



Shri Vile Parle Kelavani Mandal's MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBEN JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)

NAAC Reaccredited 'A' grade, CGPA: 3.57, Granted under RUSA, FIST-DST & Star College Scheme of DBT, Government of India, Best College (2016-17), University of Mumbai

Affiliated to the UNIVERSITY OF MUMBAI

plang dangered queleure Program: Master of Science-Biochemistry and in learning and male

Semester III & IV and in shipe III ammuning how pathons

Choice Based Credit System (CBCS) with effect from the Academic year 2022-23

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The courses are as fol	lows:	
Semester III	PSMABC301	Food Science and Food Technology
	PSMABC302	Management Process
	PSMABC303	Soft Skills
	PSMABC304	Sustainable Development and Community Hygiene
	PSMABCP3	Research Project/Internship
	PSMABCP31	Practical-XIII
	PSMABCP32	Practical-XIV
	PSMABCP33	Research Project
Semester IV	PSMABC401	Advances in Biochemical Sciences-II
10 3131	PSMABC402	Advanced Immunology
10 d	PSMABC403	Pharmacology and Toxicology
(cur	PSMABC404	Entrepreneurship and IPR
invernment of	PSMABCP41	Practical-IX
	PSMABCP42	Practical-X
	PSMABCP43	Practical-XI
	PSMABCP44	Practical-XII
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As per resolution of 11th Academic Council, Semester 3 of M.Sc.-Biochemistry programme (24 credits) will be for Internship/Research project or both done during the tenure of the semester. As per the recommendation of the Board of Studies -Biochemistry, it was suggested that alternative plan be prepared to accommodate a situation if all students are unable to get internship/research project opportunity, under prevailing pandemic situation. In such circumstances, students can gain 24 credits in Semester 3 of the M.Sc.-Biochemistry program, by conducting a research project in the college (4 credits) and remaining 20 credits to be gained through theory and practical courses.

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester End Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester End Examinations is as shown below:

a. Details of Internal Continuous Assessment (ICA)

Continuous Assessment	Details	Marks
Continuous Assessment	Details	IVIALES
Component 1 (ICA-1)	Test (MCQ/Subjective) / Assignments/ Project/ Presentation	15 marks
Component 2 (ICA-2)	Test (MCQ/Subjective) / Assignments / Project/ Presentation	10 marks

b. Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Q1 to Q4	Compulsory question 10 marks	10	deaw plan
	+	+	$(10+5) \times 4 = 60$
	Answer any 1 out of 2 questions	05 x 1	J
Q5	Answer any 3 out of 4 questions	05	15
ingiane perbl	in the food mining and to rood-ro	Total Marks	Mark adi 75 ili sabab

Note: (i)	The duration of each theory lecture will be of 60 minutes. A course consists of 4
	modules. For each module the number of hours allotted are 15. The total number of
	lecture hours for each course will thus be 60.

- (ii) There will be one practical per batch for each course. The duration of each practical will be of 4 hours, i.e., of 240 minutes.
 - For practical component the value of One Credit is double the number of theory hours.

Thus, in a week, a student will study 4 hours of theory and 4 hours of practical's. (iii)

Signature

Signature HOD

Signature

Approved by Vice -Principal Approved by Principal

Program: M.Sc. Biochemistry			Semeste	
Course: Food Se	cience and Food 7	Technology	Course Code: PSMAB	
,	Teaching Scheme		Evalu	ation Scheme
Lecture (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment and Evaluation (CAE)	End Semester Examinations (ESE)
4		1 x 20 4	25%	75%

Learning Objectives: Given the fact that one of the main career opportunities of graduates in Biochemistry is within the industrial sector, the aim of this course is providing the students with basic knowledge about the applications of Biochemistry in the food industry and in food-related sectors. Besides, this course also offers contents and activities that will help the students to acquire skills needed for professional opportunities in research and education.

Course Outcomes: At the end of the course learners will be able to

CO1: Compare and contrast functional foods and nutraceuticals

CO2: Explain the biochemistry of food spoilage

CO3: Appreciate different food preservation techniques and quality control

CO4: Compare food processing techniques and solve food safety problems

CO5: Evaluate properties of different food packaging materials

CO6: Compare different forms of packaging

Outline of Syllabus: (per session plan)

Module	Description	No of hours
1	Functional foods and Nutraceuticals	15
2	Food spoilage, preservation and quality control	15
3	Food processing and food laws	15(0)
4	Food packaging	15
	Total	60
PRACTICAL	RACTICALS	

Food Science and Food Technology	Hours/Credit 30/2
Functional foods and Nutraceuticals	15
Functional foods and Nutraceuticals Definition, Classification based on food source Plants, herbs and flowers as functional foods, soya, olive oil, tea, grape wine, garlic, dietary fibre, and others Natural occurrence of certain phytochemicals antioxidants and flavonoids, omega 3 and 6 fatty acids, Carotenoids Phytoestrogens, Glucosinolates, organo sulphur compounds, isoprepoid derivatives phenolic substances fatty acids and	5
structural lipids Carbohydrates and amino acid based derivatives-Isoflavones, terpenoids – saponins, tocotrienols and simple terpenes Functional foods of microbial origin- Concept of probiotics with examples, lactobacillus and bifido	5
bacterum,	
Delivery of immune modulators through functional foods, guidelines for probiotics, probiotic microflora and functions, Prebiotics, ingredients in foods, types of prebiotics and its effect in gut microbes and health benefits *Role of functional foods and nutraceuticals in diseases:* Concept of dietary supplements, phytochemicals, phytosterols, dietary fiber, Role of nutraceuticals in health and management of diseases Inborn errors of metabolism/obesity/neurological disorder/diabetes mellitus/ hypertension/ CVD/cancer/arthritis/AIDS Role of nutraceuticals in sports	5
	15
Chemical and biochemical indices of food quality Factors causing food spoilage Chemical changes in nitrogenous and non-nitrogenous compounds in the food Food Poisoning by microorganisms and their products: Food borne diseases: Types and causative agents Food Poisoning: Staphylococcus food poisoning,	2
	Punctional foods and Nutraceuticals Definition, Classification based on food source Plants, herbs and flowers as functional foods, soya, olive oil, tea, grape wine, garlic, dietary fibre, and others Natural occurrence of certain phytochemicals antioxidants and flavonoids, omega 3 and 6 fatty acids, Carotenoids Phytoestrogens, Glucosinolates, organo sulphur compounds, isoprenoid derivatives, phenolic substances, fatty acids and structural lipids Carbohydrates and amino acid based derivatives-Isoflavones, terpenoids – saponins, tocotrienols and simple terpenes Functional foods of microbial origin- Concept of probiotics with examples, lactobacillus and bifido bacterium, Advances in probiotics, gut microflora and health benefits, Delivery of immune modulators through functional foods, guidelines for probiotics, probiotic microflora and finctions, Prebiotics, ingredients in foods, types of prebiotics and its effect in gut microbes and health benefits Role of functional foods and nutraceuticals in diseases: Concept of dietary supplements, phytochemicals, phytosterols, dietary fiber, Role of nutraceuticals in health and management of diseases Inborn errors of metabolism/obesity/neurological disorder/ diabetes mellitus/ hypertension/ CVD/cancer/arthritis/AIDS Role of nutraceuticals in sports Food spoilage, preservation and quality control Bio Chemistry of Food Spoilage Chemical and biochemical indices of food quality Factors causing food spoilage Chemical changes in nitrogenous and non-nitrogenous compounds in the food Food Poisoning by microorganisms and their products: Food borne diseases: Types and causative agents Food Poisoning:

	Poisoning due to salmonella Food Preservation	411/4 IV
34072	General principles of food preservation	
	Preservation by use of high and low temperatures, drying, radiations, chemical preservatives, inert gases, mechanical preservation	
	techniques (vacuum packaging, tetra packs). Quality control General principles of Quality Control and Good Manufacturing	2
	Practices in food industry. Food Adulteration and additives	3
	Common food adulterants their harm effects and physical and	
	chemical methods for their detection (any five food samples) Food additives (chemistry, food uses and functions in formulations) Preservatives, Antioxidants, Emulsifiers, sequestrants, stabilizers, Colours, flavours, sweeteners, acidulants Indirect food additives	
3	Food processing and safety management	15
	Earl macassing tacknings	5
	Heat processing: Pasteurization technique, High Pressure processing, Dehydration by drying (contact, radiation, sublimation), retort processing technique Non-thermal processing Shelf life of processed food: Determination of shelf – life of food products, Transports of perishable food items.	
	Transports of perishable food items.	10
8	Food Safety management Food Laws: Prevention of Food Adulteration (PFA) Act,	
	Fruit Products Order (FPO),	
13	Meat Products Order (MPO)	
	Meat Products Order (MPO) Food Safety and Standards Act, 2006, Food legislation: AGMARK, etc. International Food Safety Standards: ISO 22000: 2018 Standard,	
	FSSC 22000	
	Food Safety Initiatives Projects by FSSAI: BHOG, Clean street Food Hub, Eat right Movement,	
	Clean & Fresh Fruits and vegetables Safe and Nutritious Food (SNF), Hygiene Rating Role of Food Safety Officer	

4	Food packaging	15
	Introduction of Food packaging	
paidriday 15	Objectives and need of food packaging,	H.G. Harne
	The state of the s	1
	Wood, cloth, paper, metals, glass, plastic packaging, basic types	J.B merinal
		acumba/da/l
	additional packaging materials, adhesives used in food	dinamana4
	packaging, printing of packaging materials	arinan 7 G
	Properties of packaging materials	Lita giluta
	Food packaging systems and american the said the	. 8.1 5 m2
	Different forms of packaging such as rigid, semirigid and	ammer/ad
	flexible forms, retortable pouches, tetrapack - packaging system	
	for dehydrated foods, frozen foods, dairy products, fresh fruits	Any othern
	and vegetables, meat, fish, poultry, sea foods, vanaspati ghee &	
	basmati rice	
	Deteriorative changes in foodstuff and packaging methods for	
	prevention, shelf life of packaged foodstuff, methods to extend	
	shelf- life	1
	Package labeling	2
	Functions and regulations	
	Packaging Machinery	
	Bottling, can former, form fill and seal machines, bags, vacuum	2
	packs unit, shrink pack unit, tetra pack unit	
	Advanced Packaging Technologies:	
	RFID, Bar Codes, ESD protective packaging	

RECOMMENDED READING:

Essential reading:

- 1. SH Wiling & JR Stoker. 4th Editio. GMP for pharmaceuticals, A plan for TQC, Marul Dekker Inc, New York, 1997.
- 2. WA Gould & RW Gould. Total Quality Assurance for the Food Industries CTI Publications Inc, USA 1988
- 3. WA Gould. Current Good Manufacturing Practices for Food Plan Sanitation CTI Publications Inc. USA 1980
- 4. B. Srilakshmi. Dietetics. Seventh edition. New age international publishers
- 5. Booth, G.R. (1997). Snack Food, New Delhi: CBS Publishers and distributors.
- 6. Salunkhe, D.K. &Kadam, S.S. (2005). Handbook of Vegetable Science and Technology.

