,

synthetic and semi-synthetic drugs, action of antimicrobial agents, antibiotic synergism and antagonism, action of antifungal agents and disinfectants, testing the efficiency of disinfectants, sensitivity and resistance to antibiotics by microorganisms, production of vitamins and amino acids by microorganisms, drug tolerance, abuse and addiction.

***MCB 407 Pathogenic Mycology (2 Credit Units)***

General classification of fungi, Morphological and physiological characteristics of dermatophytes and fungi causing sub-cutaneous and deep mycosis, Clinical features and epidemiology of mycotic infections, Pathogenic actinomycetes, Identification of common laboratory contaminants, Collection, isolation and identification of pathogenic fungi.

***MCB 409- Seminar and Scientific Writing (2 Credit Units)***

Supervised seminar on selected current topics in microbiology and biotechnology based on review of literature.

***MCB 411 Parasitology (2 Credit Units)***

Principles of parasitism, Parasite-Host relationship, parasitic adaptations, epidemiology, and socioeconomic impact of some common tropical parasitic diseases. Brief history of Parasitology, Parasites defined, Evolution of parasites. Parasitic life; advantages and problems, Attachment and maintenance in the host, Reproduction and transmission, The distribution, life cycle, epidemiology, pathogenesis treatment and control of protozoan and helminths parasites.

***MCB 413 Virology and Tissue Culture (2 Credit Units)***

Structure, properties and classification of viruses. Principles of isolation, cultivation and maintenance of plant and animal cells *in vivo*. Application of cell culture techniques in virology. Viruses as agent of diseases in animals.

***MCB 415 Principles of Environmental Impact Assessment (2 Credit Units)***

What is EIA, objectives of EIA; principles and concept of EIA; procedures for conducting EIA; importance and justifications for EIA; interpreting EIA reports, mapping population resources; biodiversity and environmental law.

***MCB 417 Microbial Bioremediation (2 Credit Units)***

Definition, microbial leaching of ores, the leaching process, metal recovery, leaching of uranium and gold, mercury and heavy metal transformations, mercuric resistance, petroleum

biodegradation, hydrocarbon decomposition, petroleum production, biodegradation of xenobiotics and pesticides, biodegradation of synthetic polymers and biodegradable plastics, Principles of microbial deterioration of materials, Factors favouring deterioration of materials.

***MCB 420      Research Project (6 Credit Units)***

Each final year students is required to carry out an original research project under the supervision of an academic staff member. The findings of the research are presented by the student at a Departmental Seminar. A thesis (based on the project) is prepared, bound and submitted by the student for evaluation by the Department, and is defended in a viva voce before an External Examiner.

***MCB 402      Public Health Microbiology (2 Credit Units)***

Sources of infections and routes of transmission in the community, Epidemiology of diseases, Mode of disease transmission Community health, hygiene and sanitation: Water and sewage sanitation, Safe waste disposal preparations Hygiene and literacy; community education and participation, Community diseases control and management; vector control, prophylaxis, vaccination and chemotherapy. *Pre-requisite MCB 112, & 211.*

***MCB 404      Pathogenic Bacteriology (3 Credit Units)***

History of pathogenic bacteriology, Host-parasite relationship, Mechanism for bacterial pathogen city and virulence factors in pathogenic bacteria, Normal bacterial flora in human tissues and organs and their role in health and diseases, Pathogenesis, epidemiology, treatment, prevention and control of diseases caused by bacteria, Laboratory techniques for isolation, characterization and identification of pathogenic bacteria.

***MCB 406      Analytical Microbiology and Quality Control (3 Credit Units)***

Microorganisms as agents in qualitative analysis, selection of test organisms for assays of antibiotics, amino acids and vitamins, response of microorganisms used in assays, total number, number of viable individuals, total nitrogen, dry weight, pH, turbidity. Aspects of quality control principles and methods of microbiological quality control, Plant and equipment, the importance of microbiological standards and legislation, codex alimentarius, the Food standards and legislation in Nigeria.

***MCB 408 Industrial Microbiology II (2 Credit Units)***

Application of microbiology in the fermentation industry, microorganisms of industrial importance and their characteristics, factors involved in choosing a raw material as an industrial medium, yeast biomass production at industrial level, technology of fermented alcoholic beverages: beer production process, wine production, production process of spirits, microbial lactic acid production, burukutu and pito production, spoilage of these products by microorganisms. Methods of cultivating microorganisms: continuous and batch methods, their advantages and disadvantages, patents and patent laws, practical will include visits to various microbiologically based industries.

***MCB 412 Petroleum Microbiology (2 Credit Units)***

Detailed study of carbon cycle. Theories about the genesis of fossil fuels with emphasis on microbiological influence. Prospecting for oil by means of microbial indicators. Drilling: corrosion of pipes and equipment-microbiology of the process. Effects of oil spills on microbial ecology of seas and soils. Microbial decomposition of petroleum.

