

Date-10/08/2021



To,

The Principal,

Nutan Mahavidyalaya, Selu

Dist. Parbhani.


Subject: Organization of Bridge Course in microbiology

Respected Sir,

As per the subject highlighted above I, on the behalf of Department of Microbiology; hereby, feels glad to convey you that we are planning to organize Bridge Course in microbiology for all the interested UG students of our institution. The course will run from 15/08/2021 to 20/02/2022.

I request you to permit us for the successful organization of this course.


I/C Principal
Nutan Mahavidyalaya
Sailu, Dist. Parbhani


PRINCIPAL
Nutan Mahavidyalaya
SELU, Dist. Parbhani

Yours Truly


Mr. Amit Kulkarni

NUTAN MAHAVIDYALAYA SAILU, DIST. PARBHANI

Certificate Course in Microbiology

Academic Year-2021-2022

NOTICE

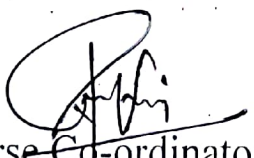


All students of B.Sc. First Year, Second Year and Third Year life science are hereby informed that an certificate course on applied Microbiology for B.Sc. FY, SY and TY is scheduled during 20/ 07/2021 to 20/07/2022 with the objective to generate local skill based employment opportunities in microbiology.

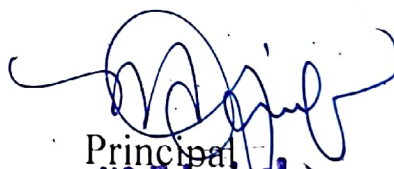
The course mentioned above is scheduled as follows:

Date	Time	Course	Faculty	Room No
15/08/2021 to 20/02/2022.	4.00 to 5.00 PM	Bridge course in Microbiology	Mr.Amit D Kulkarni Mrs.Patait A.P	Micro lab

Students interested in attending the course should register their name to Mr. Amit D Kulkarni before 15/08/2021


Course Co-ordinator
Mr.Amit Kulkarni



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Principal
I/C Principal
Nutan Mahavidyalaya
Sailu, Dist. Parbhani

Program: Bridge Course in Microbiological Studies

**Syllabus of Bridge Course in Microbiological Studies for
F.Y.B.Sc. Microbiology**


w.e.f. Academic Year 2021-22


**PRINCIPAL
Nutan Mahavidyalaya
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Bridge Course in Microbiological Studies

Syllabus for F.Y.B.Sc Microbiology

Sr.No.	Heading	Particulars
1	Title of Course	Bridge Course In Microbiological Studies
2	Eligibility for Admission	12 th Science of all recognised Board and students enrolled for F.Y.B.Sc.
3	Passing marks	40%
4	Ordinances/Regulations(if any)	-
5	Duration	10hrs
6	Level	U.G.
7	Pattern	-
8	Status	New
9	To be implemented from Academic year	2021-2022


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Preamble of the Syllabus:

This course is designed for First Year B.Sc. Microbiology learners, to be completed in ten hours. On the successful completion, learners will be awarded with certificate of course. The topics prescribed in the syllabus mainly emphasis on general introduction to the microbial World covering basic concepts and types of microorganisms. In the later section of syllabus, three important branches of microbiology viz. Medical, Industrial and Agricultural Microbiology will be taught to create awareness about scope of microbiology. This course will be helpful to make student curious by providing and recommending them different reference books in Microbiology. This course will fill the gap of subject knowledge between higher secondary and undergraduate studies. This course may be helpful to learners enrolled for FY BSc to decide their career goals.

Objectives of the Course:

- To make the learners aware about diversity of microorganisms
- To make the learners aware about scope of Microbiology
- To make the learners familiar with reference books in Microbiology
- To fill the gap of subject knowledge between higher secondary and under graduate studies.

Course Outcome: By the end of the course:

Learners will develop interest in the subject of Microbiology and it will also be useful to fill the gap of subject knowledge between higher secondary and graduate studies.

Bridge Course in Microbiological Studies:

For this course there shall be only one paper for 10 lectures comprising of two modules.

