Programme: B. Sc. Microbiology

SEMESTER - I			
Core – I - Introduction to Microbiology			
Code:18UMIC11	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Course Outcome :

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	get an idea about the historical events in microbiology.	1	Un
CO -2	understand the diversity in microbiology.	1	Un
CO-3	know the scope of microbiology	4	An
CO-4	know parts of microscope, type and its principle	1, 2	An
CO-5	get the theoretical concepts of related stain	2	Un
CO-6	distinguish different methods of staining techniques	2	Ev
CO-7	analyse nutritional requirements of microbes.	2	An
CO-8	understand the techniques involved in culturing microorganisms.	2	Un

SEMESTER - I			
Core – II Microbial Diversity			
Code : 18UMIC12	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Course Outcome :

CO .No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	list out the general classification of microbes.	1,5	Kn
CO -2	distinguish the taxonomic ranks of micro organisms	2	An
CO-3	illustrate the Bergey's manual classification about bacteria	2,4	Co
CO-4	know the Alexopoulous classification of fungi and their general features	1	Kn
CO-5	interpret the general morphological characteristics and the algal diversity	1,2	Co
CO-6	demonstrates the morphology and genetic material of viruses	2	Co
CO-7	know about diversification of microbes	2	Kn
CO-8	analyse the classification, replication, cytocidal effects of plant and animal viruses	2,5	An

SEMESTER - I			
Core Practical –I Laboratory in Introduction to Microbiology & Microbial Diversity			
Code : 18UMICR1	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credit: 1**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know bio-safety procedures in microbiology.	1, 2	Un
CO -2	develop basic skill in aseptic techniques	2	Un
CO-3	perform various staining techniques.	2	Ap
CO-4	cultivate bacteria with different cultivation techniques.	1,2	Ap
CO-5	be acquainted with various sterilization techniques.	2	Ap
CO-6	understand various specialized techniques such as pasteurization.	2	Un
CO-7	isolate bacteria on solid media	2 ,3,4	Ev
CO-8	isolate and characterize bacteria by steak plate method.	2, 3,4	Ev

SEMESTER - I			
Ability Enhancement Course - Value Education			
Code : 18UAVE11	**Hrs/Week : 2**	**Hrs / Semester: 30**	**Credits : 2**

Unit I : Introduction

Value education and its Relevance to present day – Meaning of Value Education – Education and its role – Leading a fulfilling life of universal values

Unit II : Cultivation of Personal Values

Personal Values– Truth - Honesty and Integrity – Love –Compassion – Gratitude - Courage – Optimism – Friendship

Unit III : Elimination of Negative Emotions

Overcome fear – Jealousy is harmful – Sources of jealousy - Jealousy and compulsiveness- Be an optimist – Gossip is Dynamite – Anger

Unit IV : Family Values

Familial Responsibilities –Five Basic Functions of a Mother - Fathers' role in the family - Five Duties of Children to Parents - Indian Cultural Values

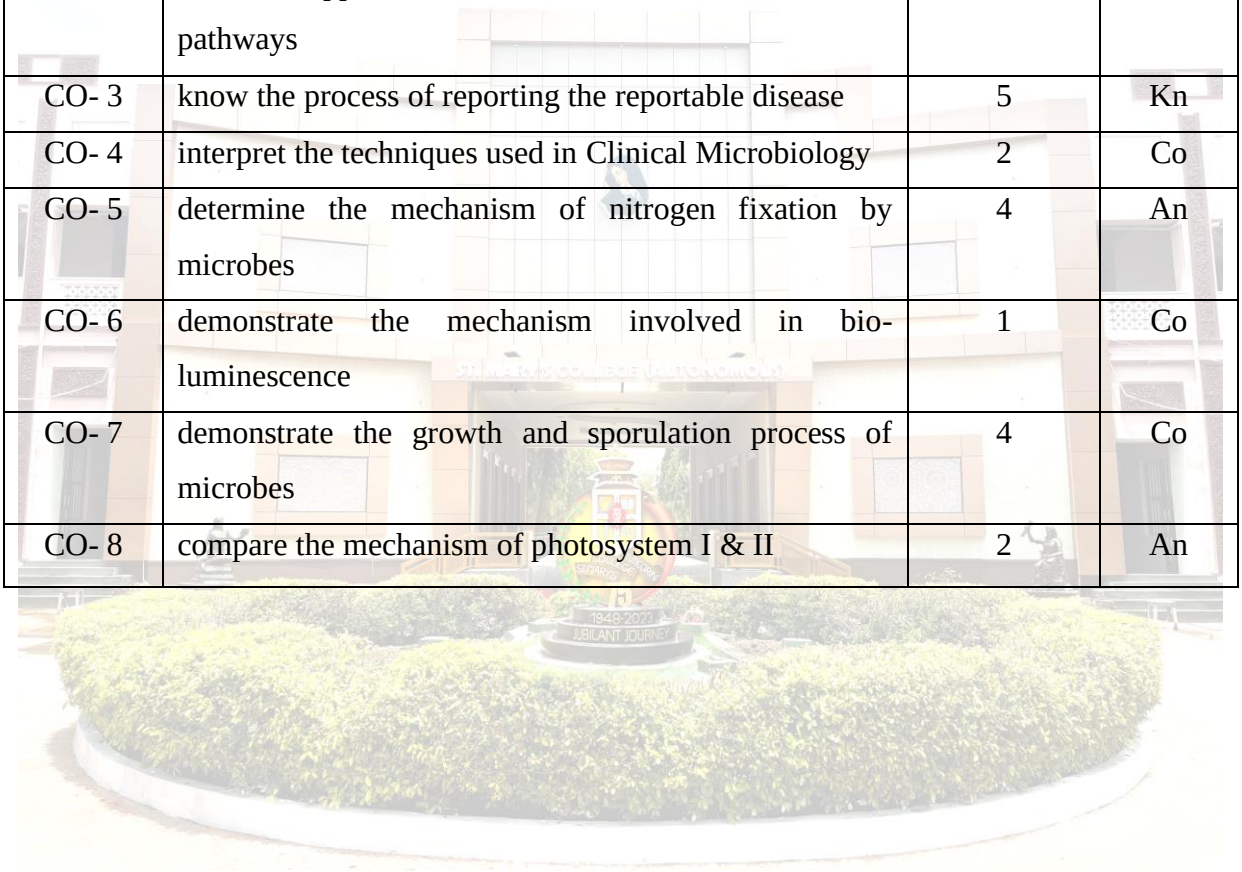
Unit V : Spiritual Value

Cultivating Good Manners – Being Persuasive – Being authentic – Professional Ethics – Work Culture – Code of Conduct

SEMESTER - II			
Core– III - Microbial metabolism and Physiology			
Code -18UMIC21	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO- 1	know the basic knowledge about Microbial metabolism	2	Kn
CO- 2	know the applications of the various culture and their pathways	4	Kn
CO- 3	know the process of reporting the reportable disease	5	Kn
CO- 4	interpret the techniques used in Clinical Microbiology	2	Co
CO- 5	determine the mechanism of nitrogen fixation by microbes	4	An
CO- 6	demonstrate the mechanism involved in bio-luminescence	1	Co
CO- 7	demonstrate the growth and sporulation process of microbes	4	Co
CO- 8	compare the mechanism of photosystem I & II	2	An



SEMESTER - II			
Core – IV - Bioinstrumentation			
Code -18UMIC22	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	Understand the concept about the basic instrumentation.	2	Un
CO -2	Know about pH measurements and important of buffer.	2,3	Un
CO-3	Grasp the principles and applications of various instruments.	2,3	Co
CO-4	Develop a basic principles and application of spectrophotometer.	2	Un
CO-5	Demonstrate an understanding of Electrophoresis.	2	Sy
CO-6	Grasp the knowledge about advanced instrumentation.	2, 4	Co
CO-7	Develop a basic principles and application of colorimetry	2	Un
CO-8	Develop a basic principles and application of centrifuge.	2	Un