Suggested reading:

1. R.G. Hansen, B.W. Wyse, A.W. Nutritional Quality Index of Foods; Sorenson AVI Publishing Co., Inc., 1979.

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- Robert E.C.Wildman. Handbook of Nutraceuticals and Functional Foods Edited by, Routledge Publishers.
- 3. Nutraceuticals by L. Rapport and B. Lockwood, Pharmaceutical Press.
- 4. D'Cunnha, J.F. (1998). Modern Food Packaging, Mumbai: IIP.
- 5. Duffy, J.I., (1981). Snack Food Technology, New Jersey: Noyes Data Corporation.
- 6. Smith, J.S. &Hui, Y.H. (2004).Food Processing Principles and Applications. Blackwell Publishing

Any other reference sources as recommended by the course instructor.

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Packaging Machinery

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RECOMPLEMENT READING:

 SH Wilmg-& JR Stoken, 4th Editio, GMP for pharmaceuticals, A plan for TQC, March Deldoer Inc. New York, 1997.

2. WA Gordd & R.W Gordd. Total Quality Assurance for the Fred Industries (TT Publiculium Inc.

3 WA Gorld, Current Good Manufacturing Practicus for Food Plan Smithion CTI Publications

4. B Setlakshini, Dieterics, Soventh odificin, New ago internazional gablishur-

2. Henriff of R. (1864) Sunst Lood New Deltill CBS Landishers and distributed

	Practical PS				
	Practical	Credit	oor (semo)		
171	(Hours per week)	Tanching Schools			
1	Estimation of Vitamin C by Iodometry/ DCPIP	method	aragino.		
2	Isolation of Lycopene from tomato	method	rmott		
3	Estimation of Reducing and Non reducing suga	ar	194] Edna (6		
4	2 Partition of Regions and Lon Leasanne and				
5	Determination of microbial load in food sample		ie salate		
6	Commensuration of the second management of the				
7		te Individio seaso, substances			
8	Estimation of two microminerals	ol affile stendiner ymeren dher ar			
9	Determination of antinutritional factor	as/Sanga	Barrelly and		
10	Estimation of Sodium Benzoate from Jam/Jellie	cs/Sauces	Istum H. V.		
	Food adulteration test				
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sales and the sa	te va us as baild a good impression and positive imperation for able to. content of soft abilis through instruction, learned perfect body language in communication. out discussion: incertage: languages and propin the computing skills in routine life to get adapt or plant.	erical world in a collaborative made strenges; erican of the course, bearness would be importance, the role and the sirrors demonstration and practice into the importance of employing late the importance of employing in middle to participate in graph included and apply amongstial skills of coverance. Outline of Syllabora (per cession Description)	with the sext problems on Consecutive CO1: Apply acquir CO3: Trans delist CO4: Corre		

Program: M.Sc. Biochemistry Course: Social Skills Teaching Scheme			Semester: III		
			Course Code: PSMABC302		
			(Aleek)	Evaluation Scheme	
Lecture (Hours per	Tutorial (Hours per week)	Credit	Continuous Assessment and Evaluation (CAE)	End Semester Examinations (ESE)	
week)		70007	activities and function	The St. American Const.	
4	•	4	25%	75%	

Learning Objectives:

Soft Skills, a buzz word today has attracted the attention of all professionals. Employability, being the major concern today, every individual aims at getting coveted jobs. Employability today is commensurate with proving multiple skills in varied situations in a fast-changing world. Hence, everyone aspiring for jobs today has to prove one's mettle in various situations where one requires to be armed with different skills, which, collectively come under Soft Skills. One may be armed with good competence of one's subject but one cannot compete with his peer groups unless one has the potential of performance. Performance can be ensured with the demonstration of certain abilities that can help a professional communicate, corroborate, convince, evaluate and look into the continuing as well as the upcoming trends of the corporate world from time to time,

The objective of the programme is to inculcate potential skills in the learners to prepare them to deal with the external world in a collaborative manner, communicate effectively, take initiative, solve problems, and demonstrate a positive work ethic so as to hold a good impression and positive impact.

Course Outcomes:

After completion of the course, learners would be able to:

- CO1: Apply the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
- CO2: Translate the importance of employing perfect body language in communication
- CO3: Develop an ability to participate in group discussion / meetings / interviews and prepare & deliver presentation
- CO4: Correlate and apply managerial skills and computing skills in routine life to get adapted to any work environment.

	Outline of Syllabus: (per session plan)		
Module	Description	No of hours	
1	Soft Skills Development-I	-15	
2	Soft Skills Development-II	15	
3	Health Awareness	15	
4	Managerial and computing skills	15	
	Total	60	
PRACTIC	CALS	60	

Module	Social Skills Televicille lattices have militarily	No. of Hours/Credit 60/4
1	Soft Skills Development-I	15
	Personal Skills Personality Development- Self Esteem, Positive Thinking, Johani Window, Physical Fitness	3
	Emotional Intelligence (EI) & Quotient (EQ) Meaning, Components of EI, IQ v/s EQ, Components of EI, Skills to develop EI	4
	Etiquettes & Manners – Meaning, Professional & Technology etiquettes. Communication Skills	3
	Process & Significance of Communication, Verbal, Non- verbal, formal & informal communication, Barriers, Techniques to improve LSRW, Intercultural & Digital Communication Interpersonal Communication: Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationships 7 through effective communication; listening skills; essential formal writing skills; corporate communication styles—	5
	assertion, persuasion, negotiation.	1.0
2	Soft Skills Development-II	15
	Creativity at Workplace Types of Workplace, Creativity/ Motivation/Innovativeness/ Initiative at Workplace Ethical Values Ethics/ Values/ Morals, Nurturing work ethics, Gender, neutrality,	2
	Human Rights Capacity Building	3
	Learn, Unlearn & Relearn, Skills for capacity building, Zones & Ideas for Learning, Strategies for capacity building. Group Discussion Ambience & Seating arrangements for GD, Importance &	4
	significance of GD, GD/ Panel Discussion/ Debate, Types of GD (Topics – based & Case- based), Analysis of personal traits in GD. Employment Communication CV & Resume Building, Scannable CV, Formats of CV/ Resume/ Job Application/ Covering Letter, professional presentations. Job Interviews Background information, Types & preparatory steps for Interviews, developing interview Skills, Mock Interviews, FAQs in Interviews.	3

3	Health Awareness	15
kina Jina	Personality and mental disorder	5
21	Definition Islandan I	
	Assessment of Personality,	
	Personality Disorders Personality Traits and Abilities and Seafaring	
	Introduction to the most common mental disorders	
	Risk Factors associated with noor mental health	
	internalizing and externalizing behaviors	
	Diagnosis of mental health problems	
	Stress	
	Definition	5
	Eustress and Distress	
	Work related stress factors,	
	Manifestations of stress Stress Management	
	Stress Management	
	Stress coping skills	
	Stress inoculation training	
	Management of various forms of fear (examination fear, stage fear	
	or public speaking anxiety)	
	or public speaking anxiety) Dealing with crisis and disasters	
	Anger Moulettogen .notabletter .notreses	3
81	D. C. Maria and C.	- 4
	Comparative account of hostility and Aggression	
	dealing with anger effectively and productively	
	Anger as a Social Script	
	Biological clock	1
	Biological clock Importance of sleep	1
4	Managerial and computing skills	15
	Time management	2
	Time wasters- Procrastination.	
	Time management tips and strategies.	
	Advantages of time management	
	Spreadsheets appropriate to the state of the	5
	Introduction to workbook, Building, Modifying, navigating	
	Worksheet: Autofill, copying and moving cells, inserting and	
	deleting rows, printing	
	Formulas and functions:	
	Troubleshooting formulas	
	Functions and its forms- database, financial, logical, reference,	
	mathematical and statistical	
	Databases – Creating, sorting, filtering and linking	
	I PERSONAL AND ADDRESS OF THE PERSON OF THE	

Information Management	
Email-reading, composing, responding, attachments, signature,	
junk mail	5
Word Processing (Azaw 190 Etmili)	
Formatting – Paragraph and character styles, templates and	
wizards, table and contents and indexes, cross referencing	
Tables and Columns - Creating, manipulating and formatting	
Important feature of word processing tools	11=1 =11
Understanding Toolbars	HIW YI
Word Art, Mail- Merge, Hyperlink	reducing.
Additional Features (Drop Cap, Auto-Correct, Word Count,	Permins
Change Case, Book Marks)	on sold
Split & Arrange Screen, Protect Document	ats and

RECOMMENDED READING:

Essential reading:

- 1. Gajandra S Chavan& Sangeeta Sharma Soft Skills- An Integrated Approach to Maximize Personality Development, Wiley India
- 2. A Guide to Mental Health & Psychiatric Nursing by Sreevani R
- 3. Mansfield, Ron. Working in Microsoft Offic, Tata McGraw Hill, 2007.
- 4. Davis, Guy Hart. Microsoft Excel 2007, Tata McGraw Hill, 2007.
- 5. Hurlock, E.B. Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill, 2006.