Module-I: Introduction to Microbiology

Module-II: Scope of Microbiology

Scheme of Examination:

Examination: 20 Marks will be as follows:-

Question I	Objectives Questions with options: MCQs, Fill in the Blanks, Match the pairs, Definitions/Concepts. (Any 20 out of 30)	20 Marks
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**Bridge course in microbiological
studies: For F.Y.B.Sc
Microbiology Detailed Syllabus
To be implemented from the Academic year 2021-2022**

Bridge Course in Microbial Studies	[10]
1 Introduction to Microbiology	
i. Microbial Diversity: Archaeobacteria, Eubacteria and Extremophiles	[03] [01]
ii. Reference books for Microbiology	
2 Scope of Microbiology	
i. Medical Microbiology	[02]
ii. Industrial Microbiology	[02]
iii. Agricultural Microbiology	[02]

Books and References:

1. Prescott L.M., Harley J.P. and Klein D.A., Microbiology, 5th Edition, October-2002, The McGraw-Hill Companies, 2002.
2. Stanier R.Y., General Microbiology, 5th Edition, 1987, Macmillan Press Ltd.
3. Pelczar, Elementary Microbiology, McGraw-Hill Companies

Program:Certificate Course in Applied Microbiology'

Revised Syllabus of Certificate Course in Applied Microbiology

for F.Y.B.Sc. Microbiology

w.e.f. Academic Year 2021-22



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**Syllabus for Certificate Course in Applied Microbiology
for F.Y.B.Sc Microbiology**

Sr.No.	Heading	Particulars
1	Title of Course	Certificate Course in Applied Microbiology
2	Eligibility for Admission	Students enrolled for F.Y.B.Sc.
3	Passing marks	40%
4	Ordinances/Regulations(if any)	-
5	Duration	60 hrs
6	Level	U.G.
7	Pattern	-
8	Status	New
9	To be implemented from Academic year	2022-23

Preamble of the Syllabus:

Microbiology is a combination of biological sciences, and engineering and technology, where properties of biological molecules are harnessed for the benefit of human kind. This course is designed for First Year B.Sc. Microbiology learners, to be completed in 60 hours (one academic year). On the successful completion, learners will be awarded with certificate. By integrating the knowledge and information presented in the course taught by faculty into a Certificate program in Applied Biotechnology will prepare learners to meet and exceed the expectation of growing industrial needs. This certificate program offers an opportunity to undergraduate student's for the interdisciplinary training. The units of the syllabus are well defined, taking into consideration the level and capacity of the students. The syllabus for this course is divided into two units, practicals and case study. The topics prescribed in the syllabus mainly emphasis on general introduction to the nature and scope of Biotechnology covering basic concepts and importance of biotechnology, tool so genetic engineer and

Cloning techniques. In the later section of syllabus, Biological Fundamentals will be taught to create interest among students about biotechnology. This course provides learners the opportunity to study science on the edge of innovation; technology and even science itself. This course may be helpful to learners enrolled for FYBSc to decide their career goals.

The new syllabus is based on a basic and applied approach with vigor and depth at the same time precaution is taken to make the syllabus comparable to the syllabi of other universities and the needs of industries and research field.

The syllabus is prepared after discussion at length with numbers of the faculty members of the subjects and experts from industries and reserch fields.

Objectives of the Course:

- To promote understanding of basic cocepts in Biotechnology.
- To introduce the learners to various emerging areas of Biotechnology.
- To develops skills required in various industries ,research labs,and in the field of human health

Course Outcome:By the endof the course:

Learners will develop interest in the subject of Biotechnology and its application in various fields. Learners of Microbiology will develop the understanding of applied aspects of Biotechnology with respect to need of industry.

Certificate Course in Applied Microbiology :

For this course there shall be two papers comprising 15 hrs for lectures and 15 hrs for practicals in each paper..

