# Tutorial Letter 101/3/2016

## Microbial Ecology

# MIB2602

## Semesters 1 and 2

## Department of Life and Consumer Sciences

**IMPORTANT INFORMATION:**

This tutorial letter contains important information about your module.

BAR CODE

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# 1 INTRODUCTION

Dear Student

Welcome to the Department of Life Sciences and in particular to the module, Microbial Ecology. We hope you will find this academic year stimulating and satisfying.

The subject of Microbiology has several different parts. At first you may find the course difficult, but I want to assure you that, as you make progress in your studies, all the aspects of Microbiology will become clear and understandable.

Your study of this module will be satisfying if you are DEDICATED and pay REGULAR attention to your study.

The staff of the Microbiology Section of the Department of Life and Consumer Sciences would like to assist you and we encourage you to contact us early if you experience any problems with this module.

This is an online module, which means that you will find everything you need to complete the module on the module site on *my*Unisa. Check this site regularly for updates, posted announcements and additional resources uploaded throughout the semester. Rapid communications throughout the semester have been made possible through *my*Unisa. By using the *my*Unisa site, you can:

- submit assignments (**please note: it is advisable that you submit your assignment online as this will ensure that you receive rapid feedback and comments**),
- access your official study material,
- have access to the Unisa Library functions,
- "chat" to your lecturer or to fellow students and participate in online discussion forums, and
- obtain access to a variety of learning resources.

Please take some time to familiarise yourself with the site so that you get to know where the different tools and resources are. I will give you more information about this later in this learning unit.

Although I would like to encourage you study this module online, we also recognise that it might be impossible for some of you to get online at all, while some others of you might only be able to get online infrequently. For this reason, you can also use the print-based study pack that you will receive to study for this module.

Your study material for this module includes:

- Your prescribed textbook
- The learning units. You can access these by clicking on 'Learning units' in the menu on the module site. You will also receive the learning units as a printed document with the code MO001. This printed document will also be available on the web site, and you can access it by clicking on 'Official Study Material'.
- This tutorial letter, Tutorial Letter 101. You will receive this in print format, but you can also access it on the module site under 'Official Study Material'.

- Any other tutorial letters you may receive through the year

Details of your prescribed book are given in the 'Prescribed books' menu option that you can access on the left-hand side of this screen, and also in Tutorial Letter 101.

Please note that some of the printed tutorial matter may not be available when you register. Tutorial matter that is not available when you register will be mailed to you as soon as possible, but is also available on *my*Unisa under 'Official Study Material'.

# 2 PURPOSE OF AND OUTCOMES FOR THE MODULE

## 2.1 Purpose

Qualifying students are able to know, understand and apply the principles and theory relating to interactions between microorganisms and their environment, be it terrestrial or aquatic.

## 2.2 Outcomes

**The outcomes of this course**
The learner should be able to:

- study interactions between microbes and their environment
- adopt a critical approach to contemporary topics in microbial ecology.
- describe various biogeochemical cycles.
- discuss microorganisms within a terrestrial (soil) environment
- discuss microbial adaptation and nutrition within an aquatic environment.

# 3 LECTURER(S) AND CONTACT DETAILS

## 3.1 Lecturer(s)

Dr Monde A Nyila Pr.Sci.Nat. (Microbiological Science)
Email address: nyilama@unisa.ac.za
Telephone number: +2711 471 2294

## 3.2 Department

Department of Life and Consumer Sciences
Florida Campus
Private Bag X6, Florida, 1710
Fax number: +27 11 471 2796

## 3.3 University

You will find general Unisa contact details in the brochure entitled *my Studies @ Unisa*; always use your student number when contacting the University.

# 4 MODULE-RELATED RESOURCES

## 4.1 Prescribed books

Willey, JM, Sherwood, LM & Woolverton, CJ. 2014. *Prescott's Microbiology*. 9th edition. New York: McGraw-Hill.
ISBN: 9789814581561

Please refer to the list of official booksellers and their addresses in the *my Studies @ Unisa* brochure. Prescribed books can be obtained from the University's official booksellers. If you have difficulty in locating your book(s) at these booksellers, please contact the Prescribed Book Section at Tel: 012 429-4152 or e-mail *vospresc@unisa.ac.za*.

## 4.2 Recommended books

None.