SEMESTER – II			
Core Practical-II Laboratory in Microbial Metabolism, Physiology and Bioinstrumentation			
Code -18UMICR2	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	perform IMViC test and identify bacteria of enterobacteriaceae.	1	Sy
CO -2	perform various biochemical test.	1	Sy
CO-3	know the effect of various environmental factors.	1	Kn
CO-4	prepare buffer and determine the pH.	1	Sy
CO-5	perform various hydrolysis for the production of extracellular enzymes.	1	Sy
CO-6	explain the concept of microbial growth, its measurement and growth curve	1	Co
CO-7	know the working principle of spectrophotometer and be able to handle	1	Kn
CO-8	demonstrate the working principle of SDS- PAGE and Agarose gel electrophoresis.	1	Kn

SEMESTER - II			
Allied-II Biochemistry			
Code -18UMIA21	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 3**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	develop fundamental knowledge about various bio-molecules.	2	Un
CO -2	learn the element present in biomolecules	2	Sy
CO-3	differentiate between monomers and polymers	2	Un
CO-4	compare and contrast the structure and function of the carbohydrates, protein, and lipid.	2	Ap
CO-5	summarize the functions of carbohydrates, proteins, lipids, enzymes and vitamins	2	Sy
CO-6	compare and contrast saturated, mono-saturated and poly-saturated fatty acids.	2	Un
CO-7	recognize the importance of the three dimensional shape of a protein on its function and its role.	2	An
CO-8	know the working principle of spectrophotometer and able to handle.	2 ,3	Kn

SEMESTER – III			
Core – V– Molecular Biology and Microbial Genetics			
Code : 18UMIC31	**Hrs/Week- 4**	**Hrs/Sem 60**	**Credit 4**

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the basic knowledge about the microbial genetic material and its functions.	6	U n
CO-2	compare various types of bacterial plasmids, their types, and its functions.	5	U n
CO-3	interpret the role and properties of transposons and IS elements.	7	U n
CO-4	illustrate various mechanisms involved in bacteriophage cycle.	5	U n
CO-5	improve the knowledge about structure and classification of bacteriophage and their mode of replication.	6	Cr
CO-6	classify various mutations takes place in microbial genetics.	8	Un
CO-7	compare various gene transfer mechanisms	7	Un
CO- 8	recall transformation and transduction and their classification	5	Re

SEMESTER III			
Core Practical III - Laboratory in Molecular Biology and Microbial Genetics			
Code : 18UMICR3	**Hrs/Week: 2**	**Hrs/Sem : 30**	**Credit : 1**

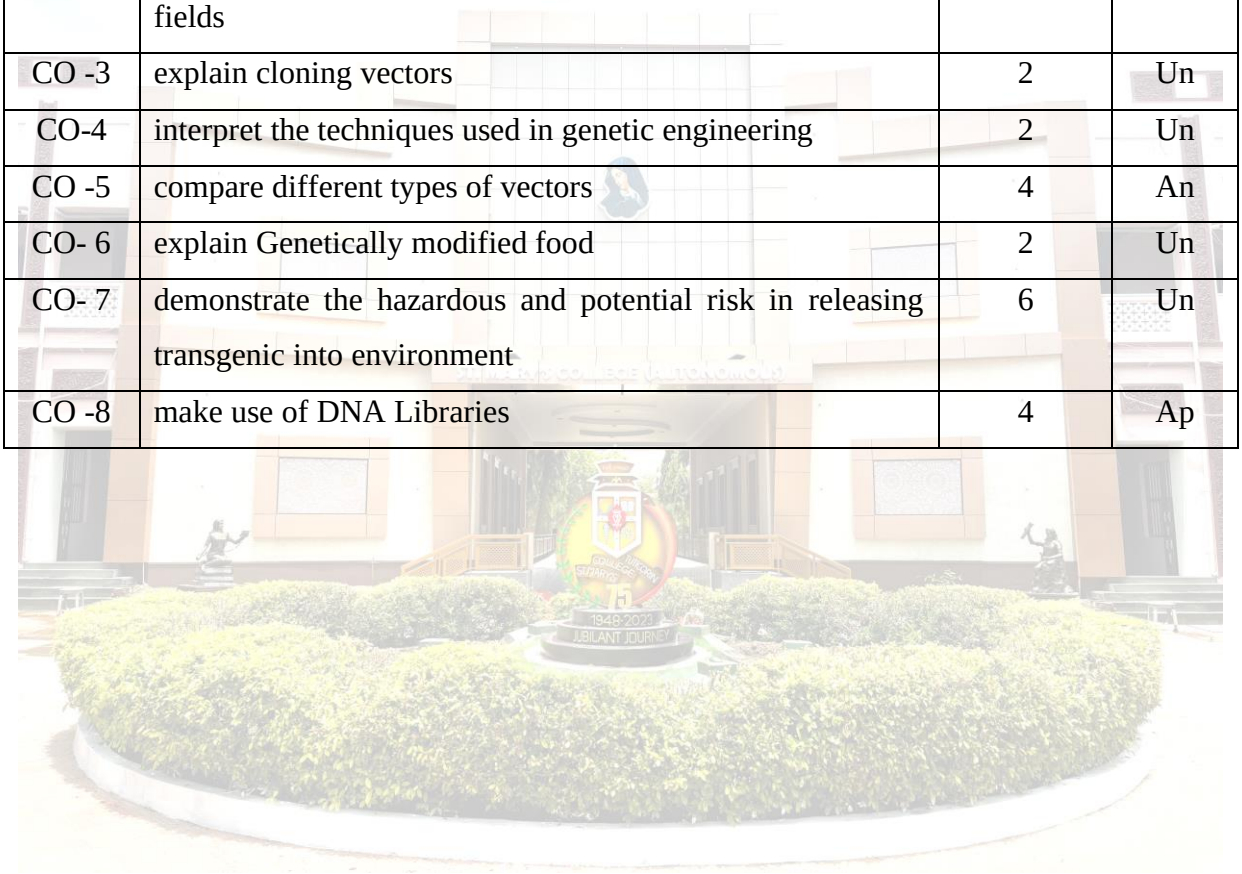
Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	examine spontaneous mutants.	4	An
CO-2	examine induced mutant by UV	5	An
CO-3	analyze antibiotic resistant mutant by gradient plate technique.	6	An
CO-4	examine UV induced auxotrophic mutants by replica plate technique.	4,5	An
CO-5	demonstrate plasmid DNA from *E.coli*	8	Un
CO-6	demonstrate AGE	7	Un
CO-7	demonstrate conjugation in bacteria by genetic recombination.	8	Un
CO-8	demonstrate PCR.	7,8	Un

SEMESTER – III			
Allied – III – Genetic Engineering			
Code:18UMIA31	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 3**

Course Outcome:

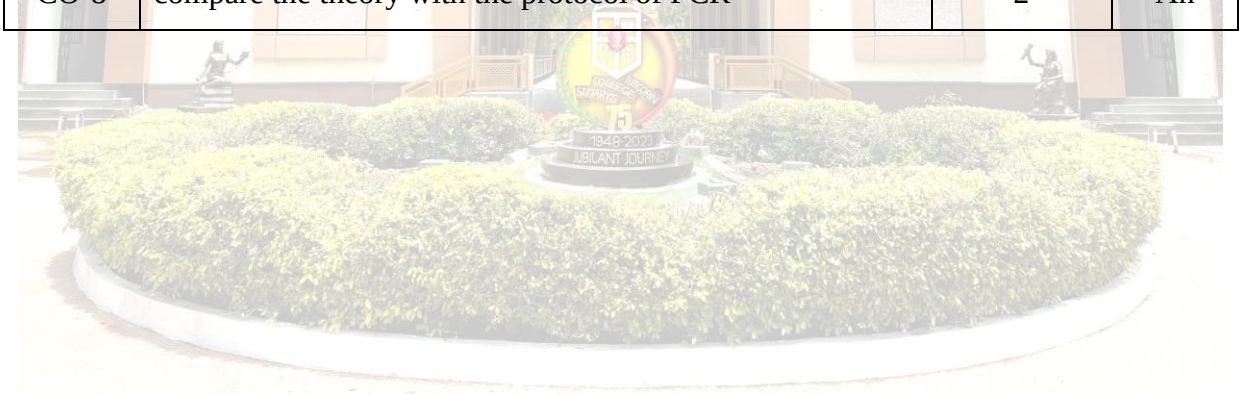
CO NO	Upon completion of this course, students will be able to	PSO Addressed	CL
CO - 1	infer basic knowledge about cloning	2	Un
CO- 2	identify the applications of genetic engineering in various fields	4	Ap
CO -3	explain cloning vectors	2	Un
CO-4	interpret the techniques used in genetic engineering	2	Un
CO -5	compare different types of vectors	4	An
CO- 6	explain Genetically modified food	2	Un
CO- 7	demonstrate the hazardous and potential risk in releasing transgenic into environment	6	Un
CO -8	make use of DNA Libraries	4	Ap



