



**THE ASSAM ROYAL GLOBAL
UNIVERSITY**

**ROYAL SCHOOL OF MEDICAL AND ALLIED SCIENCES
(RSMAS)**

**DEPARTMENT OF MEDICAL AND ALLIED SCIENCES
(MLT)**

**COURSE STRUCTURE AND SYLLABUS
FOR
B.SC. IN MLT
(4 YEARS SINGLE MAJOR)**

W.E.F

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(Based on National Education Policy 2020)

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Preamble

The National Education Policy (NEP) 2020 conceives a new vision for India's higher education system. It recognizes that higher education plays an extremely important role in promoting equity, human as well as societal well-being and in developing India as envisioned in its Constitution. It is desired that higher education will significantly contribute towards sustainable livelihoods and economic development of the nation as India moves towards becoming a knowledge economy and society.

If we focus on the 21st century requirements, the higher education framework of the nation must aim to develop good, thoughtful, well-rounded, and creative individuals and must enable an individual to study one or more specialized areas of interest at a deep level, and also develop character, ethical and Constitutional values, intellectual curiosity, scientific temper, creativity, spirit of service, and twenty-first-century capabilities across a range of disciplines including sciences, social sciences, arts, humanities, languages, as well as professional, technical, and vocational subjects.

Towards the attainment of holistic and multidisciplinary education, the flexible curricula of the University will include credit-based courses, projects in the areas of community engagement and service, environmental education, and value-based education. As part of holistic education, students will also be provided with opportunities for internships with local industries, businesses, artists, crafts persons, and so on, as well as research internships with faculty and researchers at the University, so that students may actively engage with the practical aspects of their learning and thereby improve their employability.

The undergraduate curriculums are diverse and have varied subjects to be covered to meet the needs of the programs. As per the recommendations from the UGC, introduction of courses related to Indian Knowledge System (IKS) is being incorporated in the curriculum structure which encompasses all of the systematized disciplines of Knowledge which were developed to a high degree of sophistication in India from ancient times and all of the traditions and practices that the various communities of India—including the tribal communities—have evolved, refined and preserved over generations, like for example Vedic Mathematics, Vedangas, Indian Astronomy, Fine Arts, Metallurgy, etc.

At RGU, we are committed that at the societal level, higher education will enable each student to develop themselves to be an enlightened, socially conscious, knowledgeable, and skilled citizen who can find and implement robust solutions to its own problems.

1. Introduction

The National Education Policy (NEP) 2020 clearly indicates that higher education plays an extremely important role in promoting human as well as societal well-being in India. As envisioned in the 21st-century requirements, quality higher education must aim to develop good, thoughtful, well-rounded, and creative individuals. According to the new education policy, assessments of educational approaches in undergraduate education will integrate the humanities and arts with Science, Technology, Engineering and Mathematics (STEM) that will lead to positive learning outcomes. This will lead to develop creativity and innovation, critical thinking and higher-order thinking capacities, problem-solving abilities, teamwork, communication skills, more in-depth learning, and mastery of curricula across fields, increases in social and moral awareness, etc., besides general engagement and enjoyment of learning. and more in-depth learning.

The NEP highlights that the following fundamental principles that have a direct bearing on the curricula would guide the education system at large, viz.

- i. Recognizing, identifying, and fostering the unique capabilities of each student to promote her/his holistic development.
- ii. Flexibility, so that learners can select their learning trajectories and programmes, and thereby choose their own paths in life according to their talents and interests.
- iii. Multidisciplinary and holistic education across the sciences, social sciences, arts, humanities, and sports for a multidisciplinary world.
- iv. Emphasis on conceptual understanding rather than rote learning, critical thinking to encourage logical decision-making and innovation; ethics and human & constitutional values, and life skills such as communication, teamwork, leadership, and resilience.
- v. Extensive use of technology in teaching and learning, removing language barriers, increasing access for Divyang students, and educational planning and management.
- vi. Respect for diversity and respect for the local context in all curricula, pedagogy, and policy. Equity and inclusion as the cornerstone of all educational decisions to ensure that all students can thrive in the education system and the institutional environment are responsive to differences to ensure that high-quality education is available for all. Rootedness and pride in India, and its rich, diverse, ancient, and modern culture, languages, knowledge systems, and traditions.

2. Approach towards Curriculum Planning:

2.1. Credits in Indian Context:

2.1.1. Choice Based Credit System (CBCS) by UGC

Under the CBCS system, the requirement for awarding a degree or diploma or certificate is prescribed in terms of the number of credits to be earned by the students. This framework is being implemented in several universities across States in India. The main highlights of CBCS are as below:

- The CBCS provides flexibility in designing curriculum and assigning credits based on the course content and learning hours.
- The CBCS provides for a system wherein students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.
- CBCS also provides opportunity for vertical mobility to students from a bachelor's degree programme to masters and research degree programmes.

2.2. Definitions:

2.2.1. Academic Credit

An academic credit is a unit by which a course is weighted. It is fixed by the number of hours of instructions offered per week. As per the National Credit Framework.

1 Credit = 30 NOTIONAL CREDIT HOURS (NCH)

Yearly Learning Hours = 1200 Notional Hours (@40 Credits x 30 NCH)

30 Notional Credit Hours		
Lecture/Tutorial	Practicum	Experiential Learning
1 Credit = 15 -22 Lecture Hours	10-15 Practicum Hours	0-8 Experiential Learning Hours

2.2.2. Course of Study:

Course of study indicates pursuance of study in Graphic Design. The Graphic Design course shall offer Major Courses (Core), Minor Courses, Skill Enhancement Courses (SEC), Value Added Courses (VAC), Ability Enhancement Compulsory Courses (AECCs) and Interdisciplinary courses.

2.2.3. Disciplinary Major:

The major would provide the opportunity for a student to pursue in-depth study of a particular subject in Graphic Design. Students may be allowed to change major within the broad discipline at the end of the second semester by giving her/him sufficient time to explore interdisciplinary courses during the first year. Advanced-level disciplinary/interdisciplinary courses, a course in research methodology, and a project/dissertation will be conducted in the seventh semester. The final semester will be devoted to seminar presentation, preparation, and submission of project report/dissertation. The project work/dissertation will be on a topic in the disciplinary programme of study or an interdisciplinary topic.

2.2.4. Disciplinary/interdisciplinary minors:

Students will have the option to choose courses from disciplinary/interdisciplinary minors and skill-based courses. Students who take a sufficient number of courses in a discipline or an interdisciplinary area of study other than the chosen major will qualify for a minor in that discipline or in the chosen interdisciplinary area of study. A student may declare the choice of the minor at the end of the second semester, after exploring various courses.

2.2.5. Courses from Other Disciplines (Interdisciplinary):

All UG students are required to undergo 3 introductory-level courses relating to any of the broad disciplines given below. These courses are intended to broaden the intellectual experience and form part of liberal arts and science education. Students are not allowed to choose or repeat courses already undergone at the higher secondary level (12th class) in the proposed major and minor stream under this category.

i. Natural and Physical Sciences: Students can choose basic courses from disciplines such as Natural Science, for example, Biology, Botany, Zoology, Biotechnology, Biochemistry, Chemistry, Physics, Biophysics, Astronomy and Astrophysics, Earth and Environmental Sciences, etc.

ii. Mathematics, Statistics, and Computer Applications: Courses under this category will facilitate the students to use and apply tools and techniques in their major and minor disciplines. The course may include training in programming software like Python among others and applications software like STATA, SPSS, Tally, etc. Basic courses under this category will be helpful for science and social science in data analysis and the application of quantitative tools.

iii. Library, Information, and Media Sciences: Courses from this category will help the students to understand the recent developments in information and media science (journalism, mass media, and communication)

iv. Commerce and Management: Courses include business management, accountancy, finance, financial institutions, fintech, etc.,

v. Humanities and Social Sciences: The courses relating to Social Sciences, for example, Anthropology, Communication and Media, Economics, History, Linguistics, Political Science, Psychology, Social Work, Sociology, etc. will enable students to understand the individuals and their social behavior, society, and nation. Students be introduced to survey methodology and available large-scale databases for India. The courses under humanities include, for example, Archaeology, History, Comparative Literature, Arts & Creative expressions, Creative Writing and Literature, language(s), Philosophy, etc., and interdisciplinary courses relating to humanities. The list of Courses can include interdisciplinary subjects such as Cognitive Science, Environmental Science, Gender Studies, Global Environment & Health, International Relations, Political Economy and Development, Sustainable Development, Women's, and Gender Studies, etc. will be useful to understand society.

2.2.6. Ability Enhancement Courses (AEC): Modern Indian Language (MIL) & English language focused on language and communication skills. Students are required to achieve competency in a Modern Indian Language (MIL) and in the English language with special emphasis on language and communication skills. The courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills, that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. They would also enable students to acquaint themselves with the cultural and intellectual heritage of the chosen MIL and English language, as well as to provide a reflective understanding of the structure and complexity of the language/literature related to both the MIL and English language. The courses will also emphasize the development and enhancement of skills such as communication, and the ability to participate/conduct discussion and debate.

2.2.7. Skill Enhancement Course (SEC): These courses are aimed at imparting practical skills, hands-on training, soft skills, etc., to enhance the employability of students and

should be related to Major Discipline. They will aim at providing hands-on training, competencies, proficiency, and skill to students. SEC course will be a basket course to provide skill-based instruction. For example, SEC of English Discipline may include Public Speaking, Translation & Editing and Content writing.

2.2.8. Value-Added Courses (VAC):

i. Understanding India: The course aims at enabling the students to acquire and demonstrate the knowledge and understanding of contemporary India with its historical perspective, the basic framework of the goals and policies of national development, and the constitutional obligations with special emphasis on constitutional values and fundamental rights and duties. The course would also focus on developing an understanding among student-teachers of the Indian knowledge systems, the Indian education system, and the roles and obligations of teachers to the nation in general and to the school/community/society. The course will attempt to deepen knowledge about and understanding of India's freedom struggle and of the values and ideals that it represented to develop an appreciation of the contributions made by people of all sections and regions of the country, and help learners understand and cherish the values enshrined in the Indian Constitution and to prepare them for their roles and responsibilities as effective citizens of a democratic society.

ii. Environmental science/education: The course seeks to equip students with the ability to apply the acquired knowledge, skills, attitudes, and values required to take appropriate actions for mitigating the effects of environmental degradation, climate change, and pollution, effective waste management, conservation of biological diversity, management of biological resources, forest and wildlife conservation, and sustainable development and living. The course will also deepen the knowledge and understanding of India's environment in its totality, its interactive processes, and its effects on the future quality of people's lives.

iii. Digital and technological solutions: Courses in cutting-edge areas that are fast gaining prominences, such as Artificial Intelligence (AI), 3-D machining, big data analysis, machine learning, drone technologies, and Deep learning with important applications to health, environment, and sustainable living that will be woven into undergraduate education for enhancing the employability of the youth.

iv. Health & Wellness, Yoga education, sports, and fitness: Course components relating to health and wellness seek to promote an optimal state of physical, emotional, intellectual,

social, spiritual, and environmental well-being of a person. Sports and fitness activities will be organized outside the regular institutional working hours. Yoga education would focus on preparing the students physically and mentally for the integration of their physical, mental, and spiritual faculties, and equipping them with basic knowledge about one's personality, maintaining self-discipline and self-control, to learn to handle oneself well in all life situations. The focus of sports and fitness components of the courses will be on the improvement of physical fitness including the improvement of various components of physical and skills-related fitness like strength, speed, coordination, endurance, and flexibility; acquisition of sports skills including motor skills as well as basic movement skills relevant to a particular sport; improvement of tactical abilities; and improvement of mental abilities.