PaperI: Introduction to Biotechnology

- Nature and Scope of Biotechnology
- Tool for genetic engineering

PaperII: Basic Skills

- Biological Fundamentals

Course content:

Course Name	Contact Hours				Credits			
	Paper-I	Paper-II	Practical	Project/Industrial Visit	Theory	Practical	Project/I.V.	Total Credits
Certificate course in Applied Microbiology	15	15	15	15	02	01	01	04
Total Duration:60hrs(One academic Year).Theory:30hrs. Practical:15Hrs; Project/ I.V./Case study:15Hrs								

Scheme of Examination:

- Theory Examination of 50 Marks will be as follows -:

Question1	FromUnit 1,2	20 marks
Question2	FromUnit 1	15 marks
Question3	FromUnit2	15 marks
	Total	50 marks

- There will be separate practical Examination of 50 Marks

'Certificate Course in Applied Microbiology'
For F.Y.B.Sc Microbiology
Detailed Syllabus
To be implemented from the Academic year 2021-22

Theory Unit I – Introduction to Biotechnology (15 Lectures)		
Nature and Scope of Biotechnology		[7]
a. Definitions of Biotechnology and objectives		
· Extrapolation of traditional technology in the light of new all round developments in the field of sciences		[4]
Branches of Biotechnology		
b. Historical perspective – from ancient alchemy to industrial microbiology to biotechnology with suitable illustrations.		
c. Current Status of the field		
· Type and range of products produced		[3]
Status of the biotechnology in India		
d. Biogas production & vermin composting		
Tools of genetic engineering		[3]
Restriction enzymes, DNA ligases, Vectors (Plasmid DNA vectors), Cloning techniques		
Instrumentation in Biotechnology		[05]
Analytical instruments – principle, construction, working and applications of following techniques.		
Spectrophotometric techniques – UV, Visible		
Chromatographic techniques – methods of Adsorption, partition, ion exchange, gel filtration and affinity		
Theory Unit II – Basic Skills (15 Lectures)		
Biological Fundamentals		[15]
Potential of biological systems, their handling and manipulation		
a. Cellular basis of biological systems – cell theory, cell cycle, bacterial cells		[2]
b. Nature of biological in		
formation Central Dogma		[4]
Nucleic acids and proteins as information molecules		

	<p>Introduction to transcription</p>	[2]
	<p>Introduction to translation</p>	
	<p>c. Implementation of genetic information</p>	
	<p>Metabolic processes – anabolic and catabolic pathways.</p>	[3]
	<p>d. Principles and steps involved in the purification of nucleic acids and proteins demonstration by using ICT (Virtual Lab)</p>	
	<p>e. Culturing of living systems–techniques and method so cultivation of microorganisms, plants and animal cells /tissues using pure culture techniques</p>	[4]

Books and References:

1. Glick B.R. and Pasternak J.J., "Molecular Biotechnology, Principles and applications of recombinant DNA". 3rd edition, (2003), ASM Press/CBS Publishers, New Delhi.
2. Purohit S.S., "Biotechnology, Fundamentals and Applications, 3rd edition (2001), Agrobios (India), Jodhpur.
3. Williams and Wilson, Methods of Instrumental analysis
4. Lehninger-Principles of Biochemistry-David Nelson, Michael Cox. 4th edition W.H. Freeman & Company.

Program: Bridge Course in Microbial Techniques

Syllabus of Bridge Course in Microbial Techniques for

T.Y.B.Sc. Microbiology

w.e.f. Academic Year 2021-22


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**Bridge Course in Microbial Techniques Syllabus
for T.Y.B.Sc Microbiology**

Sr.No.	Heading	Particulars
1	Title of Course	Bridge Course In Microbial Techniques
2	Eligibility for Admission	Students enrolled for T.Y.B.Sc.
3	Passing marks	40%
4	Ordinances/Regulations(if any)	-
5	Duration	10hrs
6	Level	U.G.
7	Pattern	-
8	Status	New
9	To be implemented from Academic year	2021-2022

Preamble of the Syllabus:

This course is designed for T.Y.B.Sc. Microbiology learners, to be completed in ten hours. On the successful completion, learners will be awarded with certificate of course. The topics prescribed in the syllabus mainly emphasis on basic aspects of microbiological practicals such as preparation of solutions, representation of data and reporting of observations, results and conclusion. In the later section of syllabus, some important techniques in Microbial Genetics, Medical Microbiology and Immunology, Biochemistry and Bioprocess technology will be taught to augment the theoretical aspects related to those different techniques. This course will be helpful to make student skillful by providing the different aspects of various bioassays. From this course, learners will enhance their technical as well as practical writing skills. This course will encourage the learners to get enrolled for post graduation and post graduate diploma and or other courses in Microbial techniques, Instrumentation, Bioanalytical Sciences etc.