***MCB 414 Waste and waste Management (2 credit units)***

Causes of wastes generation (industrialization, population explosion etc.) Classification of wastes and their effects on the environment e.g. disease spread, breeding sites for mosquitoes, flies, insects vectors and dirty environment etc, wastes of food industries and different methods of waste disposal and their suitability or otherwise, effluent wastes treatment and conversion of wastes or utilization as raw material, recycling, gaseous wastes control, federal laws regarding generation and disposal of wastes.

## **16.0 Time Management and Effective Study Skills**

### **16.1 Time management**

The aim of managing your time is to spend time doing the things that help you **achieve your goals** and the things that you personally prioritise and value. The key word here is goal... so to begin with you must have a goal. Time management is straightforward - but it takes time so it is important then to devise a workable system for yourself which meets your needs. Defining what is important to you is crucial because good time management is spending time achieving your goals. Include time to relax and socialise: "all work and no play" will not help you meet your goals. If you build in time to have fun you will be more effective. Before you begin to organise your time you need to think in a structured way: For instance the first step should be;

### **16.2 Prioritisation of tasks**

Identify what is important to you: is it friends? Socialising? a part time work? Or getting a good degree? Rank them in order of priority. This will help you prioritise the time you give to things you most value and things which will help you achieve your goals. Then you can allocate a realistic amount of time to each.

Student A is enjoying his first year. He has a lot of friends and a great social life. But this doesn't leave much time for work. A is anxious and guilty about this and to avoid these feelings he spends even more time going out. Looking at his priorities helps A recognise that although his friends are important to him he also wants a good degree. Prioritising would enable him to plan the amount of time he spends on work so he can socialise without feeling guilty.

### **16.3 Identify your goals**

Try to be realistic and definite about them. Identify what needs to be done, when and how. How realistic and effective is reading for fours at a stretch? If you happen to be a perfectionist you likely work all the time and find it hard to be realistic about how much can be done. If your goals are not well defined, for instance when you say to yourself "I should work harder" or "I must do better" because you feel that nothing you do is good enough, then believe me when I say you will not know when to stop, and you will end up feeling overwhelmed. For such a person, identifying his/her goals would enable him/her feel more in control of time: Having a goal such as "I want to get a first class- what do I need to do to achieve one" is more specific than "I must work harder". Being more realistic enables one to build in time to relax and work more

effectively. **To be able to manage your time effectively you would need to look carefully at the way you work.**

A systematic approach will help you identify your strengths and help you identify where improvements can be made. So begin as from today to keep a diary and include notes on: how long did it take you to get started? / did you prioritise? / did you put things off? / can you say "no" when you need to? / were you easily distracted by others? / is your desk always untidy? / are you able to focus and concentrate on the task? / do you make plans and to-do lists?

Student B leaves everything to the last minute. For B this is an attempt to deal with anxiety about his work since it gives him no time to agonise about whether it is good enough. However putting things off is actually very stressful and B will most likely encounter difficulties over more complex, long term projects or if a last minute crisis occurs. Using a more systematic approach will help C feel more in control and as a result more able to deal constructively with his anxieties about his work.

#### **16.4 Time Allocation**

Identifying how you spend your time can help you see if you use it productively. List the things you have to do, such as lectures, paid work. Once you have established these fixtures note other activities you want to include, such as sports, breaks, meetings, study time and time with friends. Are you realistic about what you can fit in? Are you studying at the best time for you? Do you spend time worrying rather than tackling things?

Consider this very typical scenario for a student. You need to get up early say 6am, prepare for lectures which commence usually at 8.00am or even 7am sometimes but other things always seem more important. So you try to juggle activity A with B, while planning C and in the midst of that activity D pops up, so you drop A and B, procrastinate C to handle D. The longer you put A and B off, the more huge and unmanageable they seem to be. D is shabbily managed and you look for blames here and there. What you need is to take a breather and look how much time is wasted achieving nothing. While in school I recognised that I actually work better at night so even presently what I do is to restructure my day such that I fit in other things in the morning leaving the evening free to do more tasking intellectual work.

Different systems work for different people but if you want the best out of yourself in the time you have available do

- Start by buying a personal diary or organiser and use it.