2.2.9. Summer Internship /Apprenticeship:

The intention is induction into actual work situations. All students must undergo internships / Apprenticeships in a firm, industry, or organization or Training in labs with faculty and researchers in their own or other HEIs/research institutions during the *summer term*. Students should take up opportunities for internships with local industry, business organizations, health and allied areas, local governments (such as panchayats, municipalities), Parliament or elected representatives, media organizations, artists, crafts persons, and a wide variety of organizations so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability. Students who wish to exit after the first two semesters will undergo a 4-credit work-based learning/internship during the summer term to get a UG Certificate.

2.2.9.1. Community engagement and service: The curricular component of 'community engagement and service' seeks to expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems. This can be part of summer term activity or part of a major or minor course depending upon the major discipline.

2.2.9.2. Field-based learning/minor project: The field-based learning/minor project will attempt to provide opportunities for students to understand the different socio-economic contexts. It will aim at giving students exposure to development-related issues in rural and urban settings. It will provide opportunities for students to observe situations in rural and urban contexts, and to observe and study actual field situations regarding issues related to

socioeconomic development. Students will be given opportunities to gain a first-hand understanding of the policies, regulations, organizational structures, processes, and programmes that guide the development process. They would have the opportunity to gain an understanding of the complex socio-economic problems in the community, and innovative practices required to generate solutions to the identified problems. This may be a summer term project or part of a major or minor course depending on the subject of study.

2.2.10. Indian Knowledge System:

In view of the importance accorded in the NEP 2020 to rooting our curricula and pedagogy in the Indian context all the students who are enrolled in the four-year UG programmes should be encouraged to take an adequate number of courses in IKS so that the *total credits of the courses taken in IKS amount to at least five per cent of the total mandated credits (i.e. min. 8 credits for a 4 yr. UGP)*. The students may be encouraged to take these courses, preferably *during the first four semesters of the UG programme*. At least half of these mandated credits should be in courses in disciplines which are part of IKS and are related to the major field of specialization that the student is pursuing in the UG programme. They will be included as a part of the total mandated credits that the student is expected to take in the major field of specialization. The rest of the mandated credits in IKS can be included as a part of the mandated Multidisciplinary courses that are to be taken by every student. All the students should take a Foundational Course in Indian Knowledge System, which is designed to present an overall introduction to all the streams of IKS relevant to the UG programme. The foundational IKS course should be broad-based and cover introductory material on all aspects.

Wherever possible, the students may be encouraged to choose a suitable topic related to IKS for their project work in the 7/8th semesters of the UG programme.

2.2.11. Experiential Learning:

One of the most unique, practical & beneficial features of the National Credit Framework is assignment of credits/credit points/ weightage to the experiential learning including relevant experience and professional levels acquired/ proficiency/ professional levels of a learner/student. Experiential learning is of two types:

a. Experiential learning as part of the curricular structure of academic or vocational program. E.g., projects/OJT/internship/industrial attachments etc. This could be either within the Program- internship/ summer project undertaken relevant to the program being

studied or as a part time employment (not relevant to the program being studied- up to certain NSQF level only). In case where experiential learning is a part of the curricular structure the credits would be calculated and assigned as per basic principles of NCrf i.e., 40 credits for 1200 hours of notional learning.

b. Experiential learning as active employment (both wage and self) post completion of an academic or vocational program. This means that the experience attained by a person after undergoing a particular educational program shall be considered for assignment of credits. This could be either Full or Part time employment after undertaking an academic/ Vocation program.

In cases where experiential learning is as a part of employment the learner would earn credits as weightage. The maximum credit points earned in this case shall be double of the credit points earned with respect to the qualification/ course completed. The credit earned and assigned by virtue of relevant experience would enable learners to progress in their career through the work hours put in during a job/employment.

2.3. Distribution of Credits:

'*Credit*' is recognition that a learner has completed a prior course of learning, corresponding to a qualification at a given level. For each such prior qualification, the student would have put in a certain volume of institutional or workplace learning, and the more complex a qualification, the greater the volume of learning that would have gone into it. Credits quantify learning outcomes that are subject achieving the prescribed learning outcomes to valid, reliable methods of assessment.

The *credit points* will give the learners, employers, and institutions a mechanism for describing and comparing the learning outcomes achieved. The credit points can be calculated as credits attained multiplied with the credit level.

The workload relating to a course is measured in terms of credit hours. A credit is a unit by which the coursework is measured. It determines the number of hours of instruction required per week over the duration of a semester (minimum 15 weeks).

Each course may have only a lecture component or a lecture and tutorial component or a lecture and practicum component or a lecture, tutorial, and practicum component, or only practicum component.

A course can have a combination of *lecture credits, tutorial credits, practicum credits and experiential learning credits*.

The following types of courses/activities constitute the programmes of study. Each of them

will require a specific number of hours of teaching/guidance and laboratory/studio/workshop activities, field-based learning/projects, internships, and community engagement and service.

- **Lecture courses:** Courses involving lectures relating to a field or discipline by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.
- **Tutorial courses:** Courses involving problem-solving and discussions relating to a field or discipline under the guidance of qualified personnel in a field of learning, work/vocation, or professional practice. Should also refer to the Remedial Classes, flip classrooms and focus on both Slow and Fast Learners of the class according to their merit.
- **Practicum or Laboratory work:** A course requiring students to participate in a project or practical or lab activity that applies previously learned/studied principles/theory related to the chosen field of learning, work/vocation, or professional practice under the supervision of an expert or qualified individual in the field of learning, work/vocation or professional practice.
- **Seminar:** A course requiring students to participate in structured discussion/conversation or debate focused on assigned tasks/readings, current or historical events, or shared experiences guided or led by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.
- **Internship:** A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning.
- **Studio activities:** Studio activities involve the engagement of students in creative or artistic activities. Every student is engaged in performing a creative activity to obtain a specific outcome. Studio-based activities involve visual- or aesthetic-focused experiential work.
- **Field practice/projects:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity.

- **Community engagement and service:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity. The curricular component of ‘community engagement and service’ will involve activities that would expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems.

Table:1: Course wise Distribution of Credits

Broad Category of Course	Minimum Credit Requirement	
	3-year UG	4-Year UG
Major (Core)	60	80
Minor Stream	24	32
Interdisciplinary	9	9
Ability Enhancement Courses (AEC)	8	8
Skill Enhancement Courses (SEC)	9	9
Value Added Courses common for all UG	6	6
Summer Internship	4	4
Research Project / Dissertation	NA	12
Total	120	160

Table 2: Credit Distribution for 3-year Course

Semester	Course Credits							
	Major	Minor	ID	AEC	SEC	VAC	SI	Total
I	6	3	3	2	3	3	0	20
II	6	3	3	2	3	3	0	20
III	8	4	3	2	3	0	0	20
IV	12	6	0	2	0	0	0	20
V	12	4	0	0	0	0	4	20

VI	16	4	0	0	0	0	0	0	20
	60	24	9	8	9	6	4	4	120

Table 3: Credit Distribution for 4-year Course

Semester	Course Credits								Total
	Major	Minor	ID	AEC	SEC	VAC	SI	RP	
I	6	3	3	2	3	3	0	0	20
II	6	3	3	2	3	3	0	0	20
III	8	4	3	2	3	0	0	0	20
IV	12	6	0	2	0	0	0	0	20
V	12	4	0	0	0	0	4	0	20
VI	16	4	0	0	0	0	0	0	20
VII	16	4	0	0	0	0	0	0	20
VIII	4	4	0	0	0	0	0	12	20
	80	32	9	8	9	6	4	12	160

2.4. Levels of Courses

2.4.1 NHEQF levels:

The NHEQF levels represent a series of sequential stages expressed in terms of a range of learning outcomes against which typical qualifications are positioned/located. NHEQF level 4.5 represents learning outcomes appropriate to the first year (first two semesters) of the undergraduate programme of study, while Level 8 represents learning outcomes appropriate to the doctoral-level programme of study.

Table: 4: NHEQF Levels

NHEQF level	Examples of higher education qualifications located within each level	Credit Requirements
Level 4.5	Undergraduate Certificate. Programme duration: First year (first two semesters) of the undergraduate programme, followed by an exit 4-credit skills-enhancement course(s).	40
Level 5	Undergraduate Diploma. Programme duration: First two years (first four semesters) of the undergraduate programme, followed by an exit 4-credit skills-enhancement course(s) lasting two months.	80

NHEQF level	Examples of higher education qualifications located within each level	Credit Requirements
Level 5.5	Bachelor's Degree. Programme duration: First three years (Six semesters) of the four-year undergraduate programme.	120
Level 6	Bachelor's Degree (Honours/ Honours with Research). Programme duration: Four years (eight semesters).	160
Level 6	Post-Graduate Diploma. Programme duration: One year (two semesters) for those who exit after successful completion of the first year (two semesters) of the 2-year master's programme	160
Level 6.5	Master's degree. Programme duration: Two years (four semesters) after obtaining a 3- year Bachelor's degree (e.g. B.A., B.Sc., B.Com. etc.).	80
Level 6.5	Master's degree. Programme duration: One year (two semesters) after obtaining a 4 -year Bachelor's degree (Honours/ Honours with Research) (e.g. B.A., B.Sc., B.Com. etc.).	40
Level 7	Master's degree. (e.g., M.E./M.Tech. etc.) Programme duration: Two years (four semesters) after obtaining a 4-year Bachelor's degree. (e.g., B.E./B.Tech. etc.)	80
Level 8	Doctoral Degree	Credits for course work, Thesis, and published work

2.5. Course Code based on Learning Outcomes:

Courses are coded based on the learning outcomes, level of difficulty, and academic rigor.

The coding structure is as follows:

- i. 0-99: *Pre-requisite courses*** required to undertake an introductory course which will be a pass or fail course with no credits. It will replace the existing informal way of offering bridge courses that are conducted in some of the colleges/ universities.
- ii. 100-199: *Foundation or introductory courses*** that are intended for students to gain an understanding and basic knowledge about the subjects and help decide the subject or discipline of interest. These courses may also be prerequisites for courses in the major subject. These courses generally would focus on foundational theories, concepts, perspectives, principles, methods, and procedures of critical thinking in order to provide a broad basis for taking up more advanced courses.
- iii. 200-299: *Intermediate-level courses*** including subject-specific courses intended to meet the credit requirements for minor or major areas of learning. These courses can be part of a major and can be pre-requisite courses for advanced-level major courses.
- iv. 300-399: *Higher-level courses*** which are required for majoring in a

disciplinary/interdisciplinary area of study for the award of a degree.

v. **400-499: *Advanced courses*** which would include lecture courses with practicum, seminar-based course, term papers, research methodology, advanced laboratory experiments/software training, research projects, hands-on-training, internship/apprenticeship projects at the undergraduate level or First year post-graduate theoretical and practical courses.

vi. **500-599: *Courses at first-year PG degree level*** for a 2-year post-graduate degree programme

vii. **600-699: *Courses for second year of 2-year PG*** or 1-year post-graduate degree programme

viii. **700 -799 & above:** Courses limited to doctoral students.