Objectives of the Course:

- To enhance the learner's practical skills and practical data compilation and its Representation.
- To enhance the learner's skills about important techniques in Microbiology.

Course Outcome :By the end of the course:

- Learners will get more knowledge of Microbial techniques and it will also be useful to work smoothly on various practicals in the Microbiology. It will promote the learners towards bioanalytical techniques as well as inculcate practical skills into them.

Bridge Course in Microbial Techniques:

For this course there shall be only one paper for 10 lectures comprising of five modules of two lectures each.

- 1 Module-I: Introduction to Basic Techniques
- 2 Module-II: Techniques in Microbial Genetics
- 3 Module-III: Techniques in Immunology and Medical Microbiology
- 4 Module-IV: Techniques in Microbial Biochemistry
- 5 Module-V: Techniques in Bioprocess Technology

Scheme of Examination:

Examination: 20 Marks will be as follows :-

Question I	Objectives Questions with options: MCQs, Fill in the Blanks, Match the pairs, Definitions/Concepts. (Any 20 out of 30)	20 Marks
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**Bridge course in Microbial Techniques:
For T.Y.B.Sc Microbiology
Detailed Syllabus
To be implemented from the Academic year 2022-2023**

Bridge Course in Microbial Techniques	[10]
6 Introduction to Basic Techniques i. Preparation of Normal, Molar Solutions ii. Data Representation: Writing observations and Graphs Plotting iii. Interpretation of results and conclusion	[02]
7 Techniques in Microbial Genetics i. Transformation and Conjugation ii. Phage Assay	[02]
8 Techniques in Immunology and Medical Microbiology i. Coomb's Test and Reverse Typing ii. ELISA iii. WIDAL & VDRL	[02]
9 Techniques in Microbial Biochemistry i. Estimation of Phenol, Proteins, Uric Acid ii. Estimation of Penicillin iii. β -Galactosidase assay	[02]
10 Techniques in Bioprocess Technology i. Bioassay of Vitamin B ₁₂ & Penicillin ii. Production of invertase by immobilized yeast cells	[02]

Books and References:

1. Prescott L.M., Harley J.P. and Klein D.A., Microbiology, 5th Edition, October-2002, The McGraw-Hill Companies, 2002.
2. Stanier R.Y., General Microbiology, 5th Edition, 1987, Macmillan Press Ltd.
3. Pelczar, Elementary Microbiology, McGraw-Hill Companies



**NUTAN MAHAVIDYALAYA, SAILU-431503
DIST. PARBHANI**

Affiliated to Swami Ramanand Teerth Marathiwada University, Nanded.
NAAC Re-accredited B+ Grade

Dr. Uttam Rathod

Principal

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Program: Certificate Course in Applied Biotechnology'

Syllabus of Certificate Course in Applied Microbiology

For S.Y.B.Sc. Microbiology

w.e.f. Academic Year 2021-2022

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SELU, Dist. Parbhani**

**Syllabus for Diploma Course in Applied Biotechnology for
S.Y.B.Sc Microbiology**

Sr.No.	Heading	Particulars
1	Title of Course	Certificate Course in Applied Microbiology
2	Eligibility for Admission	Students enrolled for S.Y.B.Sc.
3	Passing marks	40%
4	Ordinances/Regulations(if any)	-
5	Duration	60 hrs
6	Level	U.G.
7	Pattern	-
8	Status	New
9	To be implemented from Academic year	2021-2022

Preamble of the Syllabus:

Certification course in Applied Microbiology is a certificate level course which provides an inquiry-focus curriculum for bio-enthusiasts learners who love to learn through self discovery. Diploma is designed to equip learner's with the modern technological skills especially in the microbiological techniques and sub-professional levels. An area of the study includes the application of microorganisms such as virus, bacteria and fungi in relation to their importance to mankind.