Suggested reading:

- 1. Barun K Mitra Personality Development and Soft Skills, Oxford.
- 2. M S Rao Soft Skills- Enhancing Employability, I K International
- 3. Ricky W. Griffin, Cornerstone: Developing Soft Skills by Sheffield, Person India Management: Principles and Practices

Any other reference sources as recommended by the course instructor

	Practical P	PSMABCP32		
	Practical (Hours per week)	Credit		
	4	2		
	Practical F	PSMABCP32		
1	Estimate your time commitment of the week	THE WILLS OF ONE DUTY STATE SEX OF SEASON		
2	Do Self WOT analysis	gadini - Austral State State		
3	CV Writing			
4	Group discussions			
5	Personal interview			
6	Case studies on personality development	College Court And Comments		
7	Case studies on stress management	rating area of records 4 aring		
8	Case studies on time management			
9	Tutorials on computing skills based on concepts in syllabus			

Covential conding:

Conjuncted Conding:

Conjuncted Schwarz Statem Soil Skills- An Integrated Approach to Max

Personality Development, Wiley India.

C. A Quillo to Mental Health & Psychiatra Naturing by Strevani R.

Schjansfield, Rom Working in Microsoft Offic. Tom McGraw Hill, 2007.

Dayon, Guy Mart, Microsoft Progr. 2007. Ten McGraw Hill, 2007.

Unitock, v. D. Psesonapry Development, 28th Reprist. New Delhi: Tan McGraw Hill, 2006.

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 Marky W. Giriffin, Commentour: Districtping Soft Skills by Shelffel Delegation and Description.

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Program: M.S	cBiochemistry		Semester:	III
Course: Virolo	gy and Emerging	Trends	Course Co	ode: PSMABCH303
in ,n2	Teaching Schem	merglag Trenda	Evaluation	on Scheme
Lecture (Hours per	Tutorial	Credit	Continuous Assessment and	End Semester Examinations
week)	(Hours per week)	Credit	Evaluation (CAE)	Examinations (ESE)
4	pro eds	anni 4 je ili sasta	25%	75%

Learning Objectives: The learner is acquainted to virology. The life cycle of viruses is dependent on the type of nucleic acid composition matter and its replication is mediated through different mechanisms. This guides way to understanding the most effective modality for viral control. The learner will gain insight into the emergence of recent endemic and pandemic due to new species of viruses. The basic concepts of ethics and safety that are essential for different disciplines of science. This course helps to adhere to the ethical practices appropriate to the discipline at all times and to adopt safe working practices relevant to the bio-industries & field of research.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Explain general virus life cycle

CO2: Predict replication strategy of viruses based on genome composition

CO3: Describe the emergence of new viral infections

CO4: Evaluate therapeutic modalities for emerging viral diseases

CO5: Identify appropriate guidelines related to engineering, professional and biotechnology research ethics

CO6: Interpret basics of biosafety and bioethics and its impact on all the biological sciences and the quality of human life

Outline of Syllabus: (per session plan)

Module	Description	No of Hours
1,	Virology Englance multiple sour Louis Agrange and health antitioned for ex-	15
2	Emerging Diseases	15
3	Biosafety and Bioethics	15
4	Quality Management	15
28	Total	60

Module	Virology and Emerging Tr	ends was guidenall	No. of
emerter buttless	Continuous Kadi	Telorist	Hours/Credit 60/4
	Virology (MACM anti-aday)	(3693)	15
Seg ti dependent du diferoni dunal, The sepecies of all is inve- intes and to	Baltimore Classification Life cycle and replication of viruses: T4 Phage RNA-negative strand (VSV), Positive strand (Polio), Segmented (Influenza) Retrovirus- HIV DNA- adenovirus and SV-40 Mechanism of interferon and antiviral thera	membrane: Inciple acid composition In space way to under In maph mo the chies and In adhere to the ethics Ing practices relevant to Research was lete coole general was lete coole	machineibne, Tenence, Tenence, Tenence, Williams The headon and a work and a work the connect of
2	Plaque assay Emerging Diseases	l with the consequence and a	wist 1603
San spans	HIV infection Structure of HIV virus, mechanism of HIV in in infection development, therapy - anti-retro economic loss by HIV at national & international Hepatitis virus Types of hepatitis infection, spread and prever Viral outbreaks	nfection, role of T cells oviral therapy, HAART, onal level.	equant 4 squant 4 squant 5000 squant 6000 squant 6000
15	SARS-CoV-2, MERS, Ebola, H1N1, and Zik Concept of Variants Preparedness and Response for emerging infe		mild E
3 00	Biosafety and Bioethics		15
	Introduction Historical Backround Biological Safety Cabinets		3
	Working of biosafety cabinets, using specification for BSL-1, BSL-2, BSL-3. Primary Containment for Biohazards	protective clothing,	2
	Discarding biohazardous waste – Method Autoclaving & Incineration	lology of Disinfection,	2

Programs M.Sc.-Blochenisisy

lui espellik	Recommended Biosafety Levels for Infectious Agents and Infected Animals Classification of microorganisms based on the risk Biosafety guidelines Overview of National Regulations, Cross border movement of germplasm; Risk management issues - containment. Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, RCGM, GEAC etc. for GMO applications in food and agriculture; Environmental release of GMOs; Risk Analysis; Risk Assessment; Risk management and communication; Bioethics Ethical implications in diversity, GMO's, medicine and research. Social and ethical implications of biological weapons.	A september of the sept
4	Quality management	15
	Total Quality Management and its importance Good Practices in QC laboratory Schedule L1, standardization of reagents, labeling of reagents, control samples, controls on animal house, data generation and storage, QC	2 2
	documentation, Microbial contamination spoilage and hazard	2
	Sources of contamination, factors affecting survival and growth, Principles of sterilizations with respect to pharmaceutical industries.	2
	Methods of sterilization: Steam, dry heat, Radiation, Gaseous and Filtration Quality Control of	3
	a) Vaccines (any three) b) Sera c) In-vivo diagnostics ICH Q8 guideline	4
	Objectives, scope, Introduction, Pharmaceutical Development- Drug Products and their components	

RECOMMENDED READING:

Essential reading:

- 1. Pharmaceutical Microbiology Edt. by W.B.Hugo & A.D.Russell Sixth edition. Blackwell scientific Publications
- 2. Prescott's Microbiology 8th Edition by Willey, Joanne, Sherwood, Linda, Woolverton, Chris
- 3. Pharmaceutical Microbiology by Ashutosh Kar

- 4. Goel and Parashar, IPR, Biosafety and Bioethics, Pearson education, India (2013)
- 5. "Bioethics & Biosafety" by Sateesh MK, IK International publications, 2008
- 6. Sree Krishna V (2007) Bioethics and Biosafety in Biotechnology, New age international publishers

Suggested reading:

- 1. Safety Assessment by Thomas, J.A., Fuch, R.L. (2002), Academic Press.
- 2. Biological safety Principles and practices) by Fleming, D.A., Hunt, D.L., (2000). ASMPress.
- 3. Biotechnology A comprehensive treatise. Legal economic and ethical dimensions VCH. Bioethics by Ben Mepham, Oxford University Press, 2005.
- 4. Bioethics & Biosafety by R Rallapalli & Geetha Bali, APH Publication, 2007
- 5. Biosafety And Bioethics Rajmohan Joshi Publishers
- 6. https://bch.cbd.int/protocol

Any other reference sources as recommended by the course instructor.

Thamshearm Amenda		
. Foral Quality Management and its impartance toout Practices in GC inhoratory		İ
Schedule I.1. sumdardizaçãos of reagents, labeling of respects, control sun ples, centrols on animal house, data generation and storage, QC		
decumentation; Microbial contamination spollage and harged		
Squizes of contamination, factors affecting sarvival and growth. Principles of sterilizations with respect to pharmacentical industries.		
Methods of configurous Steam, dry heat, Radiation, Gastras and Fritzanion	Ž.	Ì
Quality Control of a) Vaccines (any three) b) Sees	p	
c) In-vivo diagnostics ICH Q8 guideline		
Edglectives, scope, introduction: Pharmac stilled Development Drug Products and their companies.		

To develop seientific temper and interest by expressive through industrial visits and study's the attental tours is recommended in each semester.

ROARDANDI GRUVERIMOOSE

Pharmacentical Microbiology - Eds by W.P.Lingo & A.D.Russell-Scattzelnion, Bluelowell

2. Frescop's Microlinategy 8th Felinan by Willey Jonney, Sherwood, Linda Woodveron, Chris

3. Florencestical Microbiology by Automobil Ear

Program: M.S	c. Biochemistry			Semes	ter: III
Course: Manage	ement Process		199501	Course	e Code: PSMABC304
EM6	Teaching Scheme			Evalua	tion Scheme
Lecture (Hour per	Tutorial (Hours per	Credit	Continu Assessmen		End Semester Examinations
week)	week)		Evaluation	(CAE)	(ESE)
4	91.00	4	25%	HALL TO A SEC	75%

Learning Objectives:

This course is designed to be an overview of the major functions of management. Emphasis is laid on planning, organizing, directing and controlling. Six Sigma skills are widely sought by employers both nationally and internationally and have been proven to help improve business processes and performance. This course will introduce the learners to the purpose of Six Sigma and its value to an organization. Learners will be able to apply cost concepts and cost behaviours in the solving of management decision and understand individual and group behaviour in organizations, including personality, thinking, learning & perception. It aims at enabling the students to develop a holistic and a critical understanding of sustainability around issues related to the environment.