3. Award of Degree in Medical Laboratory Technology

The structure and duration of undergraduate programmes of study offered by the University as per NEP 2020 include:

3.1. Undergraduate programmes of either 3 or 4-year duration with Single Major, with multiple entry and exit options, with appropriate certifications:

3.1.1. UG Certificate: Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

3.1.2. UG Diploma: Students who opt to exit after completion of the second year and have secured 80 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.

3.1.3. 3-year UG Degree: Students who will undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 120 credits and satisfying the minimum credit requirement.

3.1.4. 4-year UG Degree (Honours): A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 160 credits and have satisfied the credit requirements as given in table 2 in Section 5.

3.1.5. 4-year UG Degree (Honours with Research): Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a Faculty Member of the University. The research project/dissertation will be in the major discipline. The students who secure 160 credits, including 12 credits from a research project/dissertation, will be awarded UG Degree (Honours with Research).

(Note: **UG Degree Programmes with Single Major:** A student must secure a minimum of 50% credits from the major discipline for the 3-year/4-year UG degree to be awarded a single major. For example, in a 3-year UG programme, if the total number of credits to be earned is 120, a student of Mathematics with a minimum of 60 credits will be awarded a B.Sc. in Mathematics with a single major. Similarly, in a 4-year UG programme, if the total number of credits to be earned is 160, a student of Chemistry with a minimum of 80 credits will be awarded a B.Sc. (Hons./Hon. With Research) in Chemistry in a 4-year UG programme with single major. Also, the **4-year Bachelor’s degree programme with Single Major** is considered as the preferred option since it would allow the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student.)

Table: 5: Award of Degree and Credit Structure with ME-ME

Award	Year	Credits to earn	Additional Credits	Re-entry allowed within (yrs)	Years to Complete
UG Certificate	1	40	4	3	7
UG Diploma	2	80	4	3	7
3-year UG Degree (Major)	3	120	x	X	x
4-year UG Degree (Honours)	4	160	x	X	x
4-year UG Degree (Honors with Research):	4	160	Students who secure cumulative 75% marks and above in the first six semesters		

4. Learning Outcomes

4.1 The Graduate Attributes

As per the NHEQF, each student on completion of a programme of study must possess and demonstrate the expected *Graduate Attributes* acquired through one or more modes of learning, including direct in-person or face-to-face instruction, online learning, and hybrid/blended modes. The graduate attributes indicate the quality and features or characteristics of the graduate of a programme of study, including learning outcomes relating to the disciplinary area(s) relating to the chosen field(s) of learning and generic learning outcomes that are expected to be acquired by a graduate on completion of the programme(s) of study.

The graduate profile/attributes include,

- capabilities that help widen the current knowledge base and skills,
- gain and apply new knowledge and skills,
- undertake future studies independently, perform well in a chosen career, and
- play a constructive role as a responsible citizen in society.

The graduate profile/attributes are acquired incrementally through development of cognitive levels and describe a set of competencies that are transferable beyond the study of a particular subject/disciplinary area and programme contexts in which they have been developed.

Graduate attributes include,

- *learning outcomes that are specific to disciplinary areas* relating to the chosen field(s) of learning within broad multidisciplinary/interdisciplinary/transdisciplinary contexts.
- *generic learning outcomes* that graduate of all programmes of study should acquire and demonstrate.

Table: 6: The Learning Outcomes Descriptors and Graduate Attributes

Sl.no.	Graduate Attribute	The Learning Outcomes Descriptors (<i>The graduates should be able to demonstrate the capability to:</i>)
GA1	Disciplinary Knowledge	acquire knowledge and coherent understanding of the chosen disciplinary/interdisciplinary areas of study.
GA 2	Complex problem solving	solve different kinds of problems in familiar and non-familiar contexts and apply the learning to real-life situations.
GA 3	Analytical & Critical thinking	apply analytical thought including the analysis and evaluation of policies, and practices. Able to identify relevant assumptions or implications. Identify logical

Sl.no.	Graduate Attribute	The Learning Outcomes Descriptors (<i>The graduates should be able to demonstrate the capability to:</i>)
		flaws and holes in the arguments of others. Analyse and synthesize data from a variety of sources and draw valid conclusions and support them with evidence and examples.
GA 4	Creativity	create, perform, or think in different and diverse ways about the same objects or scenarios and deal with problems and situations that do not have simple solutions. Think ‘out of the box’ and generate solutions to complex problems in unfamiliar contexts by adopting innovative, imaginative, lateral thinking, interpersonal skills, and emotional intelligence.
GA 5	Communication Skills	listen carefully, read texts and research papers analytically, and present complex information in a clear and concise manner to different groups/audiences. Express thoughts and ideas effectively in writing and orally and communicate with others using appropriate media.
GA 6	Research-related skills	develop a keen sense of observation, inquiry, and capability for asking relevant/ appropriate questions. Should acquire the ability to problematize, synthesize and articulate issues and design research proposals, define problems, formulate appropriate and relevant research questions, formulate hypotheses, test hypotheses using quantitative and qualitative data, establish hypotheses, make inferences based on the analysis and interpretation of data, and predict cause-and-effect relationships. Should develop the ability to acquire the understanding of basic research ethics and skills in practicing/doing ethics in the field/ in personal research work.
GA 7	Collaboration	work effectively and respectfully with diverse teams in the interests of a common cause and work efficiently as a member of a team.
GA 8	Leadership readiness/qualities	plan the tasks of a team or an organization and setting direction by formulating an inspiring vision and building a team that can help achieve the vision.
GA 9	Digital and technological skills	use ICT in a variety of learning and work situations. Access, evaluate, and use a variety of relevant information sources and use appropriate software for analysis of data.
GA 10	Environmental awareness and action	mitigate the effects of environmental degradation, climate change, and pollution. Should develop the technique of effective waste management, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living.

4.2. Program Learning Outcomes

The outcomes described through learning outcome descriptors are attained by students through learning acquired on the completion of a programme of study relating to the chosen fields of learning, work/vocation, or an area of professional practice. The term ‘programme’ refers to the entire scheme of study followed by learners leading to a qualification. Individual programmes of study will have defined learning outcomes that must be attained for the award of a specific certificate/diploma/degree.

The programme learning outcomes focusses on knowledge and skills that prepare students for further study, employment, and responsible citizenship.

Table: 7: The Programme Learning Outcome Descriptors

Sl.no.	Programme Learning Outcome	The Programme Learning Outcomes Descriptors <i>The graduates will acquire the following:</i>
PLO 1	Knowledge of Medical Laboratory Technology	<ul style="list-style-type: none"> The student will be able to identify the pathogen, types of and its impact on the medical health sciences. The students will be able to understand and outline the laboratory technology and diagnostic lab Students will be able to understand the role of microbiology, biochemistry, pathology, blood banking and molecular tools in MLT. Students will be able to demonstrate the experimental techniques and methods of their area of specialization in Medical Laboratory Technology.
PLO 2	Develop the ability to solve complex problems	An increased understanding of fundamental concepts and their applications of scientific principles is expected at the end of this course. Students will become critical thinkers and acquire problem solving capabilities.
PLO 3	Develop Critical and analytical thinking skills	The students to develop critical thinking skills and apply them to medical and laboratory terminology concepts and other health care topics related to laboratory medicine. An introductory course for students to develop critical thinking skills and apply them to medical and laboratory terminology concepts and other health care topics related to laboratory medicine.
PLO 4	Develop and Demonstrate Creativity	A student will be able to demonstrate, perform, or think in different and diverse ways by using tools and techniques. The students will be able to deal with problems and situations that do not have simple solutions. They will be able to think ‘out of the box’ and generate solutions to complex problems in unfamiliar contexts by adopting innovative, imaginative, lateral thinking, interpersonal skills and emotional intelligence

Sl.no.	Programme Learning Outcome	The Programme Learning Outcomes Descriptors <i>The graduates will acquire the following:</i>
PLO 5	Develop effective Communication Skills	The students will develop the ability to listen carefully, read texts and research papers analytically, and present complex information in a clear and concise manner to different groups/audiences through various means of communication. A student will be able to express thoughts and ideas effectively in writing, through experiments and also orally and communicate with others using appropriate technologies.
PLO 6	Develop Research-related Skills	A student will develop a keen sense of observation, inquiry, and capability for asking relevant/ appropriate questions. Should acquire the ability to problematize, synthesize and articulate issues and design research proposals, define problems, formulate appropriate and relevant research questions, formulate hypotheses, test hypothesis using quantitative and qualitative data, establish hypotheses, make inferences based on the analysis and interpretation of data, and predict cause-and-effect relationships. Students will develop the ability to acquire the understanding of basic research ethics and skills in practicing/doing ethics in the field/ in personal research work.
PLO 7	Develop the ability to Collaborate and execute teamwork	Capable to work effectively and respectfully with diverse teams in the classroom and in the field, in the interests of a common cause and work efficiently as a member of a team.
PLO 8	Develop Leadership Qualities	Students will learn team workmanship in order to serve efficiently institutions, industry and society. Students will also strengthen their ethical and moral values and shall be able to deal with psychological weaknesses.
PLO 9	Develop technological and Digital skills	Students will acquire digital skills and integrate the fundamental concepts with modern tools.
PLO 10	Develop the ability to Identify & address the Environmental Issues	A student will identify the effects of environmental degradation, climate change, and pollution. They will develop the technique and illustrate awareness on effective waste management, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living by producing different Information Education and Communication (IEC) materials.

4.3. Programme specific Learning Outcomes (PSOs):

PSO1. A student completing the course can understand different specializations of medical laboratory technology such as definitions related to medical laboratory

technology, an introductory concept about clinical microbiology, histopathology, blood banking, clinical pathology, molecular biology and analyzing biological samples such as tissue and bodily fluids

PSO2. Ability to critically analyze various report interpretations.

PSO3. The student completing the course can design and execute experiments related to medical laboratory technology which will help in the solving all forms of medical health sciences.

PSO4. The student completing the course can execute short research projects incorporating various tools and techniques in any of the basic specializations of medical laboratory technology under supervision.

5. Teaching Learning Process

Teaching and learning in this programme involve classroom lectures as well as tutorial and remedial classes.

Tutorial classes: Tutorials allow closer interaction between students and teacher as each student gets individual attention. The tutorials are conducted for students who are unable to achieve average grades in their weekly assessments. Tutorials are divided into three categories, viz. discussion-based tutorials (focusing on deeper exploration of course content through discussions and debates), problem-solving tutorials (focusing on problem solving processes and quantitative reasoning), and Q&A tutorials (students ask questions about course content and assignments and consolidate their learning in the guiding presence of the tutor).

Flip classroom: Flip classroom allows lecture content from face-to-face class time to before class by assigning it as homework. This allows for more interactive forms of learning to take place during class.