## 4.3 Electronic reserves (e-reserves)

None

# 5 STUDENT SUPPORT SERVICES FOR THE MODULE

Important information appears in your brochure *my Studies @ Unisa.*

# 6 MODULE-SPECIFIC STUDY PLAN

Use your brochure *my Studies @ Unisa* for general time management and planning skills.

The following is a recommended time schedule which can be used as a guideline for studying this module:

| **ACTIVITY** | **HOURS** |
|---|---|
| Reading and re-reading study guide | 10 |
| Reading relevant chapters in the prescribed textbook | 35 |
| Completing study guide activities | 10 |
| Studying for and completing the assignments | 20 |
| Studying for examination | 40 |
| Final revision | 5 |
| **TOTAL** | **120** |

# 7 MODULE PRACTICAL WORK AND WORK-INTEGRATED LEARNING

There are no practicals for this module.

# 8 ASSESSMENT

## 8.1 Assessment plan

The assessment in this module has both formative and summative types of assessments. At the end of each of the study units there are self-evaluation questions. There are two assignments which you should submit before the due dates. Assignment 01 contributes 20% towards the semester mark and Assignment 02 contributes 80%. At the end of each semester you will write the examination. Both Assignments 01 and 02 combined contribute 30% towards the final mark and the examination will contribute 70%.

## 8.2 General assignment numbers

There are two assignments for both semesters, namely Assignment 01 and Assignment 02. If you are registered for semester 1 you should submit assignments for that semester only. You are not allowed to submit the assignments for the semester which you are not registered for.

### *8.2.1 Unique assignment numbers*

**Semester 1**
Assignment 01: **772586**
Assignment 02: **702341**
Assignment 03**: 737476**

**Semester 2**

Assignment 01: **773554**
Assignment 02: **651295**
Assignment 03: **882395**

### *8.2.2 Due dates for assignments*

**SEMESTER 01:**
**Assignment 01: Due date: 11 March 2016**
**Assignment 02: Due date: 8 April 2016**
**Assignment 03: Due date: 22 April 2016**

**SEMESTER 02:**
**Assignment 01: Due date: 26 August 2016**
**Assignment 02: Due date: 16 September 2016**
**Assignment 03 : Due date : 23 September 2016**

## 8.3 Submission of assignments

The assignments that you are required to submit during the year must reach Unisa **before** or **on** the **due date** stipulated. To ensure that we receive it in time please complete and post the assignment at least **a week** before the due date.
In exceptional circumstances only, a **valid** medical certificate with a valid long-term illness will be considered as a reason for submitting an assignment late. Notify the lecturer well in advance. If no arrangements were made, the assignment will not be marked. Please attach the medical certificate at the back of your assignment.
**How to receive quicker, online feedback and comments to your assignments**

Unisa is implementing onscreen marking of assignments to help you receive quicker feedback on your assignments. This will not be the case for all your modules, however, most modules from the Department of Life and Consumer Sciences can be marked this way.
To allow us to mark your assignment onscreen, you need to do the following:
**1. Convert your electronic assignment to PDF format.**

*How do I create a PDF document from any other document format (e.g. MS Word, MS Excel etc)?*
By quickly downloading FREE software (namely PrimoPDF), you can create a PDF document from any type of document you can print. Follow these easy steps:
i. Go to the Internet to the following website: http://www.primopdf.com/index.aspx
ii. Download the PrimoPDF software by clicking on the **DOWNLOAD FREE** prompt. Follow the instructions for installing the software.
iii. To create a PDF document from your assignment, go to your assignment on your PC and instead of printing your assignment to an actual printer, choose PrimoPDF as printer. To do this, click on the **Microsoft Office Button** (or „File" button for older versions of Microsoft), and then click **Print**. Then, choose from the drop-down list the printer which in this case should be **PrimoPDF**).
iv. You will now receive a pop-up message. Click the "**Create PDF**" button. Indicate in the "**Save as:**" pop-up where you want to save the PDF assignment on your PC.
v. The PDF version of your assignment will now appear for your viewing.

2. **Submit the PDF document (your assignment) via *my*Unisa (online).** For guidance on how to submit an assignment via *my*Unisa see the below guideline:

For detailed information on assignments, please refer to the *my Studies @ Unisa* brochure, which you received with your study package.