SEMESTER- III			
Allied practical III – Laboratory in Genetic Engineering			
Code : 18UMIAR3	**Hrs/Week: 2**	**Hrs/Sem: 30**	**Credit: 1**

Course Outcome:

CO NO	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	illustrate the principle behind any genetic engineering practical	2	Un
CO-2	develop basic handling skill in genetic engineering practical	2	Ap
CO-3	experiment with isolation of Nucleic acids from different sources	4	Ap
CO-4	interpret Transformation	1	Un
CO -5	test for the quantification of nucleic acids	2	An
CO-6	distinguish the quantification of DNA and RNA	2	An
CO-7	distinguish the isolation of DNA and RNA	4	An
CO-8	compare the theory with the protocol of PCR	2	An



SEMESTER – III			
Core Skill Based- Practicals in Medical Laboratory Technology			
Code: 18UMIS31	**Hrs/week : 4**	**Hrs/Sem : 60**	**Credit: 4**

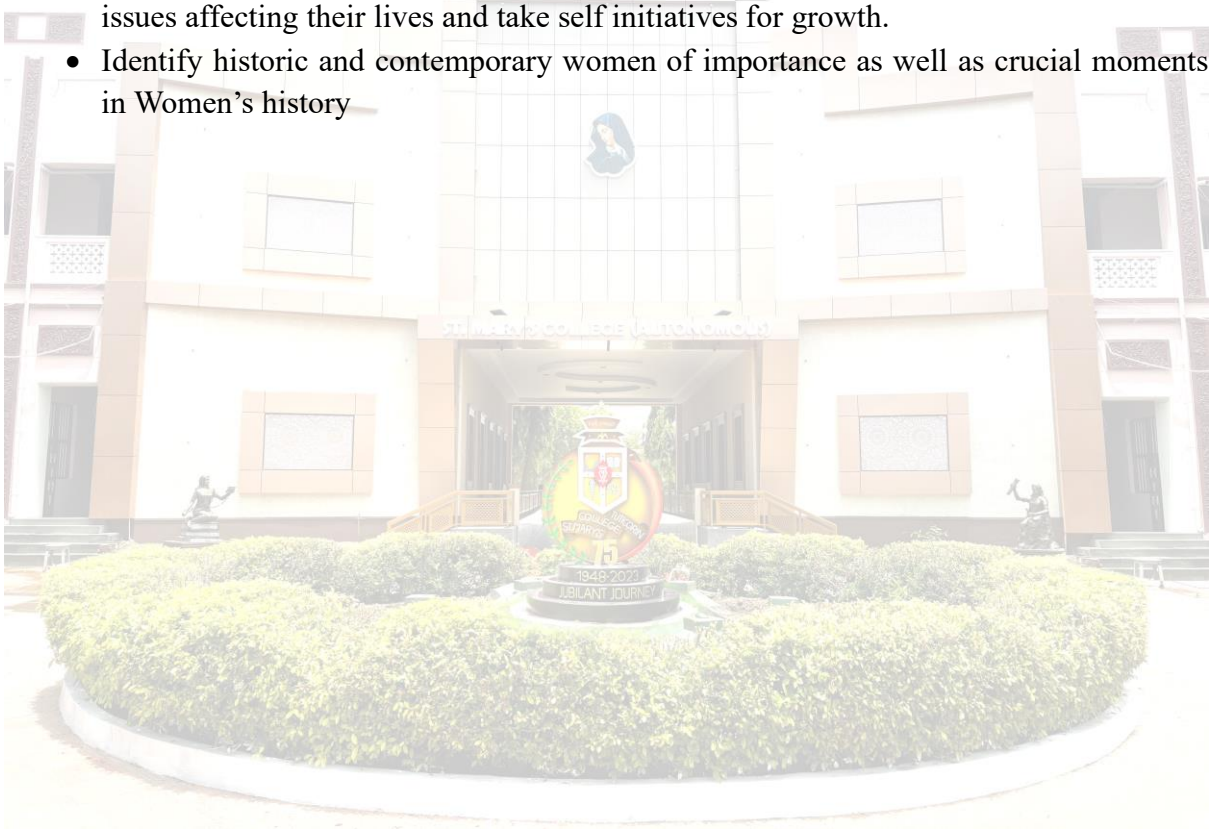
Course Outcome:

CO NO.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	1,2	Un
CO-2	analyze and distinguish various types of blood groups	2,3,4	An
CO-3	evaluate the culture tests and understand the pathological diseases of humans	2,4	An
CO-4	analyze the physical, chemical and microscopic analysis of culture samples	2,3	An
CO-5	perform various techniques on isolation of micro-organisms for various sources	2	Ap
CO-6	understand the ESR and CRP tests for analysis	1,2	Un
CO-7	perform the qualitative tests for carbohydrates and proteins	2	Ap
CO-8	analyze and isolate the microbes from blood	3,4	An

Semester – III			
Women's Synergy			
Code : 18UAWS31	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Course Outcome

- To know about Women's health issues including menstruation, pregnancy, child birth etc, thereby taking care of themselves.
- Create awareness about their own biases, fears and comfort levels and encourage to dream and fuel their own growth and self development.
- Engage in promoting social justice and women rights
- Create platforms and facilitate the young women to operate symbiotically towards issues affecting their lives and take self initiatives for growth.
- Identify historic and contemporary women of importance as well as crucial moments in Women's history



SEMESTER – IV			
Core Skill Based - Biostatistics			
Code: 18UMIS41	**Hrs/Week - 4**	**Hrs/Sem - 60**	**Credit: 4**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	develop an understanding of the basic concepts of biostatistics	2	Cr
CO -2	explain the statistical methods	4	Un
CO - 3	recall the collection, processing and presentation of data	2	Re
CO -4	explain measures of central tendency	4	Un
CO- 5	examine measures of dispersion	2	An
CO -6	determine the types and measures of correlation	2	Ev
CO- 7	define regression	4	Re
CO -8	interpret statistical inference	4	Ev

SEMESTER-IV			
NME II - Clinical Microbiology			
Code:18UMIN41	**Hrs/Week: 2**	**Hrs/Sem:30**	**Credit: 2**