Course Outcomes:

Total

After completion of the course, learners would be able to:

- CO1: Apply knowledge about management models and practices, enabling the learners to become effective professionals
- CO2: Identify situations where Six Sigma methodology could give an important contribution to quality improvement with regard to product and process development within industrial and service contexts
- CO3: Develop peer-based learning and working in groups and cross-functional skills
- CO4: Identify causes and effects of human behaviour in an organizational set-up
- CO5: Understand the basic concept of Sustainable Development (SD), the environmental, social and economic dimensions.
- CO6: Examine critically the 17 newly minted UN Sustainable Development Goals and suggest methods for assessing the achievement of sustainable development
- CO7: Articulate the major issues affecting sustainable development and how sustainable development can be achieved in practice.

Module	Description	No of hours
1	Principles of Management	15
2	Organizational behavior	15
3	Auditing in food industry and Accreditations	15
4	Environmental Management and Sustainable Development	15
Control of the Control		

60

Module	Management Process	Sc. Burchenistry igeniest Process Fracking Scheme	No. of Hours/Credits 60/4
L'Scott Rer	Principles of Management		9343915
ESE)	Nature of Principles of Management Significance of Management Principles	(Hours per week)	(#Eur par week)
7,8%	Theories of Management Henry Fayol's Administrative Theory of		tdO maranal
man is held on complaying both	14 Principles of Management Fredrick Winslow Taylor's scientific Ma	nagement Theory	Tim come is planting, organ
bus sessioning as of order or i of management		internationally and have bis course will introduce annes will be deleteraupply	
ayarsiganaa a garsigida yirisa To gadiyaateedaa	Staffing Directing Co-ordinating	departed princularitand and gre- option. It mate it varifiling it must be not related to the pa- mics:	deciment and a rest of the contract of the con
Sourced of any	Case studies on the above principles	on of the course, learning or move trains who stemments or	Lidonaud Chia
2	Organizational behavior	All the comments and a	15
ben hirdenhin ben hirdenhin s lintats Jahranh	Individual Behaviour Personality, Perception, Values, Attitude Group Behaviour Team Building, Leadership, Group Dyna	, Learning and Motivation	CO3: Davido
aldiumitus, w	Personality types:	for assessing the achiever to the major become affi ment can be achieved as a	bodism distribution
	Big 5 and MBTI	labus: (per session plan)	Outline of Spi
No of hour	• 6 Personality factors affecting OI Six sigma	Description	2
l) l	Foundations and Principles Origin of Six sigma		11 1
13	Purpose and Methodology		
- 6		representative http://www.com.com	
3	Auditing in food industry and Accredit	ations	15

Proce 19 of 46

	Food auditing	TELL SWIMON
		galtinat feita:
	Types of audits: internal audit, second party audit, third party audit	
	Seven principles of ISO Auditing, ISO 19011Requirements	L Business E
	Aspects of food safety- 120 30 values well analyzed the relations of the safety-	
	Legal aspects, Prevention of Food adulteration act of 1954;	5
	HACCD TO SEDA ACMADY ICI ECCAI	
New Delhi	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	Standard Operating Procedures	
	Preparing scope, quality policy and operating procedure -	
	purpose INTO I Department V. E. D. of season beautiest with	
	Accreditations - La & matted bear 1 and appropriate limit	
	IAF, QCI, National Accreditation Board for Testing and	3
	Calibration Laboratories (NABL)	
4	Environmental Management and Sustainable Development	15
	Introduction to energy economics	6
	Regulatory approach to environmental management	
	Carbon footprint	v
	Economic instruments for pollution control-Carbon Credit, Green	
	Audit	
	Nuclear energy and climate change	
	International climate change agreements – UNFCCC, The Kyoto	Y
	Protocol, Doha Amendment, Paris Agreement	4
	Introduction, Need and concept of Sustainability	3
	Social, Environmental and economic sustainability	
	Challenges for social development	
	Sustainability metrics: criteria and indicators	
	Sustainable Development Goals (SDGs)	6
	Evolution of SD perspectives (MDGs AND SDGs) over the years	
	1987 Brundtland Commission and outcome- later UN summits (Rio	
	summit, etc.) and outcome	
	summit, etc.) and outcome Ideation for SDG attainment from a Indian Perspective	v
	Ideation for SDG attainment from a Indian Perspective	¥
	Ideation for SDG attainment from a Indian Perspective Modern business models for sustainable development	v
	Ideation for SDG attainment from a Indian Perspective	V

RECOMMENDED READING:

Essential reading:

- 1. Organizational Behavior by Stephen Robbins 4th Edit forms in an analysis and the same of the same o
- 2. Business Ethics: Concepts and Cases by Manuel G.
- 3. Management: Principles and Practices by Ricky W. Griffin
- 4. Six Sigma for dummies Craig Gygi, Neil DeCarlo Bruce Williams
- 5. Management Principles and Practices, N.K.Sharma, Mangal Deep Prakashans, Jaipur
- 6. Principles and Practice of Management, T.N.Chabbra, S. Chand & Company Ltd. New Delhi

Steadard Openiting Procedures

Suggested reading:

- 1. Financial Management- Prassanchandra
- 2. Business Ethics: Text and Cases by C.S.V. Murthy 010 Ed
- 3. Organizational Behaviour by Fred Lathan's Ed

Any other reference sources as recommended by the course instructor

Everyona (curte Stanagement and Sustainable Tevelopment

Invaduation to energy economics

Regulatory approach to environmental management

Carbon footpains

Factorouse footpains

Factorouse footpains for pelinden control-Carbon Credit, Green

Nuclear energy and alimate change

International change agreements—UNFCCC, The Syeta

International change agreements

Protocol, Floha Amendment Paris Agreement

Protocol, Floha Amendment Paris Agreement

Social, Environmental and economic sustainability

Challenges for social development

Sustainability metrics, epitaria and indicators

Sustainability metrics, epitaria and indicators

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Evolution of 5D perapreques (ApaGs AsQ Social) over the you's

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Program: M.Sc. Biochemistry	Semester: III Course Code: USMABCP33	
Course: Research Project		
Teaching Scheme	Evaluation Scheme	
Assessment and Communities	End Semester Examinations (ESE)	
Credit Credit	vicely) wedgi	
4	200	

Program: M.Sc. Biochemistry	Semester: III
Course: Internship	Course Code: USMABCP3
Teaching Scheme	Evaluation Scheme
Credit	End Semester Examinations (ESE)
24	600

	manufacture for a first manufacture of the continuous and the continuous and the continuous and the continuous	
	Practical PSMABCP3/33	-04E31F6/# KI
(GUIDELINES TO CARRY OUT INTERNSHIP / PROJECT IN SEMEST	ER III
awhed 1,	The goal of the internship / research project (04 credits) course is to be sunational education policy mission to enrich skills set in students. The current opportunity to connect the students to the industry to bridge the industry-acade to give them hands on experience for research.	t course is ar
2.	Duration of Internship / Project: Depending on the nature of internship, the internship / project is recommended as minimum 600 hours during Semester	
3.	Nature of Work: The learner should submit a thesis for the work conducted.	
5,	syllabus: Sper resslant plans:	
ned Ja	LP 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
	Recombinant DSAS Fedintology-II	
	Harism and musics or the boronical software	

Program: M.	Sc. Biochemistry		Semeste	
Course: Adva	nces in Biochemical S	Sciences-II	Course	Code: PSMABC401
EAT DAT	Teaching Scheme		Evaluation Scheme	Course: Research P
Lecture (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment and Evaluation (CAR	
4	005	4	25%	75%

Learning Objectives:

It is vital to familiarize the student with emerging field of biotechnology i.e. Recombinant DNA Technology as well as to create understanding and expertise in wet lab techniques in genetic engineering, Hence the course objective is to offer detailed knowledge about the fundamentals of recombinant DNA technology, in terms of reagents, techniques and strategies along with their applications. It is an important aspect of course to familiarize students with the basic concepts in nutritional genomics and to develop an understanding of genomics and gene regulation with respect to diet and to obtain an appreciation for the role and importance of nutrition in prevention of polygenic diseases. Immunochemistry is an advanced area of immunology that deals with the chemical components and chemistry (chemical reactions) of immunological phenomena, Immunochemical methods are processes utilizing the highly specific affinity of an antibody for its antigen which are highly important in diagnostic and clinical context. Therefore, the course structure us designed to give an insight into immunochemical and histochemical techniques.

Course Outcomes: At the end of the course learners will be able to:

CO1: Explore and appreciate the applications of Recombinant DNA Technology (RDT)

CO2: Realize the essentials of the science of nutritional genomics differentiating between nutrigenomics and nutrigenetics.

CO3: Develop an advanced understanding of the unique roles that foods, nutrients, and microcompounds therein play in chronic diseases with a focus on their role in nutritional genomics

CO4: Appreciate the applicability of the science in practice with an emphasis on the current testing that is available, and the ethics and legality involved with nutrigenomic.