To submit an assignment via *my*Unisa:
- Go to *my*Unisa.
- Log in with your student number and password.
- Select the module.
- Click on assignments in the menu on the left-hand side of the screen.
- Click on the assignment number you wish to submit.
- Follow the instructions.

### 8.4 Assignments

Assignments are seen as part of the learning process for this module. As you do the assignment, study the reading text, consult other resources, discuss the work with fellow students or tutors or do research - you are actively engaged in learning. Looking at the assessment criteria given for each assignment will help you to understand what is required of you more clearly.
There are TWO assignments for this module for each semester. You will find the assignments for: **Semester 01** (January to June) and **Semester 02** (July to December) in Addendum in page 9 of this tutorial letter.

# 9 OTHER ASSESSMENT METHODS

None

# 10 EXAMINATION

Use your brochure *my Studies @ Unisa* for general examination guidelines and examination preparation guidelines.

For **examination admission** it is compulsory for you to hand in the first assignment for this course (MIB2602). It is also to your own advantage to do the assignments in order to test your understanding of the subject, and to establish how well prepared you are for the examination.

You need to obtain **a minimum of 40%** in your examination to pass. If you failed to do that and want admission to a supplementary examination, the total of your examination mark and year-mark needs to be over 40%.

**Examination period**

his module is offered in a semester period of 15 weeks (12 weeks of study and three weeks of examination period). This means that if you are registered for the first semester, you will write the examination in May/June 2016 and the supplementary examination will be written in October/November 2016. If you are registered for the second semester, you will write the examination in October/November 2016 and the supplementary examination will be written in May/June 2017.

During the semester, the Examination Section will provide you with information regarding the examination in general and examination venues, dates and times. To help you in your preparation for the examination, you will receive a tutorial letter that will explain the format of the examination paper, give you examples of questions that you may expect and set out clearly what material you have to study for examination purposes.

**Calculating your final mark:**

Year-mark (marks for your assignments) = 30%

Examination = 70%

Total = 100%

# 11 FREQUENTLY ASKED QUESTIONS

The brochure *my Studies @ Unisa* contains an A-Z guide of the most relevant study information.

Q: How do I know where to write examinations?
A: After you have registered you will be contacted by the examination department about the venues (examination centres) where you will sit for your exams.
Q: Where do I get additional information about the modules I have registered for?
A: For each module you have registered for there is additional information on *my*Unisa.
Q: How do I submit my assignment via *my*Unisa?

A: For detailed information on and requirements as far as assignments are concerned, see the brochure *my Studies @ Unisa* that you received with your study material.

## 12 SOURCES CONSULTED

Tutorial letter 101 guidelines.

## 13 CONCLUSION

I hope and trust that you will enjoy the course. Please do not hesitate to contact us if you experience problems. Good luck with your studies.

# 14 ADDENDUM

## Assignments

**SEMESTER 1**

**ASSIGNMENT 01**
**Unique assignment no: 772586**
**DUE DATE: 11 March 2016**
**INSTRUCTIONS**

1) Assignment 01 contains only multiple-choice questions (MCQ). Use the mark-reading sheet provided to answer these questions.

2) Fill in all your **personal details** on the mark reading sheet.

3) Indicate the correct answer clearly by shading in the appropriate number on the mark reading sheet with an HB pencil. If more than one number is shaded in any answer, NO marks will be awarded for that question.

4) See the *myStudies @ Unisa* booklet for more detailed information on filling in mark reading sheets.

**MULTIPLE CHOICE QUESTIONS**

The purpose of this assignment is to familiarise yourself with the study material content by means of techniques designed to **improve your study skills**. **Take note** that you will have to consult your **textbook** as well as the study guide to answer Assignment 01. After reading the sections in your study guide, answer the questions below.

