

Department of Microbiology Alagappa University Karaikudi



M.Phil Microbiology (Regular Programme)

Regulation and Syllabus
(For those admitted in academic year 2018-19 onwards)

REGULATIONS

I. Objectives of the Course

Microbiology has become increasingly important to human society. It has emerged as one of the most important branches of life sciences. As microbes practically affect all activities of our life like, food, clothing, shelter, health hygiene etc., so microbiology has made vast progressive strides in all these fields in little less than a century to improve the quality of our life.

Hence our task is to introduce the M.Phil. Programme in Microbiology to educate the postgraduate students in the captivating fields. Rigorous and comprehensive in approach, this syllabus presents essential contents in a detailed, clear and direct way. This programme is offered under Choice Based Credit System (CBCS). The CBCS enables the students to select variety courses as per his interest and requirement. The programme is structured in such a way to impart more knowledge in science, in particular in Microbiology.

II. Eligibility for Admission

A candidate who has passed M.Sc., Degree in any life Sciences discipline as main course of study of any university accepted by the syndicate as equivalent thereto, subject to such condition as may be prescribed therefore shall be permitted to appear and qualify for the M.Phil degree in Microbiology of this University after a course of study of one academic year.

III. Duration of the Course

The course for the degree of M.Phil Microbiology shall consist of one academic year divided in to two semesters. Each Semester consist of 90 working days.

IV. Course of Study: M.Phil Microbiology

V. Examinations

The examination shall be three hours duration to each course at the end of each semester. The candidate failing in any course(s) will be permitted to appear for each failed course(s) in the subsequent examination.

For Subject 517201 examination shall be held at end of the second semester. It will be conducted by the department in a single session for all the students. Guide has to set the question paper confidentially and hand over to the HOD well in advance. The marks obtained by the candidate along with syllabus, question paper and valued answer scripts shall be sent to Controller of Examinations.

At the end of second semester, viva-voce will be conducted on the basis of the Dissertation report submitted by the student. Viva-Voce will be conducted jointly with the following members - H.O.D – Member of the Viva Examination, Research Supervisor and External examiner from outside (Appointed by University selected from the panel of four members).

VI. Question Paper Pattern – Theory

M.Phil Microbiology
Course Code: Course Title
(2011-12 onwards)

Time: 3 Hours

Max. Marks: 75

Answer all questions either (a) or (b)

(5 x 15 = 75 marks)

1. (a) or (b)
2. (a) or (b)
3. (a) or (b)
4. (a) or (b)
5. (a) or (b)

Each Question is represented from the same unit.

VII. Dissertation Work

Dissertation Work	–	150 marks
Viva-Voce	–	50 marks
Total	–	200 marks

(a) Plan of Work:

The student should prepare plan of work under the supervision of guide for the dissertation, get the approval of the guide and should be submitted to the university during the second semester of their study. The duration of the dissertation research shall be a minimum of six months in the second semester.

(b) Project Work outside the Department:

In case the student stays away for work from the Department for more than one month, specific approval of the university should be obtained.

(c) No. of copies/distribution of project work:

The students should prepare three copies of dissertation and submit the same for the evaluation by Examiners. After evaluation one copy is to be retained in the Department library and one copy is to be submitted to the guide and one copy can be held by the student.

(d) Format to be followed:

The format/certificate for dissertation to be submitted by the students is given below:

Format for the preparation of project work:

- (a) Title page
- (b) Bonafide Certificate
- (c) Acknowledgement
- (d) Table of contents

CONTENTS

Chapter No.	TITLE	Page No.
1.	Introduction	
2	Review of Literature	
3.	Materials and Methods	
4.	Results	
5.	Discussion	
6.	Summary	
7.	References	

Format of the Title Page:

TITLE OF THE PROJECT

A Dissertation Submitted to the Alagappa University, Karaikudi -630 003 in Partial
Fulfillment of the Requirement for the Award of Degree of

MASTER OF PHILOSOPHY IN MICROBIOLOGY

By

Students Name

Register Number

Supervisor:

University Emblem
Department of Microbiology
Alagappa University
Karaikudi – 630 003
Month and Year

Format of Declaration of the Candidate:

Name and class of the student

DECLARATION

I hereby declare that the Project entitled _____ submitted to Alagappa University for the award of the degree of Master of Philosophy in Microbiology is my original work and that it has not been previously formed the basis for the award of any degree, diploma/associate ship or any other similar title of any other University or Institution.