CO5: Describe and distinguish the types of immunochemical techniques

Outline of Syllabus: (per session plan)

Module	Description	No of hours
1	Recombinant DNA Technology-I	15
2	Recombinant DNA Technology-II	15
3	Recent advances in Biochemical science	15
4	Immunological Techniques	15
	Total	60
RACTICA	LS	60

Advances in Biochemical Sciences-II	No. of Hours/Credit 30/2
Recombinant DNA technology-I	15
Restriction and modification system Restriction and modification enzymes: Types, properties and uses restriction enzymes and methylases Ligases Construction of restriction maps (Numericals and case studies) Plasmid cloning vectors; Properties of ideal plasmid cloning vectors. Vectors for cloning large fragments of DNA- Cosmids, PAC, YAC, BAC	6
I torrel us feed record wild and a common by the common by	
Construction of recombinant DNA Formation of cDNA from RNA, Construction of DNA library;	2
Screening of RDNA Libraries Preparation of nucleic acid probes (5' and 3' end labelling, random primer labelling, nick translation, biotinylated probes) and their use in screening gene libraries.	4
Immunological screening. Subcloning of genes Chromosome walking. Applications of RDT: Medical and Biological applications Agricultural Environmental	3
Antisense technology and therapeutics	
Recombinant DNA Technology-II	15
Sequencing in RDNA technology Agarose gel electrophoresis of nucleic acids Pulsed field gel electrophoresis. Southern, Northern and Western blotting Gel retardation assay DNA foot printing by DNase I DNA sequencing by Maxam-Gilbert and Sanger's methods automated DNA sequencers Sequencing of RNA. Introduction to next generation sequencing (NGS): Pyro	6
	Recombinant DNA technology-I Restriction and modification system Restriction and modification enzymes: Types, properties and uses restriction enzymes and methylases Ligases Construction of restriction maps (Numericals and case studies) Plasmid cloning vectors; Properties of ideal plasmid cloning vectors. Vectors for cloning large fragments of DNA- Cosmids, PAC, YAC, BAC Eukaryotic cloning vectors: YIp, YEp, YRp, Mammalian Artificial Chromosome Construction of recombinant DNA Formation of cDNA from RNA, Construction of DNA library; genomic vs cDNA library Screening of RDNA Libraries Preparation of nucleic acid probes (5' and 3' end labelling, random primer labelling, nick translation, biotinylated probes) and their use in screening gene libraries. Immunological screening. Subcloning of genes Chromosome walking. Applications of RDT: Medical and Biological applications Agricultural Environmental Commercial Antisense technology and therapeutics Recombinant DNA Technology-II Sequencing in RDNA technology Agarose gel electrophoresis of nucleic acids Pulsed field gel electrophoresis. Southern, Northern and Western blotting Gel retardation assay DNA foot printing by DNase I DNA sequencing by Maxam-Gilbert and Sanger's methods automated DNA sequencers Sequencing of RNA.

or, av Unit Asionb Dan	sequencing and whole genome shotgun sequencing Amplification of DNA:	4
	PCR- Basic Principle Types of PCR - end point PCR, real time PCR, qPCR, Reverse transcription PCR, inverse PCR Primer designing, 5' and 3' RACE	
	Polymorphism at genetic level and their detection techniques DNA markers- VNTR, STR, microsatellite, SNP RAPD	5
	SNP AFLP DNA finger printing	
3	Recent advances in Biochemical science	15
, ,	Nutrigenomics: Scope and basic concept Nutrigenomics v/s Nutrigenetics Nutrient-Gene Interaction	7
	Nutrition-induced diseases- genetic aspects. Role of Leptin, Ghrelin, Adiponectin in food intake Nutrigenomics and personalized Nutrition.	8
	Beyond Nutritional Genomics and Genetics: - Metabolomics, proteomics, and microbiome (The intestinal microbiota) Nutrigenomics in food safety evaluation Ethical and legal considerations.	0
	Genome editing by CRISPER/Cas9 technology-working and its applications Micro/siRNA technology and applications in studying gene functions	
4	Immunological techniques	15
	Factors affecting antigen antihody hinding	1
-,21	Immunotechniques Immunoprecipitation and Immunodiffusion Agglutination	2
	Immunodiagnostics: Antigen-antibody binding and assays. Cytotoxicity and cytokine assay Immunoassays- types (RIA, ELISA, ELISPOT, Chemiluminescent IA, FIA, DOT blot, Immunofluorescence) and specific applications. Immunohistochemistry: Principle and techniques. In situ localization technique- FISH and GISH	12

Immunodiagnostics for detection of infectious	agents-Widal,	
VDRL, HIV, Measle,	Practical	
Immunosensors	Hours per modify	
Immunoscreening of gene library	b	
Determination of total IgE, RIST, RAST	2700,	E Ne. 1
Vaccines: types, their advantages and disadvar	ntages; new	
vaccine strategies Techniques related to hypersensitivity; leukocy	yte migration	
inhibition assaultgoursly aver	icoloris of plannid by agar	
Flow cytometry Fluorescence activated cell sorter technique (F	FACS).	

RECOMMENDED READING:

Essential Reading:

- 1. Glick, B. R. and Pasternak, J. J. 1994. Molecular Biotechnology: Principles and applications of recombinant DNA. ASM Press, Washington D.C.
- 2. Brown, T. A. 1995. Gene Cloning: An introduction. Chapman and Hall, London
- 3. Goldsby, R. A., T. J. Kindt and B. A. Osborne. 2000. Kuby Immunology. W. H. Freeman and Company, N. Y

Suggested Reading:

- Kreuzer, H. and A. Massey. 2001. Recombinant DNA and Biotechnology. ASM Press, Washington D.
- 2. Devlin TM. Textbook of Biochemistry with Clinical Correlations. New York: John Wiley, 2016-2018/ Latest edition.
- 3. Carlberg C., Ulven SM & Molnar F. Nutrigenomics. Springer International Publishing Switzerland 2016.
- 4. Shils M.C., Olson T.A. & Shike M. Modern Nutrition in Health and Disease. Philadelphia: Lea and Febiger, Latest edition
- 5. Most Recent Nutritional Genomics and Molecular Biochemistry Textbooks and Articles.
- 6. Brody T. Nutritional Biochemistry. New York: Academic Press, Latest edition.

Any other reference sources as recommended by the course instructor.

	Pract	tical PSMABCP41- Practical-IX
	Practical (Hours per week)	Credit W
	4	medit specific springs 2 2
Sr. No.	Topic	Determination of total ligh, RIST, RAST
1	Case studies and Numerical	ls on restriction digestion
2	Plasmid isolation (mini pre	p method)
3	Isolation of plasmid by again	
4	Polymerase chain Reaction	(PCR) Allamolys wolf
5000	Molecular weight determina	ation of proteins by SDS PAGE
6	Outcherlony's double diffus	
7	Manicini radial immunodifi	fusion method
8	Dot Blot (Kit Method)	Esqualid Republiga
9	Western blotting	A Chicago S. R. and Plancemer S. J. 1999. Mashingun D.C.
10	Tm of DNA	2. Brown, T. A. 1995. Gene-Cloning, An introduction, Clin
nite ma	Demonstration Experimen	as. Goldsby, R. A., I. J. (Goldsby, A. Osborne, 2000)
Α	Immunofluorescence	7 (1) (August 7
В	Flow Cytometry	Suggested Readings
С	RIA, ELISA	 Kreuzer, H. and A. Massey 2001, Recombining DISA and
D	Blood spectroscopy, (only o	oxy Hb, meth Hb, acid and alkali hematin, reduced Hb)

year admir reference sometime recommended by the course instructur.

2000

Program: M.Sc	Biochemistry		Semester:	IV
Course: Advance	ced Immunology		Course Co	de: PSMABCH402
	Teaching Scheme		Evaluation	Scheme
Lectures (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment And Evaluation(CAE)	End Semester Examinations (ESE)
4	- emate	mana4mi by	25%	75%

Learning Objectives:

The learner is introduced to cells and organs of the immune system and the mechanism including mechanism of differentiation, maturation and role of receptors. In addition, the learner grasps insight into development of the immune system and the interaction of cell mediated and humoral immunity. Antibody are central to the immune system and the learner gains knowledge regarding its structure, organization, expression and regulation of the immune response. Other molecules involved in immune response including MHC, complement system and the role of antigen presenting cells are also dealt with.

Cytokines are being crucial for the body's immune system, its role and their application for therapeutic purposes is transacted. The learner also recognises the different types of immunological responses to different infectious agents, and during transplant rejection. Types of immune response associated with allergy and autoimmunity is also studied.

Course Outcomes:

After completion of the course, learners would be able to:

- CO1: Compare and contrast the mediators of innate and acquired immunity.
- CO2: Describe the structures and functions of immunoglobulins, MHC and complement components
- CO3: Categorize the phenomenon leading to diversity of antibodies, T-cell receptor and MHC. functions and
- CO4: Relate the immunological functions of complement system and MHC molecules
- CO5: Apply the knowledge of cytokines for their application in clinics
- CO6: Analyse the immune response elicited to infectious diseases caused by bacteria, viruses, fungus and protozoa
- CO7: Describe autoimmunity and immunological response in transplantation

Outline of Syllabus: (per session plan)

Module	Description		No of Hours	
1	Elements of Immunology	DIIN'	15	
2	Humoral Immunity and Cell Mediated Immunity	intrate	15	
3	Immunological molecules and Immune response	E vel	15	
4	Transplant Immunology, Hypersensitivity and Autoimmunity	OHM	15	
	Total vuotootouva lies-T am	egittmi	60	
PRACTI	CALS POSITION REAL PROPERTY DATE OF THE PROPERTY DATE.	mb T	60	