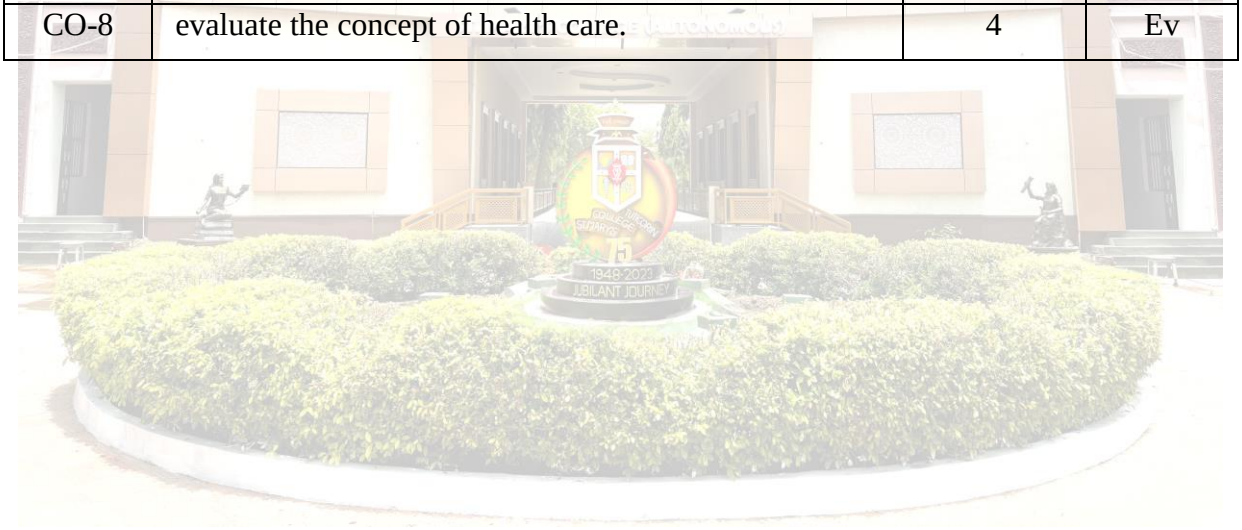
Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO- 1	provide knowledge on the importance of clinical microbiology	1,4	Un, An
CO -2	acquire knowledge on normal flora on human body.	1	Un
CO- 3	acquire knowledge on various types of diseases.	6	Co
CO- 4	provide information about the mechanisms of infectious disease transmission	1,6	Un
CO- 5	acquire knowledge on causative agent, treatment , prevention and control measures.	1,6	Un
CO- 6	provide interpretation of laboratory tests in the diagnosis of infectious diseases.	2	Co
CO- 7	understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue.	6	Co
CO- 8	develop basic skills necessary to work in the microbiology laboratory.	1,2	Un

SEMESTER- V			
Common Core VII	**Psychology and Microbiology for Health care**		
Code: 18UBCS51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit: 4**

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	learn the nature of psychology and microbiology	1	Re
CO-2	understand the importance of human system	1	Re
CO-3	gain knowledge about the acute stressors.	2	Un
CO-4	analyze the various problems in menstrual cycle	5	An
CO-5	develop a proper lifestyle	3	Cr
CO-6	understand about sleep related disorders	6	Un
CO-7	create a depth knowledge about the warning and health risk	2	Un
CO-8	evaluate the concept of health care.	4	Ev



SEMESTER – V			
Core – VIII - Immunology			
Code : 18UMIC52	**Hrs/Week-5**	**Hrs/Sem– 75**	**Credit – 4**

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the structural features of the components of the immune system and functions.	4	Un
CO-2	compare humoral and cellular immunity and their relative significance.	4	Un
CO-3	interpret the characteristics of antigen and antibody reactions.	4	Ev
CO-4	influence of the roles of the immune system in both maintaining health and contributing disease.	4	Ev
CO-5	influence the immunological response and how it is triggered and regulated.	4	Ev
CO-6	analyze about the pathogenesis of disease, effect, treatment and maintenance to prevent disease.	4	An
CO-7	compare types of lymphoid organs	5	Un
CO-8	compare various types of hypersensitivity	5	Un

SEMESTER-V			
Core - IX- Clinical Microbiology			
Code:18UMIC53	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credit: 4**

Course Outcome:

CO No	Upon completion of this course, students will able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	4	An
CO-2	analyze and distinguish various types of blood cells	2	Un
CO-3	understand the pathological diseases and explain the test for hepatitis, aids, and intestinal parasites.	6	Ev
CO-4	evaluate critical thinking of biochemical test	5	Un
CO-5	demonstrate the proficiency in basic methods of instrumentation and quantitative analytical skills used to conduct biological research.	4	An
CO-6	determines the applied microbiology aspects of clinical technique	1	An
CO-7	interpret different classes of microbes.	3	Cr
CO-8	analyze the level information in the subject of medical microbiology.	6	Ev

SEMESTER –V			
Core Integral - I – Microbial Nanotechnology			
Code: 18UMII51	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 4**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	acquire basic knowledge on nanotechnology	4	Un
CO -2	explain the basics of microbial applications of nanotechnology.	4	Un
CO -3	appreciate the structural and functional principles of nanomatreials.	4	An
CO- 4	grasp the fundamental knowledge about synthesis of nanomaterials.	4	Un
CO- 5	acquire basic knowledge about biosensors and types.	2	Ap
CO- 6	get knowledge about analysis of biomolecular nanostructures.	4,2	Un
CO -7	acquire knowledge on cancer diagnosis and treatment.	2,4	Ap
CO- 8	get knowledge about drug designing and delivery	2,4	Ap

SEMESTER – V			
Core Integral – II- Vermitechnology			
Code:18UMII52	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit:4**

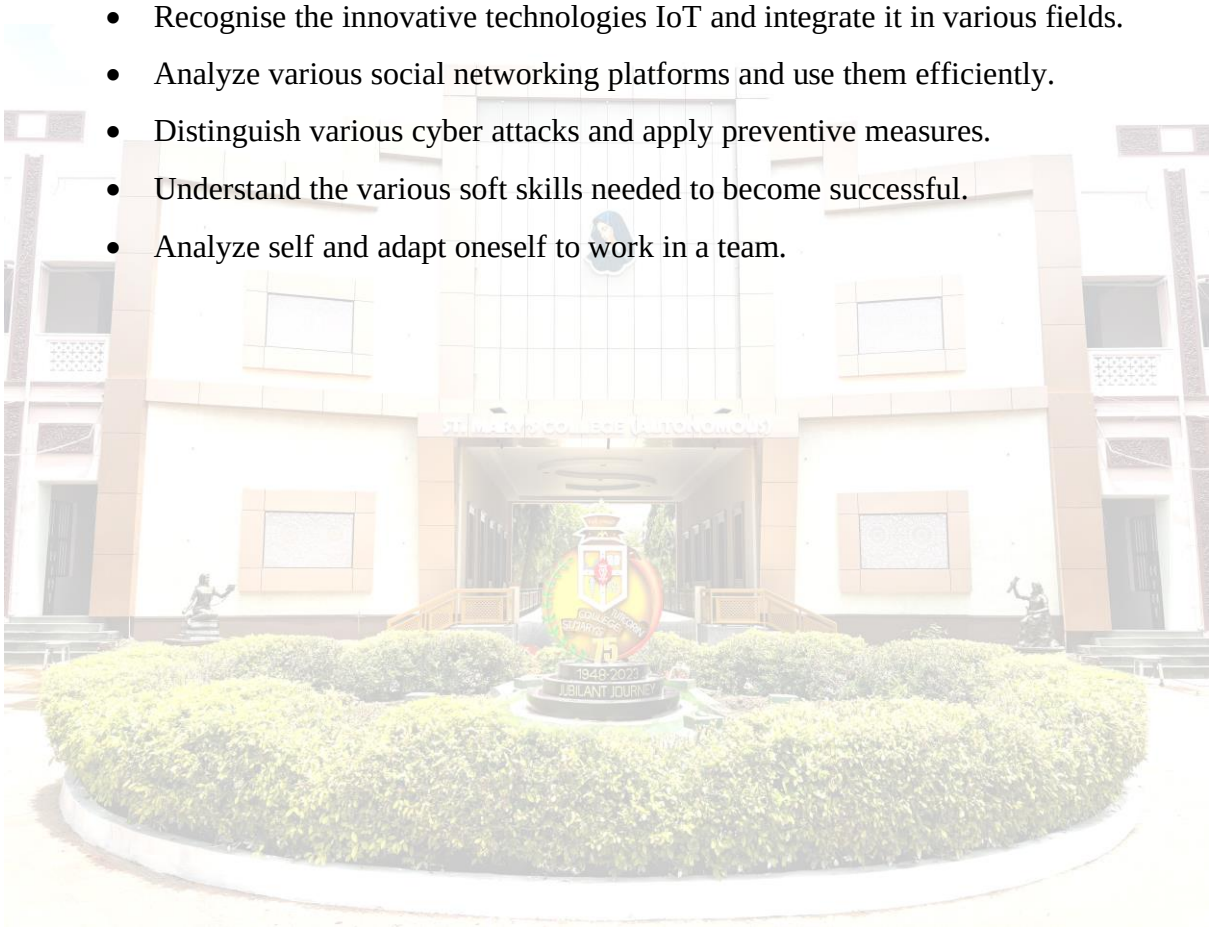
Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	select from, use and interpret results of descriptive vermi technology methods effectively.	6	Ev
CO -2	demonstrate an understanding the scientific and technological benefits to the rural sector by equipping them with the latest technology and to create the model for the nation	6	Ev
CO- 3	gain knowledge about the various morphology of earthworms	1	An
CO -4	communicate the awareness of field sampling using vermi compost	5	Un
CO- 5	make appropriate awareness of parasites and predators in vermi composting	5	Un
CO- 6	understand the awareness among the present status and importance of composting methods and vermi composting	4	An
CO- 7	understand the waste reduction in vermi composting	4	Un
CO -8	explain the nutrient availability in the vermi compost	6	Ev

Semester - V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
Code : 18UCSB51	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Course Outcome

- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.