This course is designed for Second Year B.Sc. Microbiology learners who successfully completed certificate course in Applied Biotechnology for First year learners, to be completed in 60 hours (one academic year). On the successful completion, learners will be awarded with a certificate. The syllabus for this course divided into two units, practicals and case study. The topics prescribed in the syllabus mainly emphasize on Bioprocess

Technology – Microbial Biotechnology, Introduction to GMP,QA,QC,GLP,CGMP,CGLP which gives information about scope of fermentation technology and importance of quality in fermentation industries. In the later section of syllabus, fermentation process will be taught to create interest among students about the fermentation processes and different parameters required for fermentation. This course will be helpful to make student curious by providing and recommending them different reference books in Microbiology. This course provides an intensive and in depth learning to the learners in the field of biotechnology. The course majorly focusses on the application and allows learner to gain practical knowledge rather than mere theory.

The new and updated syllabus is based on a basic and applied approach with vigor and depth, at the same time precaution is taken to make the syllabus comparable to the syllabi of other universities and the needs of industries and research field.

The syllabus is prepared after discussion at length with numbers of the faculty members of the subjects and experts from industries and research fields.

Objectives of the Course:

- To give Microbiology graduates a through training in a wide range of practical, analytical techniques and ancillary skills necessary for careers in manufacturing and service industries, especially the healthcare, food, biomedical and pharmaceutical sectors.
- To provide training through short, intensive courses in relevant vocational skills such as laboratory, effective communicating and statistics.

Course Out come: By the end of the course students will be able to:

- Develop an understanding of the various aspects of Bioprocess Technology
- Develop skills associated with screening of Industrially Important Strains.
- Understand principles underlying designs of Fermentors and Fermentation Process.

Certification Course in Applied Biotechnology:

Modules:

- Bioprocess Technology –Microbial Biotechnology
- Fermentation Process

Course content:

Course Name	Contact Hours				Credits			
	Paper-I	Paper-II	Practical	Project/Industrial Visit	Theory	Practical	Project/I.V.	Total Credits
Certificate course in Applied Microbiology	15	15	15	15	02	01	01	04
Total Duration:60hrs (One academic Year),Theory: 30hrs.Practical: 15Hrs;Project/I.V./Case study:15Hrs								

Scheme of Examination:

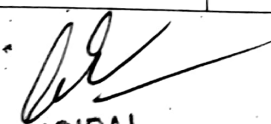
- Theory Examination of 50 Marks will be as follows -:

Question1	From Unit 1,2	20 marks
Question2	From Unit 1	15 marks
Question3	From Unit 2	15 marks
	Total	50 marks

- There will be separate practical Examination of 50 Marks

'Certification Course in Applied Microbiology'
For S.Y.B.Sc Microbiology
Detailed Syllabus
To be implemented from the Academic year 2022-23

Unit I – Bioprocess Technology – Microbial Biotechnology	
i. Scope of fermentation technology/ Industrial Microbiology – types of products produced and their applications.	02
ii. Role of molecular biological and bioinformatics techniques in product development 1) Review of basic molecular biological techniques and recombinant DNA techniques used in development and improvement of stains, recombinant microorganisms. Comparison of these techniques with traditional screening techniques. 2) Polymerase chain reaction, RT-PCR	05
iv. Large scale production of proteins using recombinant microorganisms, Antimicrobial drugs and agents, Enzymes, Biocontrol agents (Microbial insecticides), Fine chemical Products, Organic transformations with enzymes and whole cells, Vaccines.	04
v. Introduction to GMP, QA, QC, GLP, CGMP, CGLP	04
Unit-II Fermentation Process	
1. Inoculums development and maintenance [1]	[15]
2. Media Formulation and sterilization [1]	
3. Fermentation proper a. Bioreactors and support Equipments – Types of reactors, typical construction of a fermentation vessel, various components and their role. [3] b. Process parameters – methods of their monitoring, control and importance – aeration, agitation, mixing, pH, foam and temperature control, monitoring metabolites – substrates, intermediates and products, power consumption. [3]	
4. Product recovery – down stream processing [3] a. General principles involved b. Types of equipments used – centrifuges, filters, dryers, concentrators, Solvent extractors, chromatographic systems c. Packaging and storage	