- Allocate time every day to organise your activities and forward plan. Some people do this first thing, others at the end of the day. Divide your activities into categories. Then make a list and rank them in order of importance and urgency. Reviewing the way you spend time may have revealed time wasted on tasks which were low on your list of priorities. Ideally less time should be allocated to those and more time to those items higher up.
- Look carefully at what must be done today, should be done today (please avoid procrastination), identify what could be put off until tomorrow or that someone else could do. Tackle something you want to avoid now rather than tomorrow. This frees your mind and allows you to concentrate more efficiently.
- Make planning your time a part of your routine.
- Create a work area which allows you to spread out, which is tidy, well-lit and warm. This means that each time you return to it you are ready to start and feel more organised.
- Get into a routine of studying at set times. Others around you need to know when you are working and don't wish to be interrupted. It is useful to identify how much time you need for different types of work: writing essays need chunks of time, and a lot of concentration. Other tasks can be fitted in to odd moments or times when your concentration is poor.
- Break the task up into manageable portions so that you don't feel so daunted by it.
- Avoid spending an unreasonable amount of time on one thing at the expense of others. It is better to hand work in on time, even though it may not meet your exacting standards.
- When someone asks you to do something, see it in terms of taking time away from something else. Your answer might be "no", but you might meet your own goals.
- Avoid saying "yes" to something that is unimportant just because it seems far away. The same amount of effort will be needed whether the task is done today or next month.
- Reward yourself for time well spent by planning an activity you will enjoy.
- Decide a time to finish as well as start so you know when you are free for other activities.

### **16.5 Effective Study is more than understanding**

There is little doubt that no two people study the same way, and it is a near certainty that what works for one person may not work for another. However, there are some general techniques that seem to produce good results. Everyone is different, and for some students, studying and being motivated to learn comes naturally. Your success here my dear students is dependent on



your ability to study effectively and efficiently. The results of poor study skills are wasted time, frustration, and low or failing grades. It's your life, your time, and your future. All I can say, upon reflection of many years as a teacher, is that time is precious and not to be squandered, no matter what you believe right now. I am not here to give a magic formula for success in preparing for tests, or assignments but guide to help you develop effective study skills. It.

Effective study skills must be practiced in order for you to improve. It is not enough to simply "think about" studying; you have to actually do it, and in the process use information from what you do to get better. This is the central idea of my talk. All that follows depends on this single concept. There is a saying that goes like this: "Practice doesn't make perfect; perfect practice makes perfect." So If you want to be an achiever, take this saying to heart.

Before you even begin to think about the process of studying, you must **develop a schedule**. If you do not have a schedule or plan for studying, then you will not have any way of allocating your valuable time when the unexpected comes up. A good, well thought out schedule can be a lifesaver. It's up to you to learn how to develop a schedule that meets your needs, revise it if necessary, and most important, and follow it. All schedules should be made with the idea that they can be revised. A good schedule keeps you from wandering off course. A good schedule, if properly managed, assigns time where time is needed, but you've got to want to do it.

When making your study schedule take into cognisance every class, laboratory, lecture, social event, and other work in which you engage. Make a weekly schedule and indicate times for classes, labs, lectures, social, and work time. Block off a period for sleeping each day. With what is left over, plan time for study. This gives you a rough road map of the time available. Of course, you can revise your schedule as circumstances warrant. Making a schedule is one thing, sticking to it is another ball game entirely. Sticking to your schedule can be tough so you will need to make deliberate effort to follow it. Don't dribble away valuable time. Avoiding study is the easiest thing in the world. It's really up to you to follow the schedule you prepared. A good deal of your success depends on this simple truth.

## **16.6 When to study**

The problem of when to study is critical. A good rule of thumb is that studying should be carried out only when you are rested, alert, and have planned for it. Last minute studying just before a class is usually a waste of time. If your study period is before the lecture class, be sure you have read all the assignments and made notes on what you don't understand. If the study period is after the lecture class, review the notes you took during class while the information is still fresh.

You can study anywhere. Obviously, some places are better than others. Libraries, or private rooms are best. Above all, the place you choose to study should not be distracting. Distractions can build up, and the first thing you know, you're out of time and out of luck. Make choosing a good physical environment a part of your study habits.

## **17.0 STRATEGIES FOR EFFECTIVE STUDYING:**

**Thinking skills:** You need to put your thinking cap on when studying. Yes everybody has thinking skills, but few use them effectively. Effective thinking skills cannot be studied, but must be built up over a period of time. Good thinkers see possibilities where others see only dead-ends. If you're not a good thinker, start now by developing habits that make you ask yourself questions as you read. Talk to other students who you feel are good thinkers. Ask them what it is they do when they think critically or creatively. Often times, you can pick up valuable insights to help you become a better thinker.

**The SQ3R method:** The SQ3R method has been a proven way to sharpen study skills. SQ3R stands for Survey, Question, Read, Recite, Review. Take a moment now and write SQ3R down. It is a good slogan to commit to memory to carry out an effective study strategy.

**Survey:** Get the best overall picture of what you're going to study BEFORE you study it in any detail. It's like looking at a road map before going on a trip. If you don't know the territory, studying a map is the best way to begin.