SEMESTER –VI			
Core - XII - Microbial Biotechnology			
Code: 18UMIC63	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define the history & concepts of biotechnology.	2	Re
CO-2	assess the intellectual property right & protection.	2	Ev
CO-3	illustrate the knowledge on the production of biotechnological products.	3	Un
CO-4	interpret about the concepts and applications in enzyme biotechnology.	3	Un
CO-5	assume the mechanisms involved in biodegradation of pollutants.	6	An
CO-6	illustrate the cloning process	2	Un
CO-7	analyse the production of biotechnological products	2,3	An
CO-8	recall the concept of biogas, bioleaching, biodegradation of petroleum.	4	Re

SEMESTER - I			
Core – I	**Introduction to Microbiology**		
Course Code: 21UMIC11	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	get an idea about the historical events in microbiology & scope of Microbiology	1	Un
CO -2	understand the diversity in microbiology.	1	Un
CO-3	know parts of microscope, type and its principle	1, 2	An
CO-4	distinguish different methods of staining techniques	2	Ev
CO-5	analyse nutritional requirements of microbes.	2	An
CO-6	understand the techniques involved in culturing microorganisms.	2	Un

SEMESTER - I			
Core Practical –I Laboratory in Introduction to Microbiology			
Course Code : 21UMICR1	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credit: 1**

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	develop basic skill in aseptic techniques	2	Un
CO-2	perform various staining techniques.	2	Ap
CO-3	cultivate bacteria with different cultivation techniques.	1,2	Ap
CO-4	be acquainted with various sterilization techniques.	2	Ap
CO-5	understand the preparation of various culture media	2	Un
CO-6	isolate and characterize bacteria by streak plate method.	2, 3,4	Ev

SEMESTER I			
Skill Enhancement Course – I Professional English for Microbiology - I			
Course Code -21UMIPE1	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recognise their own ability to improve their own competence in using the language	1	An
CO-2	use language for speaking with confidence in an intelligible and acceptable manner	2	Ap
CO-3	read independently unfamiliar texts with comprehension	1,2,3	Re
CO-4	write simple sentences without committing error of spelling or grammar	1	Re
CO-5	know presentation skills	1	An
CO-6	get critical thinking skills	1	Un

SEMESTER - I			
Ability Enhancement Course -Value Education			
Code : 21UAVE11	**Hrs/Week : 2**	**Hrs / Semester: 30**	**Credits : 2**

Unit I: Introduction to Value Education

Concept of Values -Types of Values- Approaches to values - Benefits of Value Education-Characteristics of Values

Unit II: Human Values

Human Values -Sources of Human Values - Love - Compassion - Gratitude - Courage - Optimism - Forgiveness- the need and urgency to reinforce Human Values

Unit III: Social Values

Role of family and society in teaching values - Role of educational institutions in inculcating values-Three general functions of education for society-Self-Reflection- Our society's needs - Social Responsibilities of a student

Unit IV: Spiritual Values

Spiritual Values - Spiritual Development -Moral Development - Importance of Spiritual Values - Cultivation of Spiritual Values -Five most common spiritual values - Spiritual Resources

Unit V: Values for Life Enrichment

Goal Setting - Building relationship - Friendship - Love relationship - Family relationship - Professional relationship Interpersonal Relationship -Essential Life Skills that Help in Students Future Development-Life Enrichment Skills Domain

Books for Reference:

1. Sneha M. & K. Pushpanadham Joshi. *Value Based Leadership in Education Perspective and Approaches,* Anmol Publications Pvt. Limited, 2002.

2. Venkataiah.N. *Value Education,* APH Publishing, 1998

3. Pramod Kumar M. *A Handbook on Value Education*, Ramakrishna Mission Institute of Culture (RMIC) 2007

4. Jagdosh Chand, *Value Education*, Shipra Publication 2007

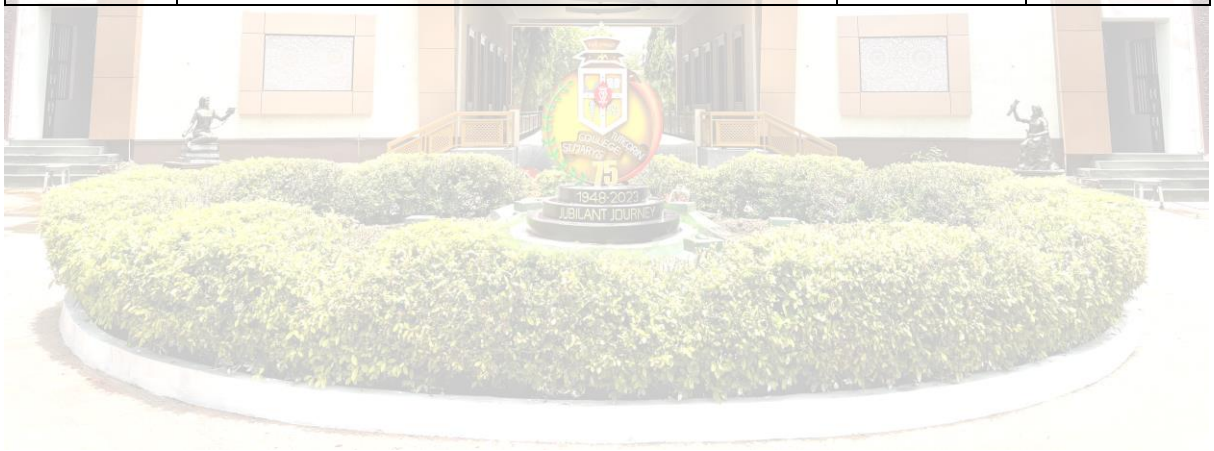
5. Indrani Majhi (Shit) Ganesh Das, *Value Education*, Laxmi Publication Pvt. Ltd., 2017

6. Arumugam, N. S. Mohana, Lr.Palkani, *Value Based Education*, Saras Publication2014

SEMESTER - II			
Core – II	**Microbial Diversity**		
Course Code : 21UMIC21	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Course outcome:

CO .No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	list out the general classification of microbes.	1,5	Kn
CO -2	distinguish the taxonomic ranks of micro organisms	2	An
CO-3	illustrate the Bergey's manual classification about bacteria	2,4	Co
CO-4	know the Alexopoulous classification of fungi and their general features	1	Kn
CO-5	interpret the general morphological characteristics and the algal diversity	1,2	Co
CO-6	demonstrates the morphology and genetic material of viruses	2	Co



SEMESTER - II			
Core Practical –I	**Laboratory in Microbial Diversity**		
Course Code : 21UMICR2	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credit: 1**

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know about the knowledge on evolution and microbial diversity	1, 2	Un
CO-2	perform the techniques of microbial diversity	2	Ap
CO-3	cultivate Cyanobacteria from natural sources	1,2	Ap
CO-4	be acquainted with the ultra structure of prokaryotic and eukaryotic cell	2	Ap
CO-5	understand the structure of Protozoa, Algae, Virus	2 ,3,4	Un
CO-6	develop a knowledge on isolation of microbes from different sources	2, 3,4	Un