Signature of the Student

Format of the Certificate:

CERTIFICATE

This is to certify that the project entitled -----
-----submitted in partial fulfillment of the requirement of the degree of Master of
Philosophy in Microbiology to the Alagappa University, Karaikudi is a record of bonafide
research work carried out by -----under my supervision and guidance and that
no part of the project has been submitted for the award of any degree or diploma.

HOD Endorsement

Place:

Date:

Signature of Guide

VIII. Classification of Successful Candidates

P.G. Programme

MARKS	GRADE POINT	CGPA	LETTER GRADE	Description
96 and above	10	9.51 and above	S+	First Class - Exemplary
91 – 95	9.5	9.01 – 9.50	S	
86 – 90	9.0	8.51 – 9.00	D++	First Class – Distinction
81 – 85	8.5	8.01 – 8.50	D+	
76 – 80	8.0	7.51 – 8.00	D	
71 – 75	7.5	7.01 – 7.50	A++	First Class
66 – 70	7.0	6.51 – 7.00	A+	
61 – 65	6.5	6.01 – 6.50	A	
56 – 60	6.0	5.51 – 6.00	B	Second Class
50 – 55	5.5	5.00 – 5.50	C	
Below 50	-	Below 5.00	F	Fail
			AA	Absent

Passing Minimum: 50%, P: Pass, ESE: End Semester Examination, CIA: Continuous Internal Assessment

$$GPA = \frac{\sum (CDT * GPT)}{\sum CDT}$$

Where: CDT = No. of credits of major allied and elective courses

GPT = Grade Point (obtained by dividing the percentage of marks scored by 10)

Note: Extra Grade Points and Marks are not considered for GPA and Total Marks Calculations.

	Category (CGY)
CGY – Category	1. Theory (Core)
CDT – Credit	2. Practical (Core)
GRD – Grade	3. Inter-disciplinary – Theory
GPT – Grade Point	4. Inter-disciplinary – Practical
GPA – Grade Point Average	5. Elective / Optional
CGPA – Cumulative Grade Point Average	6. Comprehensive Viva / Seminar
	7. Extension Programmes
	8. Project and Viva – Voce

IX. Syllabus

IX. Syllabus - M.Phil Microbiology

Semester – I

Code No	Subject	Credits	Max Marks I	Max Marks E	Total
517101	Core I - Research Methodology	6	25	75	100
517102	Core II - Applied Microbiology	6	25	75	100
517103	Core III - General Skills In Science	6	75	25 (Viva Voce)	100
Total		36	125	175	300

Semester – II

Code No	Subject	Credits	Max Marks I	Max Marks E	Total
517201	Core IV – Topic of Research	6	25	75	100
517999	Core V - Project Work	12	50 (Viva Voce)	150	200
Total		36	150	450	600

M.Phil Microbiology Syllabus
Semester - I

Core I	: Research Methodology	Maximum Marks: 100
Code	: 517101	Internal Marks : 25
Credit	: 6	External Marks : 75

Name of Course Teacher	Dr. T. Kavitha
Mobile: 9965363456	Email : kavib22@yahoo.in

Objective

1. To inculcate knowledge on research methodology
2. To familiarize in techniques used in biology
3. To know the principles of various instruments

Outcome:

1. Knowledge on research methodology
2. Basic knowledge on different instruments
3. Ideas on research review

Unit I:

Definition, basic concepts, objectives, significance and techniques of research, finding research materials – literature survey, compiling records. Scientific documents – research paper, review paper, book reviews, theses, conference and project reports.

Unit II:

pH meter- determination of pH –buffers – principle –operation and description of the apparatus. Dissociation constant of acids – titration of weak acid with a strong base. Colorimetry - ultraviolet - visible spectrophotometry - principles, instrumentation and applications, Fluorescence spectrophotometry, FTIR and XRD- , instrumentation and applications.

