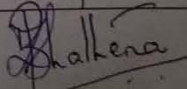# UNIVERSITY OF MUMBAI

Syllabus

for the

Program : Ph.D. Course Work

Microbiology

(Effect from the academic year 2020-21)

UNIVERSITY OF MUMBAI

Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of the Course	Phd course work (Microbiology)
2	Eligibility for Admission	M.Sc.
3	Passing Marks	40
4	Ordinances / Regulations (if any)	Nil
5	No. of Years / Semesters	nil
6	Level	P.G. (Strike out which is not applicable)
7	Pattern	Semester (Strike out which is not applicable)
8	Status	Revised (Strike out which is not applicable)
9	To be implemented from Academic Year	From Academic Year 2021-22

Dr Zarine P. Bhathena
Chairperson BOS Microbiology

Dean faculty of Science & Tech.

Course work for PhD degree in Microbiology

Ph.D Course work In Microbiology

(for students admitted after 15th June 2021onwards)

Course code: DSMD

VCD No: exam/thesis/univ/VCD/947 of 2018 dated 15 June 2018

Paper Course	Title	Max Credits
Paper 1 DSMB 101	Research Methodology and Publication Ethics	6
Paper 2 DSMB 102	Active participation for academic development	6

Paper Course	Title and Max Credits	Particulars	Period of completion	Topics
Paper 1 DSMB 101	Research Methodology &Publication ethics (6 credits)	• Lectures to be conducted • Test /assignments will be done by respective resources persons • The grades will be finalised after a combined assessment by the RAC and the Head of deptand the final grades will be communicated to the University	to be completed in a formal way during the initial 1st. or 2nd.Semester at Recognised Research centres or University depts. or Premier Institutions like IIT, BARC HBNI ICSSR, IIM etc	• Per detailed syllabi submitted below OR • Relevant Courses can be selected by the respective RAC from SWAYAM, MOOC , NPTEL Coursera and student can join them online • Evaluation certificate from the respective agency will be mandatory for the transfer of credits when such online courses are selected
Paper 2 DSMB 102	Active participation & Academic Development (6 credits)	1. Poster/oral paper presentations in ISBN Conferences of National and International repute 1 credit /presentation (Max 2 credits) + Attending training for advanced techniques in reputed institutes / laboratories for 1 week period -2 credits	Before the submission of thesis preferably In the first two years of the degree	

		(max 2 credits) + Publication of two paper in UGC recognised/ peer reviewed /ISSN recognised journal 1 credits /paper (Max 2 credits)	To be published before the submission of the synopsis	

Detailed Syllabi for DSMB 101

Unit	Topics	Lectures	credit
Unit-I	**Basics of research methodology**	15L	01
a	**Objectives of research**	03	
	- Short term goals and long term goals		
	- Research design-		
	- Repeatability, reproducibility and reliability		
	- Experimental protocols		
	How to formulate query and perform literature search and use filters	01	
	Guidelines for writing scientific proposal, scientific reports, scientific paper, identification of good journal, Guidelines for writing good thesis	03	
b	**Research ethics**	04	
	Ethics of animal research -CPCSEA, institutional ethics committee, OECD guidelines		
	Basic principles of human research ethics- International regulation		
c	**Biostatistics in Research**	04	
	Measures of central tendency -mean,median, mode, geometric mean		
	Measures of dispersion- Range, Q.D., M.D., variance, standard deviation		
	Correlation and Regression analysis: Correlations and regressions-: Relation between two variables, scatter diagram, definition of correlations& their equations, interpretation of regression coefficients, principles of least squares, Two regression lines, curve fitting Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation		
Unit-2	**Theory of probability**	15L	**02**

	Parametric tests		02	
	• Large sample Tests			
	i. Testing significance of single population mean			
	ii. Testing significance of single population proportion			
	iii. Testing significance of two population mean			
	iv. Testing significance of two population proportion		03	
	• Small sample Tests			
	i. Testing significance of single population mean			
	ii. Testing difference between two independent normal population mean			
	iii. Testing difference between two correlated normal population mean			
	iv. Testing significance of correlation coefficient		03	
	• $\chi 2$ test			
	i. Testing single population variance			
	ii. Testing Goodness of fit			
	iii. Testing association between two attributes			
	Clear explanation of assumptions is necessary		02	
	• F-test- Testing equality of variance			
	ANOVA- one-way classification, two way classification		05	
	Introduction to non -parametric tests			
	• The Wilcoxon signed-Rank test for location			
	i. Testing single population mean			
	ii. Testing difference between correlated(match pair) population means			
	iii. Testing difference between two independent population means			
	• The Mann-Whitney Test(Mann-Whitney-Wilcoxon test -for equality of medians)			
	• The Kolmogorov-Smirnov Goodness- of -Fit Test			
	• The Kruskal-Wallies One-Way Analysis of Variance by Ranks			
	• The Friedman Two-Way Analysis of Variance by Ranks			
Unit 3	**Research & publication Ethics**		**15L**	**02**
	• Ethics : definition , moral philosophy , nature of moral judgements & reactions , ethics wrt to science & research		02	
	• Intellectual honesty and research integrity		02	
	• Scientific misconducts : falsification, fabrication & Plagiarism		02	
	• Redundant Publication : duplicate and overlapping publication, salami slicing		02	
	• Publication ethics		07	
	- Definition			
	- Best practices/Standards /guidelines(COPE, WAME etc)			
	- Conflict of interest : Violation of publication ethics , authorship			
	- Identification of publication misconduct , complaint's and appeals examples and frauds from india&abroad			
	- Predatory publishers and journals			
Unit 4	**Open access publishing**		**15L**	**01**
A	**Open access publication**		**07**	
	- SHERPA/ROMEO online resources to check publishers copyright and self archiving policies			
	- Software tools to identify predatory publications			

		developed by SPPU		
	-	Journal finder/journal suggestions tools viz JANE , ELSEVIER journal finder , springer journal suggesteretc		
B	**Data bases and research metrics**		**08**	
	-	Indexing databases		
	-	Citation databases : web of Science , Scopus etc		
	-	Impact factor of journal as per journal citation report , SNIP, SJR, IIP, cite Score		
	-	Metrics : - h- index , g index , i10 index , altmetrics		

References

1) Research Methodology in medical and Biological sciences -edited by PetterLaake, HaakonBenestad and Bjorn Reino Olsen, Academic Press
2) Research Methodology : A guide for Researchers in Agricultural Science, Social Science and other related fields. PradipkumarSahu. Springer 2006
3) Ranjit Kumar, 2005 Research Methodology- A step-by-step Guide for beginners, 3rd edition, Sage publications
4) Fundamentals of Research methodology and statistics- Yogesh Kumar Singh, New Age International Publishers
5) Biostatistics: A foundation for analysis in health sciences. Daniel WW, Cross CL. 10thEdn, Wiley.2013
6) Fundamentals of Biostatistics. Rosner B. 7thEdn. Duxbury Thomson 2011
7) Introductory Applied Biostatistics D'Agostino RB., Sullivan LM., Beiser AS., Thomson Brooks/Cole 2006
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