**QUESTIONS**

1. Members of all of the following genera of bacteria typically are found in a maturing Winogradsky column except …
   1. *Clostridium*.
   2. *Rhodospirillum*.
   3. *Chlorobium.*
   4. *Escherichia*. (2)

2. Higher plants most often absorb nitrogen from the soil in the form of …
   1. $N_2$.
   2. nitrites.
   3. ammonia.
   4. nitrates. (2)

3. The reservoir for nitrogen is …
   1. the atmosphere.
   2. ammonia.
   3. nitrates .
   4. amino acids. (2)

4. An extremely heat- and chemical-resistant, dormant, thick-walled spore that develops within bacteria is known as a(n)…
   1. mycelium.
   2. flagellum.
   3. viroid.
   4. endospore. (2)

5. All of the following are associated with microbial interactions **except** ...
   1. rumen.
   2. mutualism.
   3. commensalism.
   4. asthma. (2)

6. The formation of a cyst (dormant, low metabolic activity) is called ____.
   1. syngamy
   2. excystment
   3. conjugation
   4. encystment (2)

7. In the Winogradsky column the bottom part consists of ____..
   1. $O_2$ dominated mud
   2. Rust- coloured zone
   3. Anoxic $H_2S$ dominated zone
   4. Red zone. (2)

8. The flow of energy and matter in living organisms through a producer-consumer sequence is known as ___.
   1. the ecosystem
   2. the food chain
   3. commensalism
   4. the food web (2)

9. Which of the following are NOT associated with aquatic environments?
   1. Dissolved oxygen
   2. Redfield ratio
   3. Outer membrane
   4. Oligotrophism (2)

10. All of the following are examples of methods involved in microbial ecology **except**____.
   1. viable counts
   2. turnover
   3. fimbria
   4. ribosomal RNA (2)

**TOTAL MARKS [20]**

**END OF ASSIGNMENT 01 (SEMESTER 1)**

**SEMESTER 1**

**ASSIGNMENT 02**
**(DUE DATE: 8 April 2016**

**Unique number: 702341**

**INSTRUCTIONS**

1) Type your assignment on a computer. You may print on ordinary white paper and not necessarily the Unisa typing paper provided. Please use 1,5 spacing and Arial or a similar font of 11 or 12 pitch. Leave a line open between questions. We will not mark a typed assignment that does not comply with these requirements. If you could not type your assignment, use a black or blue pen and please write neatly.

2) Use the assignment cover and envelope provided. When stapling your answers inside the cover, staple only in the top left-hand corner.

3) Your student number is the number just below your address. This number must be filled in on the assignment cover and must also be quoted in all correspondence with the university.

4) Answer all questions as briefly and clearly as possible.

5) Formulate the answers in your own words.

6) Number your answers correctly.

**Question 1**

*Clostridium botulinum*, the bacterium that causes botulism, sometimes causes fish deaths in lakes where people swim. Currently there are limited, if any monitoring procedures for this potential source of disease transmission to humans. Do you think a monitoring program is essential, and if so, how would you implement it? **[25]**

**Question 2**

Write short notes on the following: (5X5=25)

2.1. The Winogradsky column. (5)
2.2. Soil as a microbial environment. (5)
2.3. Soil microorganisms linked to plant and human disease. (5)
2.4. Positive and negative microbial interactions. (5)
2.5. The rumen as an ecosystem. (5)
**[25]**

**Question 3**

Discuss the role of soil microorganisms in the global circulation of nutrients. **[25]**

**Question 4**

Briefly discuss biofilms, microbial mats and microbial loops.

**[25]**
**TOTAL MARKS [100]**

**END OF ASSIGNMENT 02 (SEMESTER 1)**

**Assignment 03:**

**Unique number: 737476**

**Discussion Forum**

**Due date : 22 April 2016**

**Discussion Forum**

Note: This assignment is not compulsory and will not be marked. I would however like to encourage you to undertake it, as it will contribute positively to your learning experience.

To complete assignment 3, you need to go to the 'Discussion' option in the module web site on myUnisa. Click on the forum 'Module-related discussions' and then on the topic 'Activity 4.1: Soil as microbial habitat. Answer the question in this topic, and also respond to at least one other posting by another student.

**END OF ASSIGNMENT 03 (SEMESTER 1)**

**SEMESTER 2**

**ASSIGNMENT 01**

**Due Date: 26 August 2016**

**Unique assignment no: 773554**
**INSTRUCTIONS**

1) Assignment 01 contains only multiple-choice questions (MCQ). Use the mark-reading sheet provided to answer these questions.

2) Fill in all your **personal details** on the mark reading sheet.

3) Indicate the correct answer clearly by shading in the appropriate number on the mark reading sheet with an HB pencil. If more than one number is shaded in any answer, NO marks will be awarded for that question.