Remedial classes: The remedial classes are conducted for students who achieve average and above average grades in their weekly assessments. The focus is laid to equip the students to perform better in the exams/assessments. The students are divided into small groups to provide dedicated learning support. Tutors are assigned to provide extra time and resources to help them understand concepts with advanced nuances. Small groups allow tutors to address their specific needs and monitor them. Following methods are adopted for tutorial and remedial classes:

- Written assignments and projects submitted by students
- Project-based learning

- Group discussions
- Home assignments
- Class tests, quizzes, debates organized in the department
- Seminars and conferences
- Extra-curricular activities like cultural activities, community outreach programmes etc.
- Field trip, excursions, study tour, interacting with eminent authors, etc.

Experiential Learning: Experiential learning is a part of the curricular structure of the Graphic Design program. E.g., projects/OJT/internship/industrial attachments etc. This could be either within the program- internship/ summer project undertaken relevant to the program being studied or as a part time employment.

6. Assessment Methods

Sl. No.	Components of evaluation	Marks	Frequency	Code	Weightage (%)
A. Continuous Evaluation					
i.	Analysis/ Class Test	Combination of any 3 from i. to v. with 5 marks each (15 marks)	1 – 3	C	25%
ii	Home assignments		1 – 3	H	
iii	Project		1	P	
iv	Seminar		1 – 2	S	
v	Viva-Voce/ Presentations		1 – 2	V	
vi	Mid sem Examinations	10	1	Q/CT	
vii	Attendance	5	Every month	A	5%
B. Semester End Evaluation					
i.	Semester End examination	70	1	SEE	70%
Total					100%

Semester-wise and component wise distribution of credit (Four Year UGP – Single Major)

Year	Semester	Course code	Component	Level	Credit
		Major Course			
	I	MLT242M101/ MLT242M111	Basic Anatomy (Theory+ Lab)	100	3
		MLT242M102/ MLT242M112	Basic Biochemistry (Theory +Lab)	100	3
		Minor Course			
		MLT242N101	Patient care management	100	3
		Interdisciplinary			
		IKS-I	Introduction to Indian Knowledge System - I	100	3
		AEC-I			
		AEC982A101	Communicative English and Behavioral Science-I	100	2
		Skill enhancement Elective courses (SEC-I)			
		MLT242S101	Fundamental of Lab Instruments	100	3
		Value Addition Course (VAC-I)			
		VAC	To be chosen from a pool of courses	100	3
					20
	II	Major (Core)			
		MLT242M201/ MLT242M211	Basic Physiology (Theory+ Lab)	100	3
		MLT242M202/ MLT242M212	Basic Microbiology (Theory+ Lab)	100	3
		Minor Course			
		MLT242N102	Biomedical waste management	100	3
		Interdisciplinary			
		IKS-II	Introduction to Indian Knowledge System - II	100	3
		AEC-II			
		AEC982A201	Communicative English and Behavioral Science-II	100	2
		Skill enhancement Elective courses (SEC-II)			

		MLT242S201	Clinical Pathology	100	3	
		Value Addition Course (VAC-II)				
		MLT242VAC2	To be chosen from a pool of courses	100	3	
					20	
Second Year	III	Major (Core)				
		MLT242M301/ MLT242M311	Immunology and Virology (Theory+ Lab)	200	4	
		MLT242M302/ MLT242M312	Intermediate Biochemistry (Theory+ Lab)	200	4	
		Minor Course				
		MLT242N301	General Microbiology	200	4	
		Interdisciplinary				
		IKS-III	To be a chosen from a basket course	200	3	
		AEC-III				
		AEC982A301	Communicative English and Behavioural Science-III	200	2	
		Skill enhancement Elective courses (SEC-III)				
		MLT242S301	Fundamentals of Blood Banking	200	3	
						20
		Second Year	IV	Major (Core)		
MLT242M401/ MLT242M411	Hematology (Theory+ Lab)			200	4	
MLT242M402/ MLT242M412	Histopathology Cytopathology (Theory+ Lab)			200	4	
MLT242M403/ MLT242M413	Intermediate Microbiology (Theory+ Lab)			200	4	
Minor(core)						
MLT242N401	Cytopathology			200	3	
MLT242N402	Biochemistry-IV			200	3	
AEC-IV						
AEC982A401	Communicative English and Behavioural Science-IV			200	2	
						20

Year	Semester	Course code	Component	Level	Credit	
THIRD YEAR	V	MLT242C301/ MLT242C311	Medical Bacteriology and Parasitology (Theory+ Lab)	300	4	
		MLT242C302/ MLT242C312	Diagnostic molecular biology (Theory+ Lab)	300	4	
		MLT242C303/ MLT242C314	Advanced Biochemistry and Enzymology (Theory+ Lab)	300	4	
		Minor (Core)				
		MLT242M301	HDPC-I	300	4	
		Internship		-	4	
					20	
	Major (Core)					
	VI	MLT242C304/ MLT242C315	Advanced Microbiology (Theory+ Lab)	300	4	
		MLT242C305/ MLT242C316	Mycology and parasitology (Theory+ Lab)	300	4	
		MLT242C306	Biostatistics and Research methodology (Theory+ Lab)	300	4	
		MLT242C307/ MLT242C317	Advanced Blood Banking (Theory+ Lab)	300	4	
		Minor (Core)				
		MLT242M302	HDPC-II	300	4	
					20	
	FOURTH YEAR	VII		INTERNSHIP	400	20
VIII			INTERNSHIP	400	20	

Semester -I
Detailed Syllabus

Name of the Subject: Basic Anatomy	Type of Course: Major
Paper Code: MLT242C101	Course Level: 100
Total credits: 3	Scheme of Evaluation: T+P
	L-T-P-C: 2-0-2-3

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding Anatomy of

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on the structure and function of the human body.	BT 1
CO 2	Explain the relation between the different organs and circulating system.	BT 2
CO 3	Organize application of anatomical knowledge with various diseases.	BT 3
CO 4	Analyse the various experiments related to special senses and nervous system.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	General Anatomy: Introduction to Anatomy, terms and terminology. Regions of Body, Cavities and systems. Surface anatomy – Musculo- skeletal, vascular, cardiopulmonary system General Embryology. Applied anatomy	11
II	Musculoskeletal system: Connective tissue & its modification, tendons, membranes, special connective tissue. Bone structure, blood supply, growth, ossification, and classification. Muscle	11

	classification, structure and functional aspect. Joints – classification, structures of joints, movements, range, limiting factors, stability, blood supply, nerve supply, dislocations and applied anatomy.	
III	hypothalamus Structure and features of meninges Ventricles of brain, CSF circulation Development of nervous system & defects Cranial nerves – (course, distribution, functions, and palsy) Sympathetic nervous system, its parts and components Parasympathetic nervous system Applied anatomy	11
IV	Sensory system: Structure and function of, Visual system, Auditory system, Gustatory system, Olfactory system, Somato sensory system	11
TOTAL		44

Title of the Paper: Basic Anatomy Lab

Paper code: MLT242C111

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Identification and description of all anatomical structures. The learning of Anatomy is by demonstration only through dissected parts, slides.	10
III	Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain).	10
IV	Demonstration of skeleton- articulated and disarticulated.	10
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Students can see how tight the spaces are between organs or how clinical issues can arise

- Students examine the effectiveness of yoga poses as experiential learning techniques for the musculoskeletal system.
- They can learn experientially about the blood pressure measurement and learn about hypertension and hypotension.
- They can visit hospitals to get to learn about anatomy
- Brainstorming session

Texts:

1. Alison, G. Anne, W. (2014). Ross and Wilson Anatomy and Physiology in Health and Illness. Elsevier Health; UK, 13th edition
2. Khurana, I., Khurana, A., (2018). Textbook of anatomy and physiology, 3rd edition.
3. Shekar C N C. Manipal Manual of Medical Physiology: CBS Publication, 1st edition.
4. Singh, S.H. (2017). Principles of human physiology for allied health sciences: CBS Publishers & Distributors

5. Reference Book:

1. Tortora, G.J. & Derrickson. (2008). Principles of Anatomy and Physiology. Wiley, Global edition.
2. Venkatesh D. Sudhakar H.H. (2016). Basics of anatomy, physiology & microbiology level 1: CBS Publishers & Distributors, 4th edition
3. Yalayaswamy N.N. (2018). Human anatomy and physiology for courses in nursing and allied health sciences, 3rd edition

Name of the Subject: Basic Biochemistry		Type of Course: Major
Course Level: 100		
Total credits: 3	Scheme of Evaluation: T	T-P-C: 2-0-2-3

Course Objectives: The course is designed to provide a wholesome Understand the metabolism of carbohydrate nutrient molecules in physiological and pathological conditions.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Bloom's Taxonomy Level
CO 1	Recall the core knowledge of metabolism of Carbohydrates, lipids, nucleic acids and their applied aspects.	BT 1
CO 2	Explain the role, classifications, and functions of lipids, carbohydrates, and proteins.	BT 2
CO 3	Develop a wide knowledge of the nucleic acids, DNA, RNA and their applied importance.	BT 3
CO 4	Analyze the various biochemical experiments related to carbohydrates, proteins and fats etc	BT 4

DETAILED SYLLABUS:

Modules	Topics (if applicable) & Course Contents	Periods
I	CARBOHYDRATES: Definition and classification of carbohydrates Common carbohydrates (Glucose, Fructose, Starch, Glycogen, Starch) and their sources.	11
II	PROTEINS: Definition of Proteins along with the biological significance. Amino acids and its classification Essential and Non-essential amino acids	11
III	LIPIDS: Definition and classification of lipids. Classification of Fatty Acids with examples and functions of some common lipids (Phospholipids, Glycolipids, Steroids).	11
IV	NUCLEIC ACIDS: Basic idea of the structure of DNA and RNA, Function of DNA and RNA acid-base buffers, Basic idea of acids, bases, Ph, buffer Acid base balance	11
TOTAL		60

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	To study the general laboratory safety rules. To demonstrate glasswares, apparatus and plasticwares used in laboratory.	10
II	To collect blood samples Anticoagulant vials. Code of conduct of medical laboratory personnel.	10
III	Preparation of different percentage solution Preparation of normal and molar solution. Hazard signs and precautions to be taken in case of acid, base,	10
IV	Demonstration of photocolrimeter Demonstration of centrifuge. Demonstration of ph meter Demostration of spectrophotometer.	10
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Preparation of model of DNA
- Creating physical models of different carbohydrate structure
- Students can create physical models or visual models or visual representations of the Krebs cycle.
- Students performed biochemistry tests in the royal diagnosticlab.
- Students visit to BBCI and GMCH for diagnostic exposure

Textbook:

1. Leininger , Principles of Biochemistry. 7th Edition, 2017.
2. Robert K. Murry, Daryl K. Granner and Victor W. Rodwell., Harper’s Biochemistry. 30th Edition, 2015
3. D. Satyanarayana and Chakrapani, Biochemistry.5th Edition, 2017.

Reference Book:

1. Robert Horton H, Laurence A Moran, Gray Scrimgeour K. Principles of Biochemistry, 4th Edition, 2006, Pearsarson Publisher. ISBN-13: 978-0321707338Conn and Stumpf, Outlines of Biochemistry, 5th Edition, 2006.