SEMESTER – II			
Allied-II	**Biochemistry**		
Course Code -21UMIA21	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 3**

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	develop fundamental knowledge about various bio-molecules.	2	Un
CO-2	compare and contrast the structure and function of the carbohydrates, protein, and lipid.	2	Ap
CO-3	summarize the functions of carbohydrates, proteins, lipids, enzymes and vitamins	2	Sy
CO-4	compare and contrast saturated, mono-saturated and poly-saturated fatty acids.	2	Un
CO-5	recognize the importance of the three dimensional shape of a protein on its function and its role.	2	An
CO-6	know the working principle of spectrophotometer and able to handle.	2 ,3	Kn

SEMESTER II			
Skill Enhancement Course – II Professional English for Microbiology – II			
Course Code -21UMIPE2	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	attend interviews with boldness and confidence.	6	Ev
CO – 2	adapt easily into the workplace context, having become communicatively competent.	8	Cr
CO – 3	apply to the Research & Development organisations/ sections in companies and offices with winning proposals.	8	Ap
CO – 4	get an idea about academic writing	1, 6	Un
CO – 5	get communicative competence	6, 8	Un
CO - 6	develop creativity and imagination	2	Un

SEMESTER – III			
Core– III	**Microbial Physiology and Metabolism**		
Course Code: 21UMIC31	**Hrs/ Week:4**	**Hrs/ Sem: 60**	**Credits: 4**

Course outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know the basic knowledge about MicrobialMetabolism	2	Kn
CO-2	know the applications of the various culture and their pathways	4	Kn
CO-3	interpret the techniques used in Clinical Microbiology	2	Co
CO-4	determine the mechanism of nitrogen fixation by Microbes	4	An
CO-5	demonstrate the mechanism involved in bio-Luminescence	1	Co
CO-6	demonstrate the growth and sporulation processof microbes	4	Co

SEMESTER –III			
Core Practical-III Laboratory in Microbial Physiology and Metabolism			
CourseCode :21UMICR3	**Hrs/Week:2**	**Hrs/Sem:30**	**Credits:2**

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	perform IMViC test and identify bacteria of entero bacteriaceae.	1	Sy
CO-2	perform various biochemical test.	1	Sy
CO-3	prepare buffer and determine the pH.	1	Sy
CO-4	various hydrolysis for the production of extra-cellular enzymes.	1	Sy
CO-5	explain the concept of microbial growth, its measurement and growth curve	1	Co
CO-6	demonstrate the working principle of spectrophotometer, SDS-PAGE and Agarose gel electrophoresis.	1	Kn

SEMESTER–III			
Allied–III	**Genetic Engineering**		
CourseCode:21UMIA31	**Hrs/Week:4**	**Hrs/Sem:60**	**Credit:3**

Course outcome:

CO.NO	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	infer basic knowledge about cloning	2	Un
CO-2	identify the applications of genetic engineering inVarious fields	4	Ap
CO-3	explain cloning vectors	2	Un
CO-4	interpret the techniques used in genetic engineering	2	Un
CO-5	explain Genetically modified food	2	Un
CO-6	demonstrate the hazardous and potential risk in Releasing transgenic into environment	6	Un

SEMESTER-III			
Allied practical III– Laboratory in Genetic Engineering			
Course Code:21UMIAR3	**Hrs/Week:2**	**Hrs/Sem:30**	**Credit:1**

Course outcome:

CO.NO	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	illustrate the principle behind any genetic engineering practical	2	Un
CO-2	experiment with isolation of Nucleic acids from different sources	4	Ap
CO-3	interpret Transformation	1	Un
CO-4	test for the quantification of nucleic acids	2	An
CO-5	distinguish the quantification of DNA and RNA	2	An
CO-6	distinguish the isolation of DNA and RNA	4	An

SEMESTER –III			
Skill Based Elective	**Bioinstrumentation**		
Course Code: 21UMIS31	**Hrs/Week:2**	**Hrs/Sem:30**	**Credits:2**

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand the concept about the basic instrumentation.	2	Un
CO-2	know about pH measurements and important Of buffer.	2,3	Un
CO-3	develop basic principles and application of centrifuge.	2,3	Co
CO-4	develop basic principles and application of spectrophotometer.	2	Un
CO-5	demonstrate an understanding of Electrophoresis and Colorimetry	2	Sy
CO-6	grasp the knowledge about advanced instrumentation.	2	Un

SEMESTER–III			
Skill Based Elective	**Vermitechnology**		
Course Code:21UMIS32	**Hrs/Week:2**	**Hrs/Sem:30**	**Credit:2**

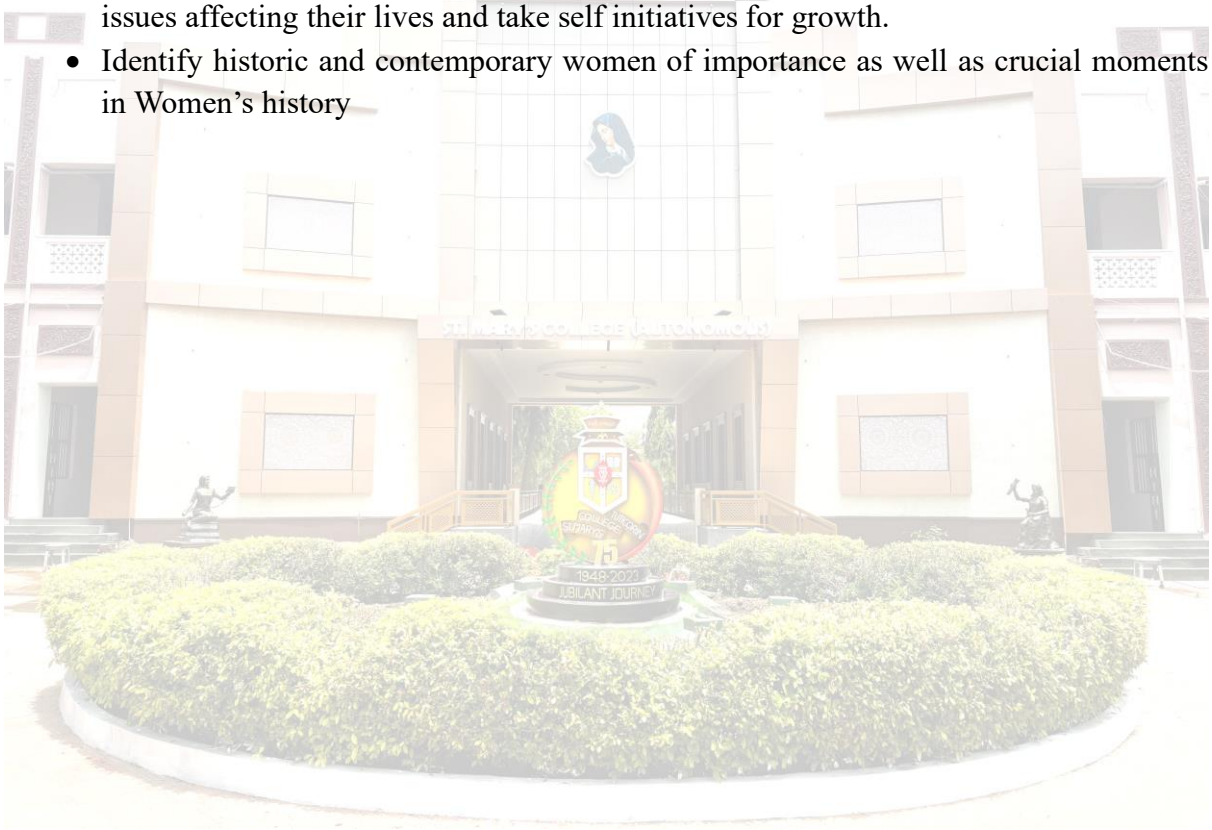
Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	select from, use and interpret results of descriptiveVermitechnology methods	6	Ev
CO-2	demonstrate an understanding the scientific and technological benefits to the rural sector by equipping them with the latest technology and to create the model for the nation	6	Ev
CO-3	gain knowledge earthworms about the variousmorphology	1	An
CO-4	communicate the awareness of field sampling using Vermicomposting	5	Un
CO-5	make appropriate awareness of parasites and predators	5	Un
CO-6	understand the awareness among the present status and importance of composting methods and Vermicomposting	4	An