Unit : III

Chromatography – paper, column, thin layer, gas, liquid and ion exchange chromatography – Principle - description– applications of various chromatography. Electrophoresis – Principle, method and application of acrylamide and agarose gel electrophoresis. Two dimensional gel electrophoresis (IEF), DGGE, trflp and RAPD.

Unit : IV

Basic principles and sedimentation - types of centrifuge –density gradient and ultra-centrifuge – applications. Basic principles of microscope – compound, electron, phase contrast, fluorescent, microscopy, TEM, SEM, AFM – applications.

Unit : V

Spreadsheet tools : Introduction to spreadsheet applications, features, Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts / graph and other features, Tools – Microsoft Excel or similar. Presentation tools: Introduction, features and functions, Presentation of Power Point Presentation, Customizing presentation, Showing presentation, Tools – Microsoft Power Point or Similar. Writing of Synopsis and dissertation and thesis.

References:

1. Bajpai, S. 2014. Revised Edition, Biological Instrumentation and Methodology: (Tools and Techniques of Biology), Chand & Company Ltd., New Delhi.
2. Gurumani, N. 2016. First Edition, Research Methodology for Biological Sciences, MJP Publishers, A unit of Tamilnadu Book House, Chennai.
3. Lederberg, J. 2000. Second Edition, Encyclopedia of Microbiology, Volume 4, Academic Press.
4. Palanivelu, P. 2009. Fourth Edition, Analytical biochemistry and separation techniques – A Laboratory Manual, Twenty first Century Publications, Madurai, Tamilnadu.
5. Pelczar, M.J., Schan, E.C. and Kreig, N.R. 2010. Microbiology – An application based approach, Fifth Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
6. Plummer, D.T. 2003. Third Edition, An Introduction of practical biochemistry Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Prave, P., Faust, U., Sittig, W. and Sakatsch, D.A. 2004. First Edition, Fundamentals of Biotechnology. Panima Publishing Corporation, India.
8. Sawhney, S.K. and Singh, R., 2005. Second Edition, Introductory Practical Biochemistry, Alpha Science International Ltd.
9. Webster, J.G. 2004. Student Edition, Bioinstrumentation, John Wiley and Sons, Ltd., New Delhi.
10. Wilson, K. and Walker, J. 2010. Seventh Edition, Principles and Techniques of Practical Biochemistry, Cambridge University Press.

Semester - I

Core II : Applied Microbiology
Code : 517102
Credit : 6

Maximum Marks: 100
Internal Marks : 25
External Marks : 75

Name of Course Teacher	Dr. T. Sathiamoorthi
Mobile: 9790031626	Email : tsathiamoorthi@gmail.com

Objective

1. To acquire knowledge on food product analysis
2. To enable them to know about preservation of pharmaceutical products
3. Learn to assess the microbial quality of marine foods

Outcome

1. Acquire Knowledge on food product analysis
2. Impart knowledge of preservation technology.
3. Knowledge on quality analysis of marine food products

Unit I

Mineral water industry: Stages of mineral water production. Analysis of water quality – pH, salinity, alkalinity, dissolved oxygen, carbonates, nitrate, silicate, phosphate, COD and BOD. Determination of microbial load in water : Faecal indicator organisms - coliform bacteria, faecal enterococci, *Clostridium perfringens*, yeast, mould and sulphide reducing anaerobes, viruses and bacteriophages, fungi and yeasts, protozoa and helminths. Methods of mineral water quality assessment – MPN test, membrane filtration technique.

Unit II

Preservation of pharmaceutical Products: Chemical preservatives – raw materials – equipment – role of preservatives. Finished product tests – microbial enumeration test, tests for specified microorganisms. Sterility testing – antimicrobial effectiveness testing. Sterility assurance – biological indicators, sterilization validation process. Microbial risk assessment through HACCP plan.

Unit III

Endotoxin test methods - gel clot assay, turbidometric assay and chromogenic methods. Biological assays - vitamin assay, antibiotic assay and mycoplasma testing. Endotoxin activity – risk assessment in parenterals manufacture – pyrogen test – depyrogenation methods.

Unit IV

Rapid methods for detection of microorganisms in food – conventional and automated. Application of light pulse technology – principles of light pulse generation, mode of action, equipments, application of light pulses, effect of light pulses on foods and microorganisms, advantage and limitation of light pulse treatment. Quality control in fruits and vegetable processing. Risk assessment in food industry – physical, chemical and biological hazards.