Subject: Patient care management	Course: Minor
Subject Code: MLT242N101	L-T-P-C: 3-1-0-3
Scheme of Evaluation: T	

Course Objective:

The course is designed with an objective to understand basic care needed for patients, Organization of Hospitals, Management of Hospitals, importance of safety measures to be taken at the hospital and Personal Hygiene and its Maintenance.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Recall the different organization of Hospitals, importance of personnel hygiene and its maintenance.	BT 1
CO 2	Explain how giving quality patientcare can absolutely have an effect on health outcomes, contributing to a more positive patient recovery experience.	BT 2

CO 3	Apply the knowledge of first aid and safety measures to be given during emergencies	BT 3
CO 4	Analyze how accidents can easily prevail in laboratory and the role of safety measures in preventing it.	BT 4

DETAILED SYLLABUS:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Poisoning: Definition, Causes of poisoning, Sources of Poisoning, Symptoms of poisoning, First aid & Management, Antidotes, Common drugs poisoning, Carbon monoxide poisoning, Legal hazards of medical profession: Malpractice, Civil negligence, Clinical negligence, Corporate negligence	16
II	Laboratory Investigations: Preparation of patients, Preparation of equipments, Collection of specimen of urine, stool, sputum, blood, CSF, Pericardial fluid, Peritoneal fluid, Pleural fluid, etc	16
III	Shock: Definition, Types of shock, General Features of shock, Investigations of shock, Initial management & first aid of shock, Hyperglycemia: Definition, Clinical features, Diabetes laboratory tests for diabetes, Different types of glycosuria, Ketone bodies, Glucose tolerance test. Hypoglycemia: Definition, Etiology & Clinical Features, Investigations for hypoglycemia	16
IV	Drugs: Definition, Names & classification of drugs, Different preparations of drugs, Effects of drugs, Adverse effects of drugs, Tolerance, Abuse, addiction of drugs, Different routes of drug administration, Storing of medicine, Units of standard measurement, Consumer protection Act: Act of commission, Act of omission, Act of rashness, negligence & damage, Legal liabilities of medical profession, Advantage & disadvantage of the act.	16
TOTAL		64

Text:

1. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states.
2. William and Wilkins, Baltimore;1991 [1990 printing].

- Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.

Reference Books:

- Hugo W.B and Russel A.D, Pharmaceutical Microbiology, 7thedn, 2004, Blackwell Scientific publications, Oxford London.
- Prescott and Dunn., Industrial Microbiology, 8th edn, 2011, CBS Publishers & Distributors, Delhi.
- Pelczar, Chan Kreig, Microbiology, 5thedn, 2001, Tata McGraw Hill publisher ltd

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
64	00	26

Experiential learning activities may include:

- Students can see how tight the spaces are between organs or how clinical issues can arise
- Students examine the effectiveness of yoga poses as experiential learning techniques for the musculoskeletal system.

Name of the Subject: Fundamentals of Lab Instrument		Type of Course: SEC-I
Course Level: 100		
Total credits: 3	Scheme of Evaluation: T+P	L-T-P-C: 3-0-0-3

Objective:

The objective of this course is to provide fundamentals which equips the student with the most essential knowledge and skill pertaining to medical laboratories such as importance of laboratory services, role of medical laboratory technologist, use of laboratory wares, instruments and sterilization techniques with the understanding of various professional core areas such as Hematology, Bacteriology, Urinalysis, Parasitology, and others.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Recall the provide fundamentals Knowledge of Instruments and equipment's	BT 1
CO 2	Explain how giving quality skill pertaining to medical laboratories such as importance of laboratory services, role of medical laboratory technologist	BT 2
CO 3	Apply the knowledge of various professional core areas such as Hematology, Bacteriology, Urinalysis, Parasitology, and others.	BT 3
CO 4	Analyze how accidents can easily prevail in laboratory and the role of safety measures in preventing it.	BT 4

Detailed Syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to Clinical laboratory, Code of conduct of medical laboratory personnel, Modern Laboratory Setup and role of medical laboratory technician - Safety measures in Lab. Introduction to Infection.	11
II.	Common Laboratory Equipment's Incubator, Hot Air Oven, Water Bath , Centrifuge, Autoclave -Microscope - Fundamentals of Microscopy, Resolution & Magnification, Glassware – Description of Glassware, its use, handling and care. Syringes, distillation apparatus.	11
III.	Basic Steps for Drawing a Blood Specimen Requirement of Blood Collection - Blood collection. Preparation of reagents: Normal Saline, percent and Molar solution - Clinical Laboratory records	11
IV.	Single cell photometer its principle and uses - Responsibilities of a technician and maintenance. Characteristics of laboratory Substances The chemical composition, structure, and properties of substances. The chemical processes and transformations that they undergo including the use of chemicals and their interactions, danger signs.	11
TOTAL		44

Fundamentals of Lab Instrument

Detailed Syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Handling common laboratory equipment's	10
II.	Preparation of various reagents, Use and care of microscopes	10
III.	Responsibilities of a technician in the maintenance of the analyzers.	10
TOTAL		30

Text Books:

1. Fischbach, 2005. Manual of lab and diagnostic tests, Lippincott Williams Wilkins, New York.
2. Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and leonard jarret, M.D.B.I., New Delhi.

Reference Book:

1. Kanai L. Mukherjee, 2007, Medical laboratory technology Vol.1.Tata McGraw Hill.
2. J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice, Tata McGraw- Hill, New Delhi.

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	26

Level: Semester I**Detailed Syllabus**

Name of the Subject: Behavioural Sciences -1	Type of Course: BHS
Paper Code: BHS982A104	
Total credits: 1	

Course Objectives

To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations.

Course Outcomes:

SI No	Course Outcome
CO 1	Understand self & process of self exploration
CO 2	Learn about strategies for development of a healthy self esteem
CO 3	Apply the concepts to build emotional competencies.

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to Behavioral Science Definition and need of Behavioral Science, Self: Definition components, Importance of knowing self, Identity Crisis, Gender and Identity, Peer Pressure, Self image: Self Esteem, Johari Window ,Erikson's model.	4
II	Foundations of individual behavior Personality- structure, determinants, types of personalities. Perception: Attribution, Errors in perception. Learning- Theories of learning: Classical, Operant and Social.	4
III	Behaviour and communication. Defining Communication, types of communication, barriers to communication, ways to overcome barriers to Communication, Importance of Non-Verbal Communication/Kinesics, Understanding Kinesics, Relation between behaviour and communication.	4

IV	Time and Stress Management Time management: Introduction-the 80:20, sense of time management, Secrets of time management, Effective scheduling. Stress management: effects of stress, kinds of stress-sources of stress, Coping Mechanisms. Relation between Time and Stress.	4
TOTAL		16

Text books

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer & Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc
- K.Alex, Soft skills; S.Chand.

Level: Semester I

Detailed Syllabus

Name of the Subject: Introduction to Effective Communication	Type of Course: AEC
Paper Code: CEN982A101	Course level: 100
Total credits: 1	L-T-P-C: 1-0-0-1

Course Objectives

To understand the four major aspects of communication by closely examining the processes and figuring the most effective ways to communicate with interactive activities.

Course Outcomes:

SI No	Course Outcome
CO 1	Identify the elements and processes that make for successful communication and recognise everyday activities that deserve closer attention in order to improve communication skills.
CO 2	Contrast situations that create barriers to effective communication and relate them to methods that are consciously devised to overcome such hindrance.

CO 3	Use language, gestures, and para-language effectively to avoid miscommunication and articulate one’s thoughts and build arguments more effectively
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COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to Effective Communication <ul style="list-style-type: none"> • Listening Skills <ul style="list-style-type: none"> - The Art of Listening - Factors that affect Listening - Characteristics of Effective Listening • Guidelines for improving Listening skills 	5
II	<ul style="list-style-type: none"> • Speaking Skills <ul style="list-style-type: none"> - The Art of Speaking - Styles of Speaking - Guidelines for improving Speaking skills - Oral Communication: importance, guidelines, and 5 barriers 	5
III	<ul style="list-style-type: none"> • Reading Skills <ul style="list-style-type: none"> - The Art of Reading - Styles of Reading: skimming, surveying, scanning • Guidelines for developing Reading skills 	5
IV	<ul style="list-style-type: none"> • Writing Skills <ul style="list-style-type: none"> - The Art of Writing - Purpose and Clarity in Writing - Principles of Effective Writing 	5
TOTAL		16

Keywords: Communication, Listening, Speaking, Reading, Writing

Text:

1. Business Communication by Shalini Verma

References:

1. Business Communication by P.D. Chaturvedi and Mukesh Chaturvedi
2. Technical Communication by Meenakshi Raman and Sangeeta Sharma

CREDIT DISTRIBUTION

LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
15 hrs	-	10 hours - Movie/ Documentary screening - Peer teaching - Seminars - Field Visit

Level: Semester II

Detailed Syllabus

Name of the Subject: Basic Physiology	Type of Course: Major
Paper Code: MLT242M201	Course Level: 100
Total credits: 3	Scheme of Evaluation: T+P
	L-T-P-C: 2-0-1-3

Course Objectives

The objective of the course is to introduce students acquire knowledge of the normal physiology of various human body systems and understand the alterations in physiology in diseases.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Recall the function of the cell, tissue, and organ systems.	BT 1
CO 2	Understand the importance of body immunity, blood coagulation, blood grouping etc.	BT 2
CO 3	Apply the acquainted knowledge about the digestive system and its different role and actions.	BT 3
CO 4	Distinguish the various experiments related to special senses and nervous system.	BT 4

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	General Physiology- Cell: morphology, Structure and function of cell organelles, Structure of cell membrane, Transport across cell membrane, Intercellular communication, Homeostasis	11
II	Blood- Introduction-composition & function of blood, W.B.C., R.B.C., Platelets formation & functions, Immunity, Plasma: composition, formation & functions, Plasma Proteins: -types & functions, Blood Groups- types, significance, determination Hemoglobin, Haemostasis, Lymph-composition, formation, circulation & functions Cardiovascular system- Conducting system-components, impulse conduction, Heart valves, Cardiac cycle-definition,	11
III	phases of cardiac cycle, Cardiac output- definition, normal value, determinants. Stroke volume and its regulation, Heart rate and its regulation, Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure, Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes during exercise	11
IV	Nerve Muscle Physiology- Muscles- classification, structure, properties, Excitation contraction coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise, Nerve –structure and function of neurons, classification, properties, Resting membrane potential & Action potential their ionic basis, All or None phenomenon, Neuromuscular transmission, Ionic basis of nerve conduction, Concept of nerve injury & Wallerian degeneration, Synapses, Electrical events in postsynaptic neurons, Inhibition & facilitation at synapses, Chemical transmission of synaptic activity, neurotransmitters.	11
TOTAL		44

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Elicitation of Reflexes & jerks. Identification of blood cells by study of peripheral blood smear. Introduction to hemocytometry. Enumeration of white blood cell (WBC) count	10
II	Determination of blood group. Determination of erythrocyte sedimentation rate (ESR). Recording of blood pressure. Special senses Structure and functions of eye, ear, nose and tongue and their Determination of heart rate and pulse rate disorders.	10
III	Enumeration of total red blood corpuscles (RBC) count Determination of bleeding time Determination of clotting time Estimation of hemoglobin content	10
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44 hrs	30 hrs	16 hrs

Experiential learning activities may include:

- The students are acquainted with normal bodily functions(homeostasis) and learn the capacity to distinguish what is normal state and diseased state.
- They can learn experientially about the blood pressure measurement and learn about hypertension and hypotension.
- They can have experiential learning as regards ABO and Rh blood group types and their disorders as well as hemoglobinopathies.
- Experiential learning on health camp conduction and detection of disorders as well as hands on training.