Semester – III			
Women's Synergy			
Code : 21UAWS31	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Course Outcome

- To know about Women's health issues including menstruation, pregnancy, child birth etc, thereby taking care of themselves.
- Create awareness about their own biases, fears and comfort levels and encourage to dream and fuel their own growth and self development.
- Engage in promoting social justice and women rights
- Create platforms and facilitate the young women to operate symbiotically towards issues affecting their lives and take self initiatives for growth.
- Identify historic and contemporary women of importance as well as crucial moments in Women's history



SEMESTER – IV			
Core – IV– Molecular Biology and Microbial Genetics			
Course Code: 21UMIC41	**Hrs/Week- 4**	**Hrs/Sem: 60**	**Credit: 4**

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the basic knowledge about the microbialgenetic material and its functions.	6	U n
CO-2	compare various types of bacterial plasmids, theirtypes, and its functions.	5	U n
CO-3	interpret the role and properties of transposons andIS elements.	7	U n
CO-4	illustrate classification of bacteriophage and their mode of replication and various mechanisms involved inbacteriophage cycle.	5	U n
CO-5	classify various mutations takes place in microbialgenetics.	8	Un
CO- 6	recall transformation and transduction and theirclassification	5	Re

SEMESTER IV			
Core Practical IV - Laboratory in Molecular Biology and Microbial Genetics			
Course Code:21UMICR4	**Hrs/Week: 2**	**Hrs/Sem : 30**	**Credit : 2**

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	examine spontaneous mutants.	4	An
CO-2	examine induced mutant by UV	5	An
CO-3	analyze antibiotic resistant mutant by gradient plate technique and UV induced auxotrophic mutants byreplica plate technique.	6	An
CO-4	demonstrate plasmid DNA from *E.coli*	8	Un
CO-5	demonstrate AGE and PCR.	7	Un
CO-6	demonstrate conjugation in bacteria by genetic recombination.	8	Un

SEMESTER – IV			
Skill Based Elective - Practical in Medical Laboratory Technology			
Course Code:21UMIS41	**Hrs/week : 2**	**Hrs/Sem : 30**	**Credit: 2**

Course Outcome

CO NO.	Upon completion of this course, students will beable to	PSO addressed	CL
CO-1	analyze and distinguish various types of blood groups	2,3,4	An
CO-2	evaluate the culture tests and understand the patho-logical diseases of humans	2,4	An
CO-3	analyze the physical, chemical and microscopicanalysis of culture samples	2,3	An
CO-4	perform various techniques on isolation of micro-organisms for various sources	2	Ap
CO-5	understand the ESR and CRP tests for analysis	1,2	Un
CO-6	perform the qualitative tests for carbohydrates andproteins	2	Ap

SEMESTER – IV			
Skill Based Elective	**Practical in Parasitology**		
Course Code:21UMIS42	**Hrs/week : 2**	**Hrs/Sem : 30**	**Credit:2**

Course Outcome

CO NO.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	1,2	Un
CO-2	analyze and distinguish various types of stool samples	2,3,4	An
CO-3	analyze the detection of Ascaris, *E. histolytica* infrom sputum sample.	2,3	An
CO-4	perform various techniques on isolation of micro-organisms for various sources	2	Ap
CO-5	understand the blood smear by field's stain.	1,2	Un
CO-6	perform the examination of *Leishmania* spp. fromblood parasites	2	Ap

SEMESTER-IV			
NME II	**Clinical Microbiology**		
Course Code: 21UMIN41	**Hrs/Week:2**	**Hrs/Sem:30**	**Credit:2**

Course Outcome

CO No	Upon completion of this course students will be able to	PSO addressed	CL
CO-1	provide knowledge on the importance of Clinical microbiology	1,4	Un,An
CO-2	acquire knowledge on normal flora on human body.	1	Un
CO-3	acquire knowledge on various types of diseases.	6	Co
CO-4	provide information about the mechanisms of Infectious disease transmission	1,6	Un
CO-5	acquire knowledge on causative agent, treatment, prevention and control measures.	1,6	Un
CO-6	provide interpretation of laboratory tests in the Diagnosis of infectious diseases.	2	Co

SEMESTER-V			
Common Core V Psychology and Microbiology for Healthcare			
Course Code: 21UBCS51	**Hrs/Week:6**	**Hrs/Sem:90**	**Credit:3**

Course Outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	learn the nature of psychology and microbiology	1	Re
CO-2	understand the importance of human system	1	Re
CO-3	gain knowledge about the acute stressors.	2	Un
CO-4	analyze the various problems in menstrual cycle	5	An
CO-5	develop proper lifestyle	3	Cr
CO-6	understand about sleep related disorders	6	Un

SEMESTER–V			
Core VI	**Immunology**		
Course code:21UMIC51	**Hrs/Week-4**	**Hrs/Sem–60**	**Credit–4**

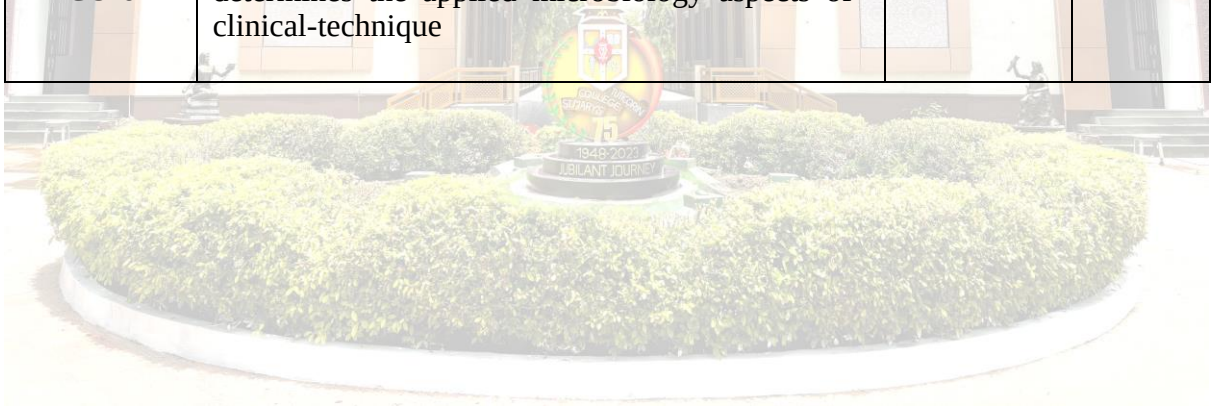
Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the structural features of the components of the immune system and functions.	4	Un
CO-2	compare humoral and cellular immunity and their relative significance.	4	Un
CO-3	interpret the characteristics of antigen and antibody reactions.	4	Ev
CO-4	influence of the roles of the immune system in both maintaining health and contributing disease.	4	Ev
CO-5	influence the immunological response and how it is triggered and regulated.	4	Ev
CO-6	analyze about the pathogenesis of disease, effect, treatment and maintenance to prevent disease.	4	An

SEMESTER- V			
Core VII	**Clinical Microbiology**		
Course Code : 21UMIC52	**Hrs/week: 4**	**Hrs/sem: 60**	**Credit:4**

Course Outcome

CO No	Upon completion of this course, students will able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how tomaintain the laboratory instruments	4	An
CO-2	analyze and distinguish various types of blood cells	2	Un
CO-3	understand the pathological diseases and explain the testfor hepatitis, aids, and intestinal parasites.	6	Ev
CO-4	evaluate critical thinking of biochemical test	5	Un
CO-5	demonstrate the proficiency in basic methods of instrumentation and quantitative analytical skills used to-conduct biological research.	4	An
CO-6	determines the applied microbiology aspects of clinical-technique	1	An