Module	Advanced Immunology			o. of
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annlian	street Credit Assessment And Exam	meli) te	0.510	50/4
1 (3)8	Elements of Immunology	1917	(alpo)	15
AVV	Introduction to Innate and Acquired immune responses		į.	3
	Barriers and Toll like receptors, HI and CMI,	lisjectives:		
gnibulani		genicity,		
trigizni zg	epitopes, haptens, adjuvants and mitogens.	er dittenentual	metm	ntonia
	Clonal selection theory and Memory	Mirrord port (group)		3
Almxint.	Cells and organs of Immune systems	ath of Monas a		
m baylos	Calla af the immune arrators	F RESTRICTED TO		HARLEON
	Primary and secondary Lymphoid Organs	manian senor		3000
	Immunoglobuline	23174		TE OVILLE
		and grien st	r Ranni	3
	Organization and expression of immunoglobulin	men sa sawadana	SILLO	
switchera	genes	STREET TREASURED		nden
	Immunoglobulin variability and genetic basis of antibody di	versity		3
	Monoclonal antibodies	25222203	3757 (2)	
	Production and clinical uses	no say to mous		DBILA.
	Engineered monoclonal antibodies, Chimeric and hybrid monoclonal	noclonal		C02
	antibodies			20.3
	Applications	MICHINE MICHIEL MICHIGAN		100
2	Humoral Immunity and Cell Mediated Immunity	i)iis enoil		15
	Charles CMM bear matery househours to motion & brought	omente offici	dati.	2
	B cell and T cells mile in nonnellega right vol remisional to be	ly the knowled	my-	C\$5
nisęk,			OHLA.	ario o
	T cell receptor complex and accessory molecules,		E/x())	
	rearrangement,		260	100
	T cell and B cell receptors in T/B cell activation	and) esterphis		
200001	Antigen presenting cells	Description	le	3.1/
	Autient contains and managing of aution (and	Ann SHAMSTA		
6	Antigen representation and processing of antigen (end	ogenous and	H	T
	Antigen representation and processing of antigen (end	mm in constrict		4
š.	Antigen representation and processing of antigen (end exogenous) Activation of T and B cells	nooral limitus		
	Antigen representation and processing of antigen (end exogenous) Activation of T and B cells B cell – Maturation, activation and proliferation	mm in constrict		4
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ارة ارة ارة	Antigen representation and processing of antigen (end exogenous) Activation of T and B cells B cell – Maturation, activation and proliferation T cell – Maturation, activation and proliferation MHC restriction, TCR gene rearrangement, thymic sel	ection, super		ξ
1.5 1.5 1.5 1.8	Antigen representation and processing of antigen (end exogenous) Activation of T and B cells B cell – Maturation, activation and proliferation T cell – Maturation, activation and proliferation MHC restriction, TCR gene rearrangement, thymic sel antigens, T-cell cytotoxicity	ection, super		£.
ارة ارة ارة	Antigen representation and processing of antigen (end exogenous) Activation of T and B cells B cell – Maturation, activation and proliferation T cell – Maturation, activation and proliferation MHC restriction, TCR gene rearrangement, thymic sel antigens, T-cell cytotoxicity	ection, super		ξ

Course Code: PTMABCH402

	General structure and functions Cytokine secretion by TH1 and TH2 subsets Cytokine related diseases Therapeutic uses of cytokines	(F)
3	Immunological molecules and Immune response	15
Ę.liwi	Major Histocompatibility Complex (MHC) General organization and inheritance of MHC. Structure of Class I and Class II HLA Polymorphism of MHC Expression Complement System Complement activation by Classical, alternative and lectin pathways Biological consequences Complement deficiency Immune Response to infectious diseases Viral Bacterial Fungal Protozoal Cancer and immune system and immunotherapy Immune responses directed to tumors Cell mediated response and B cell response to tumors Tumor specific antigens, escape mechanisms and potential immunotherapy	A Laberra 3 A Laberra 3 A Laberra 3 A Laberra 4 A Laberra 4 A Laberra 4 A Laberra 4
4	Transplant Immunology, Hypersensitivity and Autoimmunity	15
	Immune Response in Transplantation Types of graft, immunological basis of graft rejection- 1st set, 2nd set rejection- role of T lymphocytes Tissue typing and laboratory investigations- microcytotoxicity test, mixed lymphocyte reaction (HLA Typing) Clinical manifestation of graft rejection, General and specific immunosuppressive therapy Autoimmunity and autoimmune diseases their etiology Immunological tolerance; tolerance vs. activation of immune response, B and T cell tolerance and their general characteristics; mechanism of tolerance induction. Organ specific autoimmune diseases (Hashimoto's thyroiditis, insulin dependent diabetes mellitus, Graves disease and hemolytic anemia) Systemic specific autoimmune diseases (Rheumatoid Arthritis, Multiple Sclerosis,	7
	Theories for autoimmune response Immune Responses	4

Inflammation mediators of inflammation and process of inflammation
Hypersensitivity, Gell and coombs classification
Types I to IV with mechanisms

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

RECOMMENDED READING:

Essential Reading:

- 1. Kuby, Janis, Immunology. 3rd Ed., 1997, W.H. Freeman Co.
- 2. Roitt Ivan and others, Immunology, 6th Ed., Mosby, Edinburg.

Suggested Reading:

- 1. Weir D.M., Immunology, 5th ed., ELBS and Churchill Livingston.
- 2. Chakravarthy A.K. Immunology, Tata McGraw Hill, New Delhi.
- 3. Callaghan Richard B. Immunology, Academic Press
- 4. Weir D.M., Immunology: Student's Notes, ELBS-Oxford.
- 5. Bowry T.R., Immunology Simplified, 2nd Ed., ELBS and Oxford.
- 6. Hood Leroy E., Immunology, 2nd Ed., 1976, Benjamin Cummings Publication
- 7. Topley Wilson, Topley and Wilson's Principle of Bacteriology, Virology and immunity Edward Arnold Ltd., London
- 8. Bruce Alberts. Molecular Biology of Cell. 5th edition. Publisher Garland Science
- 9. Ian R. Tizard. Immunology: An Introduction. Saunders College publishing.

Any other reference sources as recommended by the course instructor.

	Practical PSMAl	BCP42- Practica	l-X	
	Practical			Pengrama M.S.
CUPCAN	(Hours per week)		er Flore employer	Constant Whenest
	E Manual Scheme		Tung Library Septem	
Sr. No.	Topic 3		Islantel	Leenne
1	Estimation of C- reactive protein	Horro	Truj zizouli)	and complete
2	Widal-Qualitative and Quantitative			
3	VDRL			I A
1.4	Pregnancy test	etraducts advirologis	rate transport in the	ejme glubaco. Tecologia
5718	Function Tests: Urea and Creatinine Clearance Test with Clinical Interpretation (case study			
6	Ghost membrane preparation from RBC			
7	Preparation and Estimation of Aspirin (Volumetric Metho	od)	ginolinging in
8 110	Isolation and Estimation of Oxalates fro	om spinach/ Aloe	vera	nlusai tsu Ilay
9	Demonstration Experiments		nalii entiite liigi	other physinian
	 Flow Cytometry RIA, ELISA Blood spectroscopy, (only oxy Hb, 1) Allergen Testing HLA typing HIV detection- screening tests 	nimers would be a ancests in phurm	l alkali hematin, r	educed Hb),

Program: M.Sc. Biochemistry				Semester	
Course: Pharmacology and Toxicology Teaching Scheme		(3/11)	Course Code: PSN		
			Evaluation Schen		tion Scheme
Lecture (Hours per week)	Tutorial (Hours per week)	Credit	Continu Assessme Evaluation	nt and	End Semester Examinations (ESE)
4		4	25%	⁄о	75%

Learning Objectives:

The objective of this course is to make the students' understand the basics of pharmacokinetics and the concept of clinical research. The learner also gains knowledge about the molecular basis of drug action, drug receptor theory as well as classification of receptors. The learner acquires knowledge of pharmacodynamics of NSAIDs and will get acquainted with the nutritional significance of various macronutrients. Diet and nutrition play an important role in maintaining health. The learner will get insight into the sports nutrition, nutrition during exercise, for therapeutic conditions and other physiological states also

This course also includes a module on molecular toxicology to acquaint students' with skills for recognition of exposure of toxicants in man and animal as well as to potentially hazardous environmental factors of chemical, biological and physical nature.

Course Outcomes:

After completion of the course, learners would be able to:

- CO1: Explain the fundamental concepts in pharmacodynamics and pharmacokinetics.
- CO2: Describe the molecular basis of drug action & pharmacological selectivity with special
 - a. reference to structure-Function Relationship
- CO3: Critically evaluate the technicalities of clinical trials and ethical issues pertaining to the same.
- CO4: Follow the stepwise procedure of New Drug Investigation and Application.
- CO5: Analyse dose response relationship, LD₅₀, LC₅₀ and TD₅₀ and therapeutic response, delivery and detoxification of a xenobiotic.
- CO6: Classify toxic substances on the basis of duration, frequency, route and site of exposure
- CO7: Prepare a diet plan for the management in various conditions of health and disease
- CO8: Discuss the interactions between food and drug, supplement and drug and drug-drug

Outline of Syllabus: (per session plan)

Module	Description	No of hour
1	Pharmacokinetics and Clinical Research	15
2	Pharmacodynamics and Investigational New Drug Application	15
3	Toxicology and Xenobiotic Biotransformation	15
4	Role of Drug and Diet in Health and Disease	15
	Total	60
RACTICA	LS	60