- They can visit hospitals to get to learn about hospital setup and laboratory setup and function specially blood bank.

Texts:

1. Arthur, Guyton, Textbook of Medical Physiology, Mosby. 3rd Edition
2. Singh, S.H. (2017). Principles of human physiology for allied health sciences: CBS Publishers & Distributors, Latest Edition
3. Anand&Manchanda, Textbook of Physiology, Tata McGrawHill. 5th Edition
4. Sembulingam.K, Human Physiology- Vol. 1&2, MedicalAllied, 7th Edition.

Reference Books:

1. Chaudhari, S.K, Concise Medical Physiology, New Central Agency, Calcutta, 4th Edition
2. Tortora & Grabowski, Harper Collins, Principles of Anatomy and Physiology, Global

Edition

Name of the Subject: Basic Microbiology	Type of course: Major
Course Level: 100	Scheme of Evaluation: T+P
Paper code: MLT242C104	
Total credits: 3	L-T-P-C: 2-0-2-3

Course Objectives:

This course has been formulated to impart comprehensive knowledge on Virology, Bacteriology, Parasitology and Mycology. To introduce the nutrition requirements and growth factor of the microbes. The students will learn to identify and classify fungi and parasites, as well as correlate their presence with disease states.

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Recall the microorganisms name and relate their growth and nutrition factors.	BT 1

CO 2	Classify the different media used for growth and nourishment of microbes	BT 2
CO 3	Apply a basic technique of Microscopes and its importance.	BT 3
CO 4	Analyze the morphology, pathogenesis and laboratory diagnosis of the microorganisms.	BT 4

DETAILED SYLLABUS

Modules	Course Content	Periods
I.	Introduction to Microbiology: Microscopy, Bright-field Microscopy, Dark field Microscopy, Phase contrast Microscopy, Fluorescence Microscopy, Electron Microscopy Transmission electron Microscopy, Scanning electron Microscopy Stains in microbiology: Preparation of smear, simple staining, classification of stains: Gram staining, Acid fast staining, Negative staining	11
II.	Shapes and structure of bacteria: Bacterial cell- structure and function, capsule, spores, flagella, Virulence factor of Bacteria, Operation and Principles of Incubator, Autoclave, Hot air oven, Inspissator, Distillation plant.	11
III.	Antisepsis, Autoclave, Dry heat Sterilisation Moist heat Sterilisation	11
IV	Bacteriological medias: -Simple Media, Differential Media, Special; media, Enrichment media Bacterial growth curve	11
TOTAL		44

Text Books:

1. Pepler J H, Microbial Technology, 2ndedn, 1979, Academic press.
2. Ananthnarayan and Panikar's Text Book of Microbiology, 10thedn, 2017, Orient-Longman, Chennai
3. Sastry SA, Bhat S, Essentials of medical microbiology, 2ndedn, 2018, CBS publisher and distributors.
3. Edward Alcamo, Fundamentals of Microbiology, 4thedn, 2004, Benjamin-cummings Pub. Co.

Ltd..

Reference Books:

1. Harvey AR, Lippincott's Illustrated Reviews Microbiology, 3rdedn, 2012, wolter and klower publications.
2. Mims R, Medical microbiology, 1stedn, 2020, Mosby publisher.
3. Prescott and Dunn., Industrial Microbiology, 8th edn, 2011, CBS Publishers & Distributors, Delhi.

Title of the Paper: BASIC MICROBIOLOGY (Practical)

Paper code: MLT242C113

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	Care and operation of Microscopes viz. Light, Dark ground, Phase contrast, Inverted, Fluorescent microscopes. Collection of specimens for Microbiological investigations such as blood, urine, throat swab, rectal swab, stool, pus, OT specimens	10
II.	Special tests – Bile solubility, chick cell agglutination, sheep cell haemolysis, niacin and catalase tests for mycobacterium, satellitism, CAMP test, catalase test and slide agglutination tests, and other as applicable for identification of bacteria upto species level	10
III.	Preparation of swabs/sterile tubes & bottles. Preparation of smear. Staining.: Gram & Ziehl -Neelsen staining. Identification of Culture media. Identification of instruments. Identification of common microbes.	10
IV	Performance of antimicrobial susceptibility testing by Kirby-Bauer disk diffusion method; estimation of Minimum inhibitory/Bactericidal concentrations by tube/plate dilution methods. Tests for drug susceptibility of Mycobacterium tuberculosis Testing of disinfectants- Phenol coefficient and 'in use' tests. Quality control of media reagents etc. and validation of sterilization procedures. Aseptic practices in laboratory and safety precautions. Disposal of contaminated material like cultures	10
TOTAL		40

Text Books:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease;

South Asia edition; India; Elsevier; 9th Edition, 2014.

2. HarshMohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 5th Edition, 2010.

3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.

Reference Books:

1. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
2. William and Wilkins, Baltimore;1991 [1990 printing].
3. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44 hrs	40 hrs	6 hrs

Experiential learning activities may include:

- The students are acquainted with normal bodily functions(homeostasis) and learn the capacity to distinguish between a normal state and a diseased state.
- They can learn experientially about microorganism.
- Experiential learning on health camp conduction and detection of disorders as well as hands-on training.
- They can visit hospitals to get to learn about hospital setup and laboratory setup and function specially microbiology lab.

Subject: Biomedical Waste management	Type of course: Minor
Code: MLT242N201	Level: 100
Total Credit: 3	Scheme of Evaluation: T

Course Objectives:

The course is with the objective of giving the students wholesome practical knowledge on

biomedical waste management.

On successful completion of the course the students will be able to:		
Sl. No	Course Outcome	Blooms Taxonomy Level
CO 1	Recall the Bio-medical waste, Concepts and Perceptions Waste Generation, Segregation Disposal	BT 1
CO 2	Classify the different Policies and Perspectives of BMW Management	BT 2
CO 3	Apply a Basic Policies and Perspectives of BMW Management	BT 3
CO 4	Analyse the Criteria for selecting appropriate Medical Waste Technologies	BT 4

Course outcomes:

Modules	Course Content	Periods
I	Bio-medical waste – Concepts and Perceptions Waste Generation Segregation Disposal	16
II	Planning and Objectives of BMW Management Survey Policies and Perspectives of BMW Management	16
III	Record Keeping Management of Bio-medical Waste Technologies for Treatment for BMW Criteria for selecting appropriate Medical Waste Technologies	16
IV	Training, Occupational Safety and Health Issues Legal Aspects and Environment Concern Implementation of Action Plan Approaches to Common Regional facility	16
TOTAL		64

Reference Books:

1. The Book of Hospital Waste Management: Dr. D.B. Acharya & Dr. Meeta Singh (Minerva Press, New Delhi)
2. Hospital Waste Management & its Monitoring: Madhuri Sharma (Jaypee Brothers, Medical

Publishers (P) Ltd. New Delhi)

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
64 hrs	00	26 hrs

Experiential learning activities may include:

- They can learn about BMW Management
- They can visit hospitals to get to learn about hospital setup and laboratory setup and function.

Subject: Clinical Pathology	Type of course: SEC-II
Total credits: 3	L-T-P-C: 1-0-4-3
Level: 100	Scheme of Evaluation: T+P

Course Objectives:

The course with an objective to give the students a wholesome practical knowledge on collecting different biological specimen and its role in analyzing different pathological disorders, on performing different biochemical and microscopic examination of urine and the different methods to perform ABO blood grouping.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI. No	Course Outcome	Blooms Taxonomy Level
CO 1	Name the biological specimen commonly collected in clinical laboratory.	BT 1
CO 2	Explain the clinical importance of 24 hours urine examination for proteins.	BT 2
CO 3	Apply the knowledge of the principle of blood grouping and perform both forward and reverse grouping.	BT 3
CO 4	Analyze the physical and microscopic examination of the various biological specimen	BT 4

DETAILED SYLLABUS

Modules	Course Content	Periods
I	<p>CLINICAL PATHOLOGY</p> <p>Urine collection for Routine examination Midstream Urine Collection 24 hrs. Urine examination for proteins. Urine R/E- Physical Examination- Colour, pH, Specific Gravity</p> <p>Biochemical Examination-</p> <p>Urine Sugar, Urine Protein, Bile salt, Bile Pigment Urobilinogen Ocult Blood Ketone bodies Pregnancy test Bence Jones Proteins</p>	16
II	<p>Microscopic Examination</p> <p>Fluid – Pleural Fluid examination -Physical, Chemical, Cell count – DLC/TLC, - Bacteriological Cerebrospinal Fluid (CSF) examination:Physical, Chemical, Cell cou DLC/TLC, - Bacteriological</p> <p>Synovial fluid examination Physical, Chemical, Cell count – DLC/TLC, - Bacteriological</p>	16
III	<p>Semen analysis</p> <p>Physical Examination, Chemical examination, Sperm count, Motility, Morphology study etc</p> <p>Stool analysis</p>	16

IV	Preparation of Blood cells for ABO grouping ,Preparation of Serum Cells for reverse grouping,	16
	Blood grouping Forward grouping - Moist Chamber Slide method and tube method Reverse Grouping – Moist Chamber Slide method and tube metho Cross matching, Donor Screening	
TOTAL		64

Suggested Books:

1. Textbook of pathology, Harsh mohan, 8th edition, Jaypee publishers
2. Textbook of Medical laboratory Technology, 3rd edition, Godkar PB, Bhalani publishing house
3. Textbook of Medical laboratory Technology, RamnikSood, Jaypee publishers

References:

1. Dacie and lewis practical Haematology, Barbara J Bain, Imedla Bates, Mike A Laffan,12th edition, Elsevier publications
2. Manual of Medical Laboratory Technology, K.N.Sulochana and S. Ramakrishnan, Jaypee publishers

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
10 hrs	54 hrs	26 hrs

Experiential learning activities may include:

- The students know about the specimen collection in the clinical laboratory.
- They can have exponential learning as regards ABO and Rh blood group types and their disorders as well as hemoglobinopathies.
- Experiential learning on health camp conduction and detection of disorders as well as hands on training.
- They can visit hospitals to get to learn about hospital setup and laboratory setup and function specially blood bank.

Level: Semester II

Detailed Syllabus

Name of the Subject: Behavioural Sciences - II	Type of Course: BHS
Paper Code: BHS982A204	
Total credits: 1	

Course Objectives

To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations.

Course Outcomes:

SI No	Course Outcome
CO 1	Develop an elementary level of understanding of culture and its implications on personality of people.
CO 2	Understand the concept of leadership spirit and to know its impact on performance of employees.
CO 3	Understand and apply the concept of Motivation in real life.

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Culture and Personality Culture: Definition, Effect, relation with Personality, Cultural Iceberg, Overview of Hofstede's Framework, Discussion of the four dimensions of Hofstede's Framework..	4
II	Attitudes and Values Attitude's definition: changing our own attitudes, Process of cognitive dissonance Types of Values, Value conflicts, Merging personal and Organisational values.	4
III	Motivation Definition of motivation with example, Theories of Motivation (Maslow, McClelland's theory & Theory X and Y).	4
IV	Leadership Definition of leadership, Leadership continuum, types of leadership, Importance of Leadership, New age leaderships: Transformational & transactional Leadership, Leaders as role models.	4
TOTAL		16

Text books

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer & Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc.
- Organizational Behaviour by Kavita Singh (Vikas publishers, 3rd Edition).