Unit V

Assessment of microbial quality of marine foods: Conventional and recent development methods – flow cytometry, ATP estimation, radiometric, reflective colorimetry, LAL test, immunoassay, DNA based and microarray methods. Application of additives in food. Food safety and standard act for adulteration. Significance of barcode and its uses in food industry.

References:

1. Ashutosh, K. 2008. Pharmaceutical Microbiology, New Age International Publishers, New Delhi.
2. Carlberg, D.M. 2004. Second Edition, Cleanroom Microbiology for the Non-Microbiologist, CRC Press.
3. Clontz, L. 2008. Second Edition, Microbial Limit and Bioburden Tests: Validation Approaches and Global Requirements, CRC Press.
4. Lederberg, J. 2000. Second Edition, Encyclopedia of Microbiology, Volume 4, Academic Press.
5. Prince, R. 2008. Second Edition, Revised and Expanded, Microbiology in Pharmaceutical Manufacturing, Volume 1, Parenteral Drug Association and Davis Healthcare International Publishing.
6. Prince, R. 2008. Second Edition, Revised and Expanded, Microbiology in Pharmaceutical Manufacturing, Volume 2, Parenteral Drug Association and Davis Healthcare International Publishing.
7. Trivedy, R.K., Goel, P.K. and Trishal, C.L. 1987. Practical methods in Ecology and Environmental science, Environmental publishers.
8. USP Pharmacists' Pharmacopeia, Second Edition, 2009. The United States Pharmacopeial Convention.
9. Williams, K.L. 2004. Microbial Contamination Control in Parenteral Manufacturing, Marcel Dekker, Inc., New York.
10. Williams, K.L. 2007. Third Edition, Endotoxins: Pyrogens, LAL Testing and Depyrogenation, CRC Press.

Semester I

Core III : General Skills in Science
Code : 517103
Credit : 6

Maximum Marks: 100
Internal Marks : 75
Viva Marks : 25

Name of Course Teacher	Dr. V. Balasubramanian
Mobile: 9994304752	Email : microbaalu8211@gmail.com

Objective

1. To learn about computers
2. To know the applications of computer
3. Learn about the Communication skills and Pedagogical skill

Outcome

1. Better understanding importance of computer and its application
2. Get information about Pedagogical skills
3. Enable them to have good communication in English

Unit I

Introduction to Computers: Computer Hardware: Input devices and media-magnetic device and media-output devices and media-storage device and media-computer architecture – system software: types, operating system and translators – Application software: types of language – application packages – integrated software – Introduction to operating system – Working with windows and office programs – Internet, Website and Email

Unit II

Computer operating skills : Starting a program and opening a document – saving and naming the document – create file and folders – deleting and un-deleting a document – closing a document – renaming and moving a document – finding a document – MS office: Word, Excel, Access, Power point, outlook and integrated office applications – C programming – Principles, classes and structure of C++ programming

Unit III

Communication skills in English : Understanding communication – greeting and introducing – making requests – asking for and giving permission – offering help – giving instruction and directions art of small talk participating in conversation – making a short formal speech – Describing the people, place, events and things. Telephone skill: understanding, handling calls, leaving message and making request. Written communication: report writing, note making – career skills: curriculum vita and cover letter – Facing an interview and presentation skills – academic listening

Unit IV

Pedagogical skill for science teachers: Science Teacher: Qualification, teacher competencies and professional growth. Theory and models of curriculum development: Concept and Technical scientific models of curriculum development – planning a science library – Handling of practical classes. Educational technology and classroom pedagogy: educational Technology – Concept, Emerging technologies – New technologies on methodology of teaching, learning experiences and curriculum development. Micro-teaching: Meaning, teaching, skill of stimulus variation, questioning, explanation, reacting, linking and benefits

Unit V

Practical training: Preparation of charts and models for handling classes of science teacher – Creating management documents e.g. Curriculum Plan, Time Table scheduling, Evaluation – Strategies etc – Learning to write and draw on the blackboard – Preparation of over head projector presentations – Preparation of power point / LCD presentations – Preparation of micro-teaching skills – Preparation of teaching materials – seminar classes for PG students – Preparation of album