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5. Waste treatment[2]	
a. Nature of industrial waste	
b. Obligation of industry to that waste	
c. General principles and methods used	
6. Intellectual property rights & Bioethics with special reference to Modern Biotechnology [2]	

Practicals

Overview of Molecular biological techniques as applied to industrial train development

i.	DNA extraction – Genomic – (mini and midi) (02)	
ii.	DNA polymerisation by Polymerase Chain Reaction (05)	
iii.	Transformation to demonstrate acquisition of new characters (04)	
iii.	Restriction digestion, electrophoretic analysis (04)	

Project or Industrial visit (15)

Projects [Equivalents of 15]

Consolidated exercise of process development and production, taking any one suitable product; starting from product selection, strain isolation and screening, strain improvement, lab scale production, purification (downstream processing), waste disposal, packaging. Suggested examples –


- a) amino acid production,
- b) antibiotic production,
- c) enzyme production,
- d) Biocontrol agents production,
- e) Biofertilizers production,
- f) **Alcohol production.**

Students can be divided into several groups for undertaking multiple problems for complete coverage. [Equivalents of 15]

OR

Industrial visit [Equivalents of 15]

1. Visit to Biotechnology industry and discussion with the entrepreneur reporting the steps, difficulties and problems faced and solved while establishing such industry. Groups of students can cover 2 industries under the supervision of teaching staff.
2. Diagrammatic representation of plant layout organization of various services with comment on its advantages and disadvantages and suggestion for improvements.


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Books and References:

1. Casida L. E., "Industrial Microbiology" (1999), New Age International (P) Ltd, New Delhi
2. Purohit S. S., (2001), "Biotechnology Fundamentals and Applications", 3rd Edition, Agrobios, Jodhpur.
3. Stanbury P. F., Whitaker A. & Hall S. (1997), "Principles of Fermentation Technology", 2nd Edition, Aditya Books Pvt. Ltd. New Delhi.
4. Crueger W. and Crueger A. (2000) "Biotechnology – A Textbook of Industrial Microbiology, 2nd Edition, Panima Publishing Corporation, New Delhi
5. El-Mansi E. M. T. & Bryce C. F. A. (2000), "Fermentation Microbiology and Biotechnology", Taylor and Francis Ltd., New Delhi
6. Ratledge, C. & Kristiansen, B. (2001), "Basic Biotechnology", 2nd Edition, Cambridge University Press.
7. Primrose, S. B. Twyman, R. M. & Old R. W. (2001), "Principles of Gene Manipulation, 6th Edition, Blackwell Ltd.
8. H. A. Modi, (2009), "Fermentation Technology" Vol. 2, Pointer Publication, India.
9. Peter J. Russell (2010), "Genetics – A Molecular Approach", 3rd Edition.

Assessment of candidate:

There will be continuous assessment of the candidate through the Course.

There will be continuous assessment of the candidate through the Course. At the end of each module, the candidates will be assessed. This contributes to 10% of the total marks. As an essential part of the course, participants are required to carry out a literature review assignment including oral presentation. The written assignment and oral presentation would contribute 5% of final examination marks. There will be a final examination at the end of the course. The examination would consist of theory (40%), practical (40%) and viva voce (5%). The decision of the Board of Studies regarding the examination result is final.

Successful candidates will be awarded the Diploma in Medical Microbiology, while participant who fail to obtain the passing mark but had satisfactorily completed the course will be awarded with a Certificate of Attendance.

Dress Code of the Course

The dress code for attending lectures is smart casual. However, short skirts, shorts, sleeveless dress/blouse and slippers are not allowed. For formal occasions (visit to MTCP, presentations and convocation), suit jacket and tie or national costume is required. Candidate must bring own lab coat for the use in practical class

Course Venue

The course will be held at the department of Microbiology, Nutan Mahavidyalaya Selu

Course Modules:

1. Bacteriology
 2. Virology
 3. Immunology
 4. Mycology
 5. Epidemiology
 6. Biostatistics
 7. Molecular Biology
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