Pharmacology and Toxicology	No. of Hours/Credit 60/4
Pharmacokinetics and Clinical Research	15
Pharmacokinetics Routes of drug administration Physicochemical properties of drugs-Chelation, Hydrogen bonding, Surface area, Redox potential, Ionization Pharmacokinetics (PK) and drug metabolism, objectives of PK Analysis in drug discovery Fundamental concepts in- Drug absorption Distribution	6
Metabolism Elimination (ADME) Important PK parameters, Bioequivalence & bioavailability Therapeutic drug monitoring Bioassays-Principles & methods	6
Pre-clinical Studies Models used in clinical research Clinical research- its importance, significance & rationale Clinical Trials- Stages/ Phases I to IV, milestones in clinical trials	3
Ethical Issues International guidelines, patient care in clinical research, conflict of interest. Ethical review: Informed consent, vulnerable populations, biological samples, database confidentiality, frauds & misconducts	
Pharmacodynamics and Investigational New Drug Application	15
Enrichment and Marchanism of Tradesic Variant types of dose response columnships menuphrom to duriving dose response LD to EC at 10m and absorption under Wrightman of pepale and madematical consequent land, areas.	
	Pharmacokinetics Routes of drug administration Physicochemical properties of drugs-Chelation, Hydrogen bonding, Surface area, Redox potential, Ionization Pharmacokinetics (PK) and drug metabolism, objectives of PK Analysis in drug discovery Fundamental concepts in- Drug absorption Distribution Metabolism Elimination (ADME) Important PK parameters, Bioequivalence & bioavailability Therapeutic drug monitoring Bioassays-Principles & methods Clinical Research and Trials Pre-clinical Studies Models used in clinical research Clinical rrials- Stages/ Phases I to IV, milestones in clinical trials Ethical Issues International guidelines, patient care in clinical research, conflict of interest. Ethical review: Informed consent, vulnerable populations, biological samples, database confidentiality, frauds & misconducts Pharmacodynamics and Investigational New Drug Application

16.307	Molecular basis of drug action	4
	Drug receptor theory- antagonist and agonists- types;	stubotic
	Structure-function relationship with respect to proteins,	
	enzymes, ion, channels and other drug targets	
	Classification of receptors- Cellular location & function	
	Non-specific interactions	
	- Parameter and the property of the property o	
	Receptor binding kinetics Computer-based drug designing	
	Pharmacodynamics of:	6
	Anti-inflammatory – Non Steroidal Anti-inflammatory	
	(NSAID) [Ibuprofen], Salicylates – [Aspirins],	
	Paracetamol Househall	
	Cardiovascular drugs- CVS [Ca channel blocker -	
	Amlodipine, and Beta blocker – Proprenolol	
	Antibiotic – Penicillin and Sulphonamide	
	Antacid- Proton pump blocker - Omeprazole	- 10
	Anti-malarial, Anti-coagulants, Antimalarials,	
	Antidiabetic	3
7)	Investigational New Drug and Application	3
	Documents/ Information for filing NDI- animal	
	pharmacology & toxicology studies, manufacturing	
	information, clinical protocols and investigator information	
	New Drug Application (NDA)	2
	Introduction to NDA, NDA forms,	
	contents of NDA, Preparation & Submission of	
	documents, guidance documents for NDAS	
3	Toxicology and Xenobiotic Biotransformation	15
	Introduction and toxic response	5
	Different areas of modern toxicology, classification of toxic	
	substances	
	Effect of duration, frequency, route and site of exposure of	
	xenobiotics on their toxicity.	
	Characteristics and types of toxic response.	\$
	Tolerance and addiction	
	Evaluation And Mechanism of Toxicity	
	Various types of dose response relationships, assumptions in	5
	deriving dose response; LD ₅₀ , LC ₅₀ , TD ₅₀ and therapeutic	-
	index	
	Mechanism of action and resultant toxicities of lead, arsenic,	
	organophosphates and carbamates	
	Management of poisoned patients, clinical methods to	
	decrease absorption and enhance excretion of toxicants from	
	the body,	
	Use of antidotes.	
	Xenobiotic biotransformation	5

	Significance, Phases of xenobiotic metabolism	altary\$1 baharga
مدینی جینی	Types of reactions involved- enzymes Man Hamman and the least	L vadasant
ally them, New	Factors affecting Biotransformation, Induction,	2 Anna P.P.
	Toxicity testing system- CYP assays, Cell based assays	Delite
	Preclinical phase 1 and phase 2 assays	Il noinesti 1
2019	Diagnosis of toxic effects in liver and kidney	
4	Role of Drug and Diet in Health and Disease	a neitw15 7
	Anti-nutritional Factors	7 112 12 12
incett Co.	Trypsin Inhibitors, Pressor Amines, Phytates, Oxalates	1 Hulpan S
W.B. Sumder	Recent trends in Nutrition:	X.1 Vendani 2
	Types of Drug-nutrient interactions	and the
	Drug Nutrient interactions and M. J.	8. Plannwook
	Food-drug interactions	a fallsifel or
	Herbal and Dietary Supplement-Drug Interactions	FINE ME
	2108 200 200	Philadelphi
	Non-starch polysaccharides was a more and the start of th	12. Williams S
	Prebiotics and Probiotics	uncermed7[JC]
	Sugar alcohols in human nutrition	Harping H
	Sweeteners and volum against both A LEI Mr. J. Ind. Lyangaran.	Immolled/i 21
	Fat replacers	15. Tap benine
C.D. Klausson	al Doubl's Toxicology: Bashe Science of The Polsums (20 toil)	17. Cassandh a
	Nutrition during pregnancy, adolescence Sports Nutrition (ANY TWO SPORTS)	
	Nutrition for Exercise	
	Nutrition for Bone health	_
	Nutrition for therapeutic conditions	5
	Hypertension, GI disorders, (peptic ulcer. H. Pylori)	
	Diabetes mellitus: Glycemic Index and its significance	
	Anaemia	
	Renal disorders	
	Jaundice	
	Eating Disorders: Anorexia Nervosa, Bulimia Nervosa	

RECOMMENDED READING:

Essential Reading:

- 1. F.S.K. Barar. Essentials of Pharmacotherapeutics, 3rd Ed., S chand & Company Ltd. 2005.
- 2. B. Srilakshmi Dietetics, 7th Edition, New Age International Publishers
- 3. Swaminathan M., Essentials of food and Nutrition, 2nd Ed., 1985, Ganesh and Co.
- 4. Robinson C.et al, Normal and Therapeutic Nutrition, 16th Ed., 1982, Macmillan Publi. Co
- 5. Cassarett and Doull's Essentials of Toxicology (2015) by Klaassen and Watkins, Third edition, McGraw Hill

Suggested Reading:

- 1. Anderson I et al. Nutrition in Health and Disease, 17th ed., 1982, J.B. Lippincott Co.,
- 2. Anita F.P., Clinical Dietetics and Nutrition's, 4th ed., 1997 Oxford University Press, New Delhi.
- 3. Bennion H., Clinical Nutrition, 1979, Harper Row, New York.
- 4. Carolyn E., et al, Nutrition and Diet Therapy, 7th Ed., 2000, Delmer Publishers
- 5. Gopalan C et al, Dietary Allowances for Indians, NIH, Hyderabad.
- 6. Gopalan C et al, Nutritive Value of Indian Foods, 1988, NIH, Hyderabad.
- 7. Halpern S.L., Quick reference to Clinical nutrition, 2nd Ed., 1987, J.B. Lippincott Co.
- 8. Kinney J.M. et.al, Nutrition and Metabolism in Patient Care, 19thed., 1999, W.B. Saunders and Co.
- 9. Pharmacology, B Suresh, 1st Ed. Shanti, Publication.
- 10. Pike R.L. and Brown M.L., Nutrition: An Integrated Approach, 1987, John Wiley and Sons.
- 11. Shils M.E.et al, Modern Nutrition in Health and Disease, 1998, Lea and Febiger, Philadelphia.
- 12. Williams S., Nutrition and Diet Therapy, 4th Ed., The C.V. Mosby Co., Missouri.
- 13. Pharmaceutical chemistry, G Melentyeva L L Antonova Mir Publishers, Moscow
- 14. Chemical Pharmacology, R B Barlow, 2nd Ed, Methven and CO. New Fetters Lane
- 15. Medicinal Chemistry, Vol I, 3rd Ed, Alfred Burga, Wiley Inter sciences
- 16. Textbook of paramedical chemistry, Jayshree Ghosh, S Chand and company, New Delhi
- 17. Cassarett and Doull's Toxicology: Basic Science of The Poisons (2013) by C.D. Klaassen. Eighth edition, McGraw Hill.

Any other reference sources as recommended by the course instructor.

COMMENDED RUNDING:

antial Resilings

1. F. S.K. Harar. Essentials of Plantoneoulsgrapeutes. 3th Ed., School & Company Etd., 2004.

2. D. Stripholomic Direction. 1th Educion. New Age International Publishers.

3. Swapminish M., Essentials of Food and Suntrition, 3th Ed., 1955. Company and Co.

4. Robinson C et al., Marinel and Therapeute Netrition, 10th Ed., 1952, Magniflan Public Co.

5. Cossered and Doull's Essentials of Foreignlong (2014) by Educion and Watkins, Trink edition, Mediano Hill.

	VI : 12 team Practical PS	MABCP43 Pr	actical-XI	Programs, 51 Sc. 1
ABC40	Practical Practical		Credit	Course; Entroper
herne	(Hours per week)		suscible Asham.	1
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S.No.	Topic han themsee	Credit	(Mours per	
1	Monograph of Vitamin C.		(30,24)	ENERGY
2	Monograph of Acetyl salicylat	te		Į.
3	Monograph of Sucrose	with invallen	es. muvide lemmers	Centraling Childrents Thin course will
4.6	Estimation of vitamin C by Ioo	dimetry method		
5	Assignment / Report writing o	n diet planning	portugy and they ame	securiteding the less
6	Analysis of Antinutritional fac	etors	ne basic consens o	Tis will metershing
17-1	Estimation of Isothiocyanate c			e esemblia lusces
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9	Determination of peroxidase a	ctivity	prosesta proden s. replacement entern	edant the bay auto- differ in students v
10	Determination of superoxide d		ity	
11	Glucose Tolerance Test	the set Telegrap as	i ibu course, Telmi	

Program: M.Sc.	Biochemistry	TVR 643 br	Semester : Γ	V
Course: Entrepr	eneurship and IP	R	Course Code	e: USMABC404
7	Teaching Scheme		Evalua	tion Scheme
Lecture	Tutorial		Continuous	End Semester
(Hours per week)	(Hours per week)	Credit	Assessment and Evaluation (CAE)	Examinations (ESE)
4		4	25%	75%

Learning Objectives:

This course will provide learners with excellent foundation of the concepts as well as advancement in the field of industrial and applied biochemistry. In addition to the theoretical knowledge the learner will be getting hands on experience which will allow them to use various tools and methods for their career ahead. The students will be empowered with clear understanding of the basic concepts of entrepreneurship and will provide them knowledge of the recent advances so that they can independently assess the vast scope in the field. The learners will be prepared to discuss why new product development is such a critical process to manage, what the key activities in new product development entail, and whether the NPD process should differ in start-up vs. traditional enterprise settings.