Level: Semester II

Detailed Syllabus

Name of the Subject: Approaches to Verbal and Non-Verbal Communication	
Type of Course: AEC	
Paper Code: CEN982A201	Course level: 100
Total credits: 1	L-T-P-C: 1-0-0-1

Course Objectives

To introduce the students to the various forms of technical communication and enhance their knowledge in the application of both verbal and non-verbal skills in communicative processes.

Course Outcomes:

SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Identify the different types of technical communication, their characteristics, their advantages and disadvantages	BT 1
CO 2	Explain the barriers to communication and ways to overcome them.	BT 2
CO 3	Discover the means to enhance conversation skills.	BT 3
CO 4	Determine the different types of non-verbal communication and their significance.	BT 4

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
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I.	Technology Enabled Communication Communicating about technical or specialized topics, Different forms of technology-enabled communication tools used in organisations Telephone, Teleconferencing, Fax, Email, Instant messaging , Blog, podcast, Videos, videoconferencing, social media	5
II	Communication Barriers Types of barriers: Semantic, Psychological, Organisational, Cultural, Physical, and Physiological. - Methods to overcome barriers to communication.	5
III	Conversation skills/Verbal Communication Conversation – Types of Conversation, Strategies for Effectiveness, Conversation Practice, Persuasive Functions in Conversation, Telephonic Conversation and Etiquette Dialogue Writing, Conversation Control.	5
IV	Non-verbal Communication Introduction; Body language- Personal Appearance, Postures, Gestures, Eye Contact, Facial expressions Paralinguistic Features-Rate, Pause, Volume, Pitch/Intonation/ Voice/ modulation Proxemics , Haptics, Artifacts, Chronemics	5
TOTAL		16

Texts:

1. Rizvi, M. Ashraf. (2017). Effective Technical Communication. McGraw-Hill.
2. Chaturvedi, P. D. and Chaturvedi, Mukesh. (2014). Business Communication. Pearson.
3. Raman, Meenakshi and Sharma, Sangeeta. (2011). Technical Communication: Principles and Practice (2nd Edition): Oxford University Press.

References:

1. Hair, Dan O., Rubenstein, Hannah and Stewart, Rob. (2015). A Pocket Guide to Public Speaking. (5th edition). St. Martin's. ISBN-13:978-1457670404
2. Koneru, Aruna.(2017) Professional Communication. New Delhi: Tata McGraw Hill ISBN-13: 978-0070660021
3. Raman, Meenakshi and Singh, Prakash.(2012). Business Communication (2nd Edition): Oxford University Press
4. Sengupta, Sailesh.(2011) Business and Managerial Communication. New Delhi : PHI Learning Pvt. Ltd.

SYLLABUS (3rd SEMESTER)

Semester -III
Detailed Syllabus

Name of the Subject: Immunology and Virology (Theory +Lab)	Type of Course: Major
Paper Code: MLT242M301	Course Level: 200
Total credits: 4	Scheme of Evaluation: T+P
	L-T-P-C: 3-0-2-4

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding immune system and different types of viruses affecting human.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on immunity and explain the immunological process at molecular and cellular level.	BT 1
CO 2	Explain the relation between the different antigens and antibodies and its role in providing immunity.	BT 2
CO 3	Apply the knowledge of virus to deal with various diseases.	BT 3
CO 4	Analyse the various impact of viruses on public health and their different diagnosis methods.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Immunology: Historical background, general concepts of the immune system, innate and adaptive immunity; active and passive immunity; primary and secondary immune response, Cell and organs of immune system, Phagocytosis	11

II	Antigens and Antibodies: Properties, foreignness, molecular size, heterogeneity, B and T cell epitopes; T dependent and T independent antigens Antibodies: Historical perspective of antibody structure; structure, function, and properties of the antibodies; different classes, subclasses and biological activities of antibodies; concepts of antibody diversity, isotype, allotype,	11
III	Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody. Immunological disorders: primary and secondary immunodeficiency, SCID. Interleukins, MHC-I, MHC-II and other types.	11
IV	VIROLOGY – General characters of viruses - Classification of viruses - Lab diagnosis of viral infections - Cultivation of viruses - Bacteriophages. -	11
TOTAL		44

Title of the Paper: Immunology and virology (Lab)

Paper code: MLT242M311

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Diagnostic tests by kit method: WIDAL, VDRL, RPR, ASO, CRP, TPHA, HCG, HIV tridot, HbSAg	15
III	Quantitative estimation HIV, HbSAg by ELIZA method and demonstration of RIA staining.	15
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Students can make a chart explaining different types of ELISA methods.
- Students can have exposure to labs and identify different microorganisms in microscope.
- They can visit hospitals to get to learn about microbiology
- Students making a model or chart explaining on HIV virus and its impact on our society

Texts:

1. Textbook of Microbiology, Ananthanarayann, Paniker, Arti Kapil, 9th edition, universities press
2. Laboratory immunology & Serology – Neville J. Bryant.
3. C.P. Baveja, Textbook of microbiology, 6th edition, Arya Publications

Reference Book:

1. TEXTBOOK OF IMMUNOLOGY by Dr. Ajoy Paul
2. Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication
3. Textbook of Medical Virology By Baijayantimala Mishra

4.

Semester -III

Detailed Syllabus

Name of the Subject: Intermediate Biochemistry (Theory +Lab)	Type of Course: Major
Paper Code: MLT242M302	Course Level: 200
Total credits: 4	Scheme of Evaluation: T+P
	L-T-P-C: 3-0-2-4

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding biochemistry related to metabolisms and different enzymes.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on enzymes, its classification and their mode of action.	BT 1
CO 2	Explain the relation between the different types of metabolic pathway and its relation to the other.	BT 2

CO 3	Understand the key metabolic pathway involved in energy production, storage and utilization in living organisms.	BT 3
CO 4	Analyse the biological charts to understand the metabolic pathways of protein, carbohydrates and fats.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Metabolism of carbohydrates: Glycogenesis, Glycogenolysis, Clinical orientation of glycogen, Glycolysis, Citric acid cycle, energetic of citric acid cycle, Glyconeogenesis, Regulation of glucose metabolism, Metabolism of Fructose, Metabolism of Galactose, Regulation of blood glucose concentration.	11
II	Metabolism of Proteins: General pathway of protein metabolism, Nitrogen metabolism, catabolism of proteins - Transamination, Oxidative Deamination, transdeamination. Synthesis of urea, metabolism of individual amino acids overview, Structural orientation of protein, Protein synthesis: Translation, Transcription	11
III	Metabolism of Lipids Role of liver in fat metabolism, B Oxidation of fatty acid, Biosynthesis of lipids, Prostaglandin, Cholesterol metabolism, formation of bile acids, plasma lipoproteins,	11
IV	Integration of metabolic pathways of carbohydrate, proteins, and fats. Formation of bile pigments, catabolism of heme. Enzymes: Definition, classification, co-enzyme, iso-enzyme, mechanism of action, factors affecting enzyme activity.	11
TOTAL		44

Title of the Paper: Intermediate Biochemistry (Lab)

Paper code: MLT242M312

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
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I.	Liver function tests – Total Bilirubin, direct and Indirect Bilirubin, Urinary Bile salt, Urinary Bile pigments, Urinary Urobilinogen, Total Protein, Albumin, SGOT, SGPT.	15
III	Renal Function Test – Estimation of urea, Uric acid and Creatinine, Urine Examination R/E Protein Estimation.	15
III	Gastric Function Test – Examination of resting Content Quality control in Biochemistry laboratory.	
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Students can make model of different metabolic pathway.
- Students can visit hospitals and have exposure to biochemistry labs
- With the help of chart they can explain the functions of different enzymes.

Textbook:

1. Leininger, Principles of Biochemistry. 7th Edition, 2017.
2. Robert K. Murray, Daryl K. Granner and Victor W. Rodwell., Harper's Biochemistry. 30th Edition, 2015
3. D. Satyanarayana and Chakrapani, Biochemistry. 5th Edition, 2017.

Reference Book:

4. Robert Horton H, Laurence A Moran, Gray Scrimgeour K. Principles of Biochemistry, 4th Edition, 2006, Pearsarson Publisher. ISBN-13: 978-0321707338
Conn and Stumpf, Outlines of Biochemistry, 5th Edition, 2006.

Semester -III
Detailed Syllabus

Name of the Subject: General Microbiology (Theory)	Type of Course: Minor
Paper Code: MLT242N301	Course Level: 200
Total credits: 4	Scheme of Evaluation: T
	L-T-P-C: 4-0-0-4

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding Microbiology

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the diversity of microorganisms and their roles in human health and disease.	BT 1
CO 2	Identify the microorganisms and fostering skills necessary for practical application in microbiology.	BT 2
CO 3	Classify pathologic microorganisms understand their different shape and structures and their virulence factors.	BT 3
CO 4	Analyse the different microorganisms with the help of different culture media	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to Microbiology Microscopy: Bright-field Microscopy, Dark field Microscopy, Phase contrast Microscopy, Fluorescence Microscopy, Electron Microscopy and their uses. Stains in microbiology: Preparation of smear. simple staining classification of stains Gram staining Acid fast staining, Negative staining	16

II	Shapes and structure of bacteria Bacterial cell- structure and function, capsule, spores, flagella, Virulence factor of Bacteria, Gram positive, gram negative organisms. Operation and Principles of Incubator, Autoclave, Hot air oven. Inspissator, Distillation plant	16
III	Microbial Nutrition, Growth and control Nutritional requirements (C, N, H,O,S,P), Nutritional type of Micro-organisms, Growth factors, Bacterial growth curve. Sterilization and disinfection: Definition, Classification, Antisepsis Autoclave, Dry heat Sterilization, Moist heat Sterilization	16
IV	Bacteriological media and their composition, Simple Media. Differential Media, Special media, Enhancement media. Culture methods: Streak culture, Lawn culture, Stroke culture, stab culture, pour plate culture, liquid culture.	16
TOTAL		64

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
64	00	26

Experiential learning activities may include:

- Students can make a model of a bacterial cell.
- Draw the chart showing the different parts of microscope.
- Students can make a chart showing different types of culture media.

Text Books:

1. Peppler J H, Microbial Technology, 2ndedn, 1979, Academic press.
2. Ananthnarayan and Panikar's Text Book of Microbiology, 10thedn, 2017, Orient-Longman, Chennai
3. Sastry SA, Bhat S, Essentials of medical microbiology, 2ndedn, 2018, CBS publisher and distributors.
3. Edward Alcamo, Fundamentals of Microbiology, 4thedn, 2004, Benjamin-cummings Pub. Co. Ltd.

Reference Books:

1. Harvey AR, Lippincott's Illustrated Reviews Microbiology, 3rdedn, 2012, wolter and klower publications.
2. Mims R, Medical microbiology, 1stedn, 2020, Mosby publisher.
3. Prescott and Dunn., Industrial Microbiology, 8th edition, 2011, CBS Publishers & Distributors, Delhi.