SEMESTER–V			
Core- VIII	**Biostatistics and Bioinformatics**		
Course code:21UMIC53	**Hrs/Week–4**	**Hrs/Sem-60**	**Credit:4**

Course Outcome

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	develop an understanding of the basic concepts of biostatistics	2	Cr
CO-2	explain the statistical methods	4	Un
CO-3	recall the collection, processing and presentation of data	2	Re
CO-4	explain measures of central tendency	4	Un
CO-5	acquire knowledge on the application of bioinformatics in life sciences.	2	An
CO-6	realise the importance and application of biologicaldatabase.	2	Ev

SEMESTER–V			
Core Elective	**Microbial Nanotechnology**		
Course Code:21UMIC51	**Hrs/Week:4**	**Hrs/Sem:60**	**Credit:4**

Course Outcome

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire basic knowledge on nanotechnology	4	Un
CO-2	explain the basics of microbial applications of nanotechnology.	4	Un
CO-3	appreciate the structural and functional principles and synthesis of nano materials.	4	An
CO-4	acquire basic knowledge about biosensors and types.	2	Ap
CO-5	acquire knowledge on cancer diagnosis and treatment.	2,4	Ap
CO-6	get knowledge about drug designing and delivery	2,4	Ap

SEMESTER –V			
Core Elective	**Marine Microbiology**		
Course Code : 21UMIC52	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

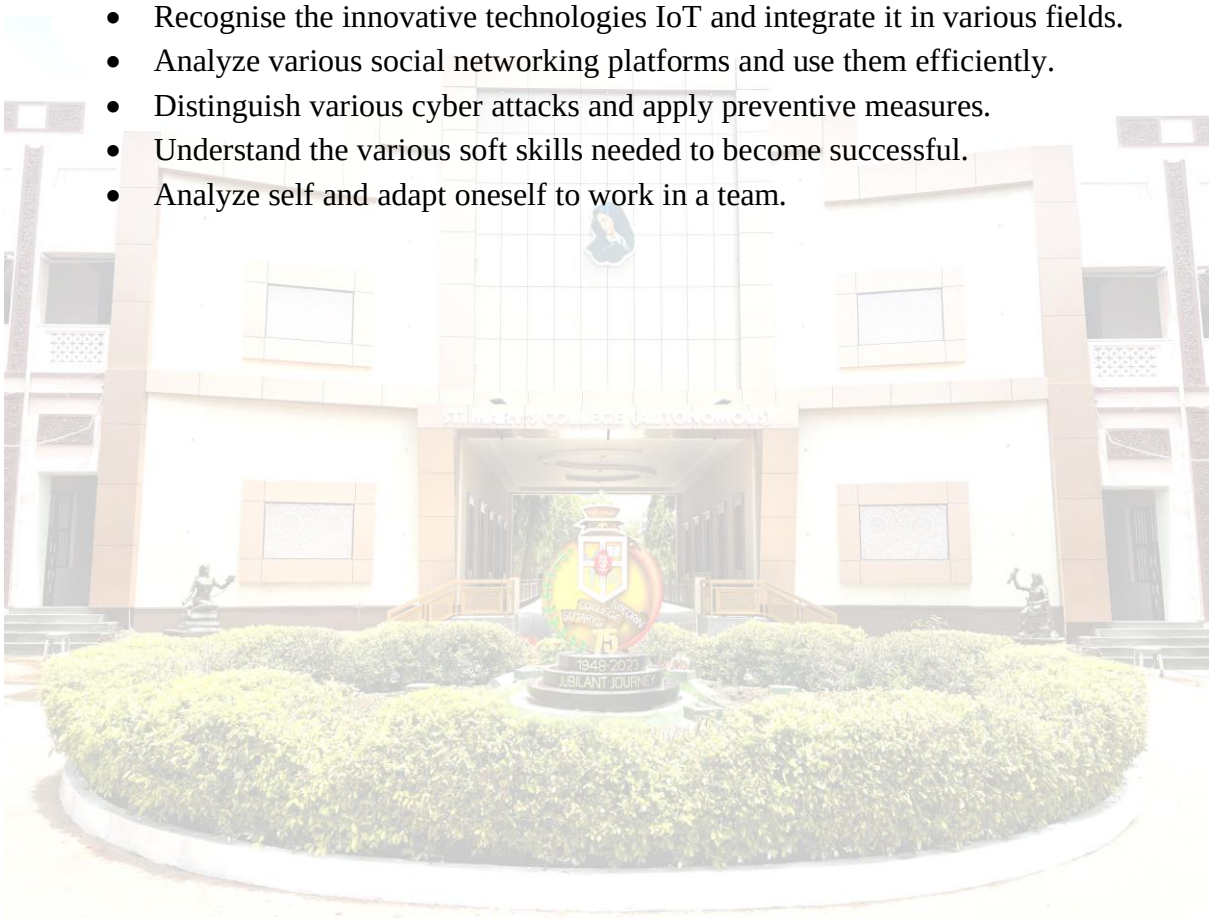
Course Outcome

CO No	Upon completion of this course,students will be able to	PSO addressed	CL
CO-1	get an idea about marine micro- biology and marine ecosystem	1	Un
CO -2	understand the diversity in marine ecosystem.	1	Un
CO-3	know the Role of marine microbes in oil degradation	1, 2	An
CO-4	get the knowledge of Bio foulingand prevention	2	Un
CO-5	analyse Microbial indicator organism and pollution	2	An
CO-6	understand Methods of studying marine microorganisms	2	Un

Semester - V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
Code : 21UCSB51	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Course Outcome

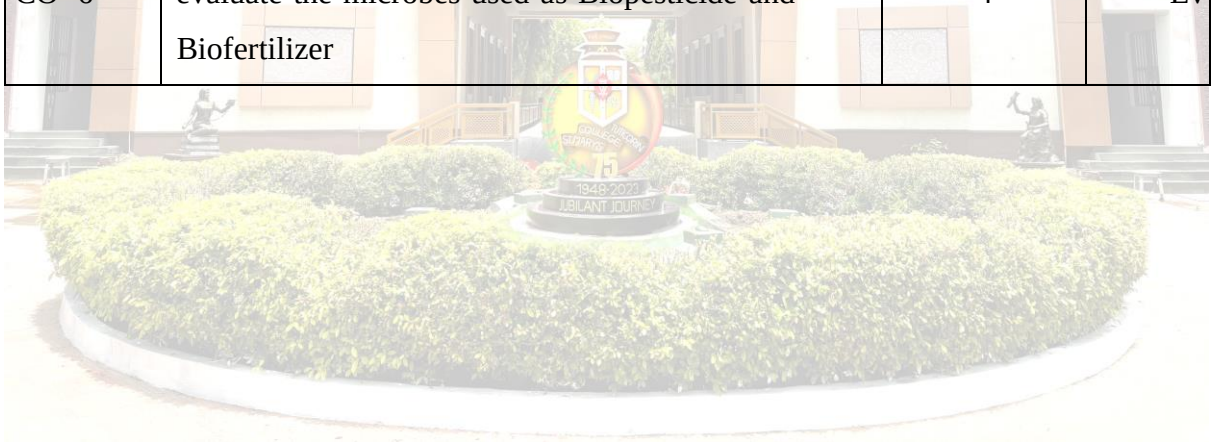
- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.



SEMESTER- VI			
Core XI	**Environmental and Agricultural Microbiology**		
Course Code : 21UMIC63	**Hrs/week: 4**	**Hrs/sem: 60**	**Credit:4**

Course Outcome

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	analyze the soil microorganism and their properties.	1	An
CO- 2	determine the role of microbes on environment.	1	Ev
CO- 3	outline the interaction between microbes and soil.	4	Un
CO- 4	discuss about the types of waste and waste treat ment	6	Cr
CO -5	determine the Biopesticide and Biofertilizer development	2	Ev
CO -6	evaluate the microbes used as Biopesticide and Biofertilizer	4	Ev



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