**Question:** In order to learn you must ask questions. That is the way kids learn, they ask a lot of questions. Questions should lead to emphasis on the what, why, how, when, who and where of study content. Ask yourself questions as you read or study. As you answer them, you will help to make sense of the material and remember it more easily because the process will make an impression on you. Those things that make impressions are more meaningful, and therefore more easily remembered. Write your questions in the margins of your textbooks, on lecture notes, or wherever it makes sense.

**Read:** Reading is NOT running your eyes over a textbook. When you read, read actively. Read to answer questions you have asked yourself or question the instructor or author has asked. Always be alert to bold or italicized print. The authors intend that this material receive special emphasis. Also, when you read, be sure to read everything, including tables, graphs and

illustrations. Often times tables, graphs and illustrations can convey an idea more powerfully than written text.

**Recite:** When you recite, you stop reading periodically to recall what you have read. **THIS IS NOT CRAMING.** Try to recall main headings, important ideas of concepts. Try to develop an overall concept of what you have read in your own words and thoughts. Try to connect things you have just read to things you already know. When you do this periodically, the chances are you will remember much more and be able to recall material for papers, essays and objective tests.

**Review:** A review is a survey of what you have covered. It is a review of what you are supposed to accomplish, not what you are going to do. Rereading is an important part of the review process. Reread with the idea that you are measuring what you have gained from the process. During review, it's a good time to go over notes you have taken to help clarify points you may have missed or don't understand. The best time to review is when you have just finished studying something. Don't wait until just before an examination to begin the review process. Before an examination, do a final review. If you manage your time, the final review can be thought of as a "fine-tuning" of your knowledge of the material.

**Reading:** A primary means by which you acquire information is through reading. In the University you are expected to do much more reading than in secondary school. You must learn to read with a purpose. In studying, you must know before you begin reading what your purpose is, and read accordingly. When reading do not underline. Use a highlighter, they are not expensive. Experience has shown that text passages highlighted are more easily remembered than the same passages underlined.

**Getting the Main Idea:** Getting the main idea in reading is central to effective studying. You must learn what the author's central idea is, and understand it in your own way. Every paragraph contains a main idea. Main ideas are perfect for outlining textbooks and even lecture notes. Make it a habit to find the main idea in each paragraph you read.

**Extracting Important Details:** Extracting important details means that you locate in your reading the basis for main ideas. There is usually one important detail associated with every main idea. The more important details you can identify, the easier it will be to review for examinations because you have made a link between an idea and information that supports it.

The more links you can make between details and ideas, as well as ideas themselves, the more powerful will be the efforts of your study.

**Don't Read Aloud to Yourself:** Generally, reading aloud to yourself does not help you study more effectively. If you move your lips while you read, you're not reading efficiently. If you read aloud or move your lips while you're reading, you are reading slowly, so stop moving your lips. Try putting a finger over your lips. Your finger will remind you not to move your lips. Make an effort to read faster and retain more - after a while, you'll be surprised how little effort it will take.

**Taking Notes:** Like reading, note-taking is a skill which must be learned and refined. Almost invariably, note taking, or the lack of it, is a constant deficiency in the study methods of many students. Learning the ingredients of good note taking is rather easy; applying them to your own situation depends on how serious you are in becoming a successful student.

**Where to Keep Notes:** You must learn to keep notes logically and legibly. Remember, if you can't read your own writing a few days after taking notes, they are of little use. By all accounts, the best place to keep notes is in a loose-leaf notebook. Use dividers to separate the different classes you take. Make it a habit of using your notebook to record ALL your notes. If you're caught without your notebook and need to take notes, always have a supply of loose-leaf paper with you. Insert your note papers into the notebook as soon as you can. Be sure to buy a good notebook, as it will get a lot of wear and tear.

**Reviewing and Revising:** As you prepare for examinations, tests, or other assessments, you should spend time reviewing and revising your lecture notes. Begin the process by reviewing your notes right after a lecture. If you wait too long, you may discover that the notes just don't make sense. Don't hesitate to revise your notes based on the review process.

## **18.0 TAKING LECTURE NOTES**

### **Surveying, Questioning, Listening**

Taking accurate and concise lecture notes is essential. Develop the habit of taking notes using appropriate methods described earlier in the SQ3R technique. For example, when you listen to a lecture, formulate questions as you listen. Your main job in taking lecture notes is to be a good listener. To be a good listener, you must learn to focus and concentrate on the main points

of the lecture. Get them down, and then later reorganize them in your own words. Once you have done this, you have set the stage for successful reviewing and revising.

**The study skills presented here depend on one thing, and that is your willingness to WANT to improve and do well in school. If you really don't want to make the effort and sacrifice, no amount of suggestions, ideas, or outlines can help much. You are the one who is responsible for your education, so to that end, one last word of advice -- work smart, not hard.**