References:

1. W. Joseph, Habraken, Microsoft office 2003, All in one, Que publishing, 2004
2. Curtis Frye, Microsoft office Excel 2003 step by step, Microsoft press, 2004
3. Greg Harvey, Microsoft office Excel 2007 for dummies, For Dummies, 2006
4. Guy Hart-D Eavis, How to do everything with Microsoft office word 2007, Mac Graw-Hill professional, 2007
5. Jim Boyce, Absolute beginner's guide to Microsoft office 2003, Que publishing, 2003
6. Benny Raphael, F.C.Smith, Fundamentals of computer-aided engineering, John wiley & sons, 2003
7. Dietel, "An introduction to operating system", Addison Wesley
8. Ravi Sethi, "Principles of Programming Languages", Addison Wesley
9. E.Balagurusamy, C++ programming, Tata Mc Graw Hill, New Delhi, 1995
10. B.S.Gottfried, theory and programming with C, Mc Graw Hill publishers, New Yark, 1990
11. L. Acklen et al, Microsoft office 97 professional Essentials, Prentice-Hall Indian, 1998
12. Shelley O'Hara, Discover Office 97, Comdex computer publishing, 1997
13. Harry chambers, Communication skills for scientific and technical professional, Perseus, 2001
14. Alan Barker, Improve your communication skills Kogan page, 2000
15. Libby kumin Early communication skills for children with down syndrome, wood fine House, 2003
16. Dutt et al., A course in communication skills, ebek public., Bangalore, 2007
17. J.G.Ferguson Communication skills, Ferguson, 2004
18. Elizabeth Arnold, Kathleen Underman Boggs, Interpersonal Relationships Professional Communication Skills for Nurses Saunders, 2002

19. Hope J.Hartman, Metacognition in learning and instruction: theory, research and practice, Springer, 2001
20. National Science Education Standards: observe, interact, change, learn, manual prepared by National research council, published by National Academics Press, 1996
21. Louis Rosenblatt, Rethinking the Way We Teach Science: The Interplay of Content, Pedagogy and the Nature of Science, Published by Taylor & Francis, 2010
22. Vijaya Kohli, How to teach science: a treatise on methodology of teaching physics, chemistry and biology, Published by Vivek Publishers, 1992
23. Raja Dan, Durga, A Study of the International Influences in Functional Content on curriculum Programme, Kash. U., 1982
24. Taba, Hilda, Curriculum Development, Theory and Practice, Harcouort Brace and World Inc., 1962

Semester II
517201 – TOPIC OF RESEARCH
(It is a guide's paper. Sub title and syllabus have to be given by the guide as per the guidelines given below)

Unit I – FUNDAMENTAL CONCEPTS

Identification of research problem. Fundamental information on the research topic selected. Significance of the research topic chosen.

(A minimum of 20 pages of materials to be prepared)

Unit II – LITERATURE SURVEY I

Literature survey on the research problem. Use of text books, reference materials, journals, internet and specialized softwares for literature collection. The period of literature search restricted upto the year 2009.

(A minimum of 6 research articles may be given)

Unit III – LITERATURE SURVEY II

In-depth study of published papers, seminar / conference proceedings on the identified research problem. The period of literature search extended from the year 2010 to the current date. National and International status on the research topic.

(A minimum of 6 research articles may be given)

Unit IV – PREPARATORY METHODS

Procurement or synthesis of chemicals needed for the research problem. Database, storage and handling of specified chemicals. Preparatory methods to execute the experimental works. Details on the principle, instrumentation and working of instruments identified for the problem.

(A minimum of 20 pages of materials to be prepared)

Unit V – CHARACTERIZATION TECHNIQUES

Types of instrumental techniques used for the identified research problem. Characterization of research materials, interpretation of results and preparation of manuscript. Writing of Research report / thesis. Presentation of research output in scientific seminar / conference.

(A minimum of 30 pages of materials to be prepared)

Semester II

Core V : Project Work

Code : 517999

Credit : 12

Maximum Marks: 200

Internal Marks : 50(Viva)

External Marks : 150

Name of Course Teacher	Research supervisor of the M.Phil candidate
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