4) See the *myStudies @ Unisa* booklet for more detailed information on filling in mark reading sheets.

The purpose of this assignment is to familiarise yourself with the study material content by means of techniques designed to **improve your study skills**. **Take note** that you will have to consult your **textbook** as well as the study guide to answer Assignment 01. After reading the sections in your study guide, answer the questions below.

**QUESTIONS**

1. All of the following are involved in the environments of microorganisms except ...
   1. biofilms.
   2. loops.
   3. mats.
   4. bases. (2)

2. Which of the following is NOT involved in biogeochemical cycling?
   1. Nutrients
   2. Transversion
   3. Reduction
   4. Immobilisation (2)

3. Which of the following is NOT directly involved in microbial ecology?
   1. Communities
   2. Urbanisation
   3. Populations
   4. Ecosystems (2)

4. What is NOT associated with nitrogen fixation?
   1. *Rhizobia*
   2. Nodules
   3. *Agrobacterium*
   4. Bacteroid (2)

5. All of the following are associated with microbial interactions **except** _____.
   1. rumen
   2. mutualism
   3. commensalism
   4. conidium (2)

6. Which of the following is NOT associated with marine environments?
   1. Plasmolysis
   2. Estuaries
   3. Halotolerance
   4. Blooms (2)

7. Which of the following are NOT associated with aquatic environments?
   1. Dissolved oxygen
   2. Conjugants
   3. Redfield ratio
   4. Primary producers (2)

8. In the Winogradsky column the top part consists of ____.
   1. $O_2$ dominated mud
   2. Rust- coloured zone
   3. Anoxic $H_2S$ dominated zone
   4. Red zone. (2)

9. All of the following are associated with microbial soil ecology **except** ____.
   1. organic matter.
   2. carbon to nitrogen ratio.
   3. humus.
   4. marine snow. (2)

10. All of the following are most closely associated with the photic zone **except** ____.
    1. element cycling
    2. virioplankton
    3. estuaries
    4. pelagic (2)

**TOTAL MARKS [20]**

**END OF ASSIGNMENT 01 (SEMESTER 2)**

**SEMESTER 2**

**ASSIGNMENT 02**
**DUE DATE: 16 September 2016**
**Unique number: 651295**
**INSTRUCTIONS**

1) Type your assignment on a computer. You may print on ordinary white paper and not necessarily the Unisa typing paper provided. Please use 1,5 spacing and Arial or a similar font of 11 or 12 pitch. Leave a line open between questions. We will not mark a typed assignment that does not comply with these requirements. If you could not type your assignment, use a black or blue pen and please write neatly.
2) Use the assignment cover and envelope provided. When stapling your answers inside the cover, staple only in the top left-hand corner.
3) Your student number is the number just below your address. This number must be filled in on the assignment cover and must also be quoted in all correspondence with the university.
4) Answer all questions as briefly and clearly as possible.
5) Formulate the answers in your own words.
6) Number your answers correctly.

**Question 1**

Describe the following terms: (5 x 5 =25)
1.1 Extreme environments.
1.2 Micro environment.
1.3 Benthos.
1.4 Eutrophic.
1.5 Geosmin.

**[25]**

**Question 2**

Discuss acid mine drainage with particular reference to soil, water ecology and extreme microorganisms. **[30]**

**Question 3**

Discuss biogeochemical cycling in detail. **[30]**

**Question 4**

By means of a simple, labelled diagram, describe the nitrogen cycle. **[15]**

**TOTAL MARKS [100]**

**END OF ASSIGNMENT 02 (SEMESTER 2)**

**Assignment 03:**

**Unique number: 882395**

**Discussion Forum**

**Due date : 23 September 2016**

**Discussion Forum**

Note: This assignment is not compulsory and will not be marked. I would however like to encourage you to undertake it, as it will contribute positively to your learning experience.

To complete assignment 3, you need to go to the 'Discussion' option in the module web site on myUnisa. Click on the forum 'Module-related discussions' and then on the topic Activity 3.3: Microorganisms in the open ocean. Answer the question umber 1 and 3 in this topic, and also respond to at least one other posting by another student.

**END OF ASSIGNMENT 03 (SEMESTER 2)**