Course Outcomes:

After completion of the course, learners would be able to:

- CO1: Develop the concept of entrepreneurship mindset and entrepreneurship process.
- CO2: Get insight into theories of entrepreneurship and role of socioeconomic environment.
- CO3: Classify the types of entrepreneurs and create the entrepreneurial venture and formulate the business plan
- **CO4:** Explore the basic structures and methodologies that are used to manage new product development in different environments.
- CO5: Discuss the basic concepts of intellectual property.
- CO6: Differentiate between copyright, patents, trademark and implement remedies after infringement of them.
- CO7: Conceptualize design, geographical indication and other forms of IPs.

Outline of Syllabus: (per session plan)

Module	Description	No of hours
1	Entrepreneurship-I	15
2	Entrepreneurship -II	15
3	Product Development and AI	15
4	IPR	15
	Total	60
RACTICALS	3	60

Module	Entrepreneurship and IPR	No. of Hours/Credits 60/4
1	Entrepreneurship -I	15
	Introduction Entrepreneurship Mindset, Entrepreneurship process; Factors	1
	impacting emergence of entrepreneurship Theories of entrepreneurship Role of Socioeconomic environment. Managerial and characteristics	2
	Qualities of Entrepreneurs Entrepreneurs versus inventors; Entrepreneurial Culture, Entrepreneur as a leader.	1
	Classification and Types of Entrepreneurs Women Entrepreneurs; Social Entrepreneurship; Corporate Entrepreneurs, characteristics of entrepreneur: Leadership; Risk taking; Decision-making and business planning.	2
	Role of Entrepreneur Role of an entrepreneur in economic growth as an innovator; generation of employment opportunities; complimenting and supplementing economic growth; bringing about social stability and balanced regional development of industries.	3
	Creating Entrepreneurial Venture Generating Business idea - Sources of Innovation, generating ideas, Creativity and Entrepreneurship	2
	Challenges in managing innovation; Entrepreneurial strategy, Business planning process; Drawing business plan; Business plan failures. Promotion of a Venture: External environmental analysis- economic, social and technological, Competitive factors:	
	Legal requirements for establishment of new unit and raising of funds Venture capital sources and documentation required.	2
2	Entrepreneurship -II	15
Add .	Entrepreneurial Management Basic forms of Business Ownership; Special forms of ownership: Franchising, Licensing, Leasing; Choosing a form of Business ownership; Corporate Expansion: mergers and acquisitions, diversification, forward and backward integration, joint ventures, Strategic alliance. Managerial functions and Roles. Insights from Indian practices and ethos.	2
	Planning Objective, Nature and process of planning, SWOT Analysis, formulation of plans, Decision making process. Organizing: Objectives, nature and process of organizing formal and informal	3

3	Product Development and AI	15
	opportunities for women, motivating women entrepreneurs. Financial agencies- funding agencies	1
1	High technology entrepreneurship and women entrepreneurs, science and technology enterprises, gender and technology, entrepreneurship, gender and empowerment, entrepreneurial	
	ventures. Entrepreneurial effectiveness and efficiency, Entrepreneurial leadership including Hersey & Blanchard's theory, contemporary leadership roles and Use of control techniques in small business. Entrepreneurship as empowerment	2
	businesses within existing corporates. Strategic Business Units. Managing Entrepreneurship Creativity, Innovations, IPR (example of 3M) and entrepreneurial	2
	Essentials of effective control, Managerial effectiveness. Management Culture: Beliefs and Perceptions. Corporate Philosophies: Bigger is better, Small is beautiful, creating new	
	Controlling: concept, process and techniques and control, Management by Objectives (MBO) Management by Exception (MBE)	2
2	Concept, Manpower Planning, recruitment, selection, training and development, performance appraisal. Directing: Concept and techniques of Motivation and Leadership. Process and barriers to communication. Controlling: Concept, Need and Techniques.	
	organization, authority and responsibility, delegation and empowerment, centralization and decentralization, concept of departmentation, Organization Chart, Line, Divisional, Staff and functional relationships, Top Management, process and principles of delegation Staffing	3

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	Concept and Components of Marketing Program; Product Development and Brand Positioning Repositioning the Product in the Market through Product Life-	3
	Cycle Analysis; Selecting the Pricing Objective and Pricing Methods Adaption of Appropriate Pricing Strategies	1
	Adoption of Appropriate Pricing Strategies Global production	2
	outsourcing, logistics and supply chain; Global marketing strategy- global positioning, branding, product development, pricing, communication, and distribution strategic; Global e-business; market development, and diversification. Methods of	2
±	strategy development: Product development for international markets Quality, green marketing, and adaptation issues. Marketing opportunities in services. Challenges of managing brands globally. International marketing channels — distribution	2
1	patterns in international markets Fundamentals of Artificial Intelligence Introduction, A.I. Representation, Non-AI &AI Techniques, Basic principles of AI, Representation of Knowledge,	2
	Knowledge Base Systems, Intelligent Agents and Environments	2
lama	Concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation, various	Ei develop
	application domains AI Machine Learning	2
addyn ghai	Examples of Machine Learning applications, Training versus Testing, Positive and Negative Class, Cross-validation. Types of Learning	Executary Executary Telegraphy
	Supervised, Unsupervised and Semi-Supervised Learning. IPR	15
	ton metalf k remediant indiction are conf. 0, they	retrict2 July
no) front	Justifications for protection of IP Co,	hil haf
Hillermoods/im	Major International Instruments relating to the protection of IP i. Berne Convention ii. Paris Convention iii. TRIPS Module	Surgeille
	Copyright Ownership of copyright respect to the least of the search of t	1 Shore
*1	Term of copyright Rights of owner Economic Rights, Moral Rights	Adding
	Infringement of copyright Patents	

Page 43 of 46

-	C '4 ' C - 14 ' 4 - 4	<u> </u>
	Criteria for obtaining patent	
	Non patentable inventions	
	Procedure for registration	
	Terms of patent and will and and solow and analytic	
	Rights of patentee	
	Basic concept of Compulsory license and Government use of	
	patent, Infringement of patents and remedies and was but to be	
	Trade Marks Williams wingus how salished guitnowing	1
	Categories of Trademark	
	Certification Mark	
	Collective Mark, Well-known and Non-conventional Marks	
	Procedure for registration and Term of protection	2
	Designs, GI and other forms of IP	2
	Designs - Meaning design protection restaurant and the state of a significant design protection restaurant and state of the significant design protection restaurant and significant design protection restaurant design protection restaura	
	Concept of original design and a semi-man and a sem	
	Term of protection	
	Geographical Indication Difference between GI and Trade Marks	2
	Difference between Gi and Trade Marks	1
	Authorized user Trade-secret	1
	Criteria of Protection,	1
	Plant Variety Protection	1
	someway some agreement	

RECOMMENDED READING:

Essential Reading:

- 1. Rachna Singh Puri, A. Vishwanathan, Practical approach to Intellectual property rights, International Publishing House
- 2. Elaine Rich and Kevin Knight: "Artificial Intelligence." Tata McGraw Hill
- 3. Stuart Russell & Peter Norvig: "Artificial Intelligence: A Modern Approach", Pearson Education,

2nd Edition.

- 4. Fundamentals of entrepreneurship-Dr. G. K. Varshney, Sahitya Bhavan Publication
- 5. Entrepreneurship-Robert Hisrich, Michael Peters, Dean Shepherd-10th Edition McGraw Hill Suggested Reading:
- 1. N. K Acharya, Textbook of Intellectual Property rights, 7th edition, Asia Law House
- 2. Shiv Sahai Singh, The Law of Intellectual Property Rights, Deep & Deep
- 3. Eugene, Charniak, Drew Mcdermott: "Introduction to Artificial Intelligence.", Addison Wesley
- 4. Patterson: Introduction to AI and Expert Systems!, PHI
- 5. Nilsson: Principles of Artificial Intelligencel, Morgan Kaufmann.

- 6. Taxmann's Entrepreneurship development-CA Dr. Abha Mathur
- 7. Entrepreneurship New Venture Creation-David H. Holt, Pearson

Any other reference sources as recommended by the course instructor.
(Hours per week)
Programment applications of company to describe and titles pourse.

To streetige securitic temper and interest its especially industrial claim and studies observed from its recommendate, in each occurrence.

Practical PSMABCP44 Practical-XII iolingamione za Credit someralen realforen. Practical Practical (Hours per week) Topic S. No. Formulation of entrepreneurial venture and generate business idea. 1. Formulate a business plan 2. Development of a product 3. Practical applications of copyright, trademark and filing patent 4. Case studies-Presentations based on IPR 5. AI related products- case studies 6. Implement AI and Non-AI techniques

 Tuxmann's fattegressmenting development-CA Dr. Ablas Madage 2. Entrepreneurship New Venture Continue-Duroid 11. Holt. Pennan

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester.

Blogs and surveys -Future of AI, AI in healthcare

7.

8.

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