Semester -III

Detailed Syllabus

Name of the Subject: Fundamental of blood banking (Practical)	Type of Course: SEC
Paper Code: MLT242S301	Course Level: 200
Total credits: 3	Scheme of Evaluation: T
	L-T-P-C: 3-0-0-3

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding blood banking.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on blood banking understanding its history and types of blood grouping.	BT 1
CO 2	Explain about the blood grouping and different types of cross matching.	BT 2
CO 3	Apply the knowledge of blood banking enabling them the criteria for donor selection and care.	BT 3
CO 4	Analyse the various blood components and the QC used in blood banking.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
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I.	History of blood group ABO blood grouping and Other Blood grouping system Donor selection & phlebotomy, preservation and storage of blood. Importance types and principle of blood grouping systems methods.	16
II	Blood grouping- forward and reverse grouping. Preparation of pooled ABO cells. Cross matching grading of reactions. Rh typing slide and tube method, DU testing Coombs test direct and indirect	16
III	Compatibility testing and emergency crossmatching Donor selection, post donation care, adverse effect of blood transfusion Testing for transfusion transmitted diseases	16
IV	Blood components preparation and their uses- PRBC, FFP, Platelet concentrate, cryoprecipitate. Quality control – methods, reagents, tests methods, products.	16
TOTAL		64

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
64	00	26

Experiential learning activities may include:

- Students can draw the chart showing blood components separation
- Students can make a chart explaining the different types of blood group system.

Text Books:

1. Textbook of pathology, Harsh mohan, 8th edition, Jaypee publishers
2. Textbook of Medical laboratory Technology, 3rd edition, Godkar PB, Bhalani publishing house
3. Textbook of Medical laboratory Technology , RamnikSood, Jaypee publishers

References:

1. Dacie and lewis practical Haematology, Barbara J Bain, Imedla Bates, Mike A Laffan,12th edition, Elsevier publications
2. Manual of Medical Laboratory Technology, K.N.Sulochana and S. Ramakrishnan, Jaypee publishers

Level: Semester III

Detailed Syllabus

Name of the Subject: Behavioural Sciences - III

Type of Course: BHS

Paper Code: BHS982A304

Total credits: 1

Course Objectives

To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations .To enable the students to understand the process of problem solving and creative thinking.

Course Outcomes:

SI No	Course Outcome
CO 1	Understand the process of problem solving and creative thinking.
CO 2	Develop and enhance of skills required for decision-making.

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Problem Solving Process Defining problem, the process of problem solving, Barriers to problem solving(Perception, Expression, Emotions, Intellect ,surrounding environment)	4
II	Thinking as a tool for Problem Solving What is thinking: The Mind/Brain/Behaviour Critical Thinking and Learning: -Making Predictions and Reasoning. -Memory and Critical Thinking. - Emotions and Critical Thinking.	4
III	Creative Thinking - Definition and meaning of creativity ,	4

	- The nature of creative thinking :Convergent and Divergent thinking, - Idea generation and evaluation (Brain Storming) - Image generation and evaluation. - The six-phase model of Creative Thinking: ICEDIP model	
IV	Building Emotional Competence Emotional Intelligence – Meaning, components, Importance and Relevance Positive and Negative emotions Healthy and Unhealthy expression of emotions	4
TOTAL		16

Text books

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer &Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc.

Level: Semester III

Detailed Syllabus

Name of the Subject: Fundamentals of Business Communication Type of Course: AEC	
Paper Code: CEN982A301	Course level: 200
Total credits: 1	L-T-P-C: 1-0-0-1

Course Objectives

The aim if the course is to develop essential business communication skills, including effective writing, speaking, and interpersonal communication, to enhance professional interactions, collaboration, and successful communication strategies within diverse corporate environments.

Course Outcomes:

SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define and list business documents using appropriate formats and styles, demonstrating proficiency in written communication for various business contexts.	BT 1
CO 2	Demonstrate confident verbal communication skills through persuasive presentations, active listening, and clear articulation to engage and influence diverse stakeholders.	BT 2

CO 3	Apply effective interpersonal communication strategies, including conflict resolution and active teamwork, to foster positive relationships and contribute to successful organizational communication dynamics	BT 3
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COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Business Communication: Spoken and Written <ul style="list-style-type: none"> • The Role of Business Communication • Classification and Purpose of Business Communication • The Importance of Communication in Management • Communication Training for Managers • Communication Structures in Organizations • Information to be Communicated at the Workplace • Writing Business Letters, Notice, Agenda and Minutes 	5
II	Negotiation Skills in Business Communication <ul style="list-style-type: none"> • The Nature and Need for Negotiation <ul style="list-style-type: none"> o Situations requiring and not requiring negotiations • Factors Affecting Negotiation <ul style="list-style-type: none"> o Location, Timing, Subjective Factors • Stages in the Negotiation Process <ul style="list-style-type: none"> o Preparation, Negotiation, Implementation <ul style="list-style-type: none"> - • Negotiation Strategies 	5
III	Ethics in Business Communication <ul style="list-style-type: none"> • Ethical Communication • Values, Ethics and Communication • Ethical Dilemmas Facing Managers • A Strategic Approach to Business Ethics • Ethical Communication on Internet • Ethics in Advertising 	5
IV	Business Etiquettes and Professionalism <ul style="list-style-type: none"> • Introduction to Business Etiquette • Interview Etiquette • Social Etiquette • Workplace Etiquette <ul style="list-style-type: none"> - • Netiquette 	5

Text:

1. Business Communication by Shalini Verma

References:

1. Business Communication by PD Chaturvedi and Mukesh Chaturvedi

2. Technical Communication by Meenakshi Raman and Sangeeta Sharma

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
15 hrs	-	10 hours - Group Discussion - Presentation - Quiz - Case Study

SYLLABUS (4th SEMESTER)

Semester -IV

Detailed Syllabus

Name of the Subject: Haematology (Theory+Lab)	Type of Course: Major
Paper Code: MLT242M401	Course Level: 200
Total credits: 4	Scheme of Evaluation: T+P
	L-T-P-C: 3-0-2-4

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding Haematology

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on the blood cells, their formation, and the lab investigations.	BT 1
CO 2	Explain the different disorders of RBC, WBC and platelets.	BT 2
CO 3	Organize the knowledge on different laboratory techniques	BT 3
CO 4	Analyse the different blood cells types through microscopic examination which enable the accurate diagnosis of haematological disorders.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction of Haematology: Blood – formation, composition, Method of collections, Preservation of blood for routine examination and Anticoagulant, Red Blood Cells/ Erythrocytes: Formation, Morphology, Functions, Count methods and its clinical importance, Haemoglobin, Reticulocyte, PCV, ESR	11
II	Anaemia: Definition, Morphology & Etiology classification, Microcytic Hypochromic anaemia – Causes, Types, Lab investigation, Laboratory pictures, Clinical importance. Normocytic Hypochromic anaemia and Diamorphicanaemia. ,other types of anaemia in details - sickle cell anemia, Thalassaemia.	11
III	White Blood Cells (WBC): Formations, Functions, life span, morphology, Types, Methods of counting, total WBC and differential counts (preparation of smears), Leukaemia and its classification. Platelets: Formation, Morphology, Functions, Method of counting, normal & abnormal counts with clinical importance	11
IV	Haemostasis: Haemostasis in detail, Haemophilia – Definition, Types & Investigation, Clinical importance Coagulation: Definition, Principle &	11

	mechanism of coagulation, Factors of coagulation, In brief coagulation profile. Bone marrow: Method of preparation of bone marrow smears, Different types of staining of bone marrow smear.	
TOTAL		44

Title of the Paper: Haematology (Lab)

Paper code: MLT242M411

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	<ul style="list-style-type: none"> • Study of Microscopes • Collection of blood • Study of instruments and glassware's • PCV estimation 	10
III	<ul style="list-style-type: none"> • Preparation of blood thin film and staining and study of RBC morphology • Preparation of blood thick film and staining and study of blood parasite • Total RBC counts, Total WBC counts • BT,CT,PT,PTT and APTT 	10
III	<ul style="list-style-type: none"> • Differential leucocyte counts • Absolute Platelet count and eosinophil count • Haemoglobin estimation by various methods, ESR estimation • Reticulocyte count 	10
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Students can draw the chart on Erythropoiesis.
- Students can explain the different lab investigations for blood with the help of chart.

- Students can show a diagrammatic representation of hemostasis.

Text Books:

4. Textbook of pathology, Harsh mohan, 8th edition, Jaypee publishers
5. Textbook of Medical laboratory Technology, 3rd edition, Godkar PB, Bhalani publishing house
6. Textbook of Medical laboratory Technology , RamnikSood, Jaypee publishers

References:

3. Dacie and lewis practical Haematology, Barbara J Bain, Imedla Bates, Mike A Laffan,12th edition, Elsevier publications
4. Manual of Medical Laboratory Technology, K.N.Sulochana and S. Ramakrishnan, Jaypee publishers

Semester -IV

Detailed Syllabus

Name of the Subject: Histopathology and Cytopathology (Theory+Lab) Type of Course: Major		
Paper Code: MLT242M402		Course Level: 200
Total credits: 4	Scheme of Evaluation: T+P	L-T-P-C: 3-0-2-4

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding

histopathology and cytopathology

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Recognize normal histological structures and identify pathological changes such as cellular abnormalities	BT 1
CO 2	Acquire the skills to diagnose disease through histopathological examination.	BT 2
CO 3	Evaluate cellular specimen, demonstrating the ability to identify normal and abnormal cell morphology.	BT 3
CO 4	Develop the skills to accurately diagnose disease based on cytopathological findings.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction of histopathology, laboratory organization, care & maintenance of equipment's used in histotechnology lab, Basic concepts of fixation and various types of fixative used in histopathology. Grossing of tissues, whole mount, sections, smears, tissue processing and its steps, manual and automated method, Decalcification, decalcification methods, Embedding media, its type and properties	11
II	Microtome, its type and working, various type of microtome, Microtome knives, its type and knife sharpening, Cryostat, frozen sections of fresh, fixed and unfixed tissue, Stains and dyes, natural dye, acidic dye, basic dye, neutral dyes, fluorescence dye, mordant, metachromatic dyes, types of hematoxylin, Hematoxylin and eosin	11

	staining, use of control sections in tissue staining, mounting and mounting media, advantages & disadvantages.	
III	Definition of cytology, Cells & tissues, Normal tissues, Classification of cytology- Exfoliative and interventional cytology, Collection of specimens from female genital tract specimen for routine screening, Urinary cytology : Collection of urinary tract specimens, Diagnostic utility of urinary cytology, Progressive changes of the cells.	11
IV	Cell block preparation, Cytological fixative and mailing Definition, Types/classification, Aims & object, Materials for establishments of cytological lab, Staining: R/E stain types-Methods, Maintenance, Preparation of stain, Pap's stain, Special stains- MGG, PAS, ZN, Mucicarminetc, Mounting and Labelling, Establishments of lab- Manpower, Space, Ventilation, Light, Water, working benches, Room arrangements, Reception of specimens, Instruments required.	11
TOTAL		44

Title of the Paper: Histopathology and Cytopathology (Lab)

Paper code: MLT242M412

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Labelling of specimen, Filling of forms, Receiving and labelling of sample and maintenance of register, Slide demonstration of different types of cells, Common instruments for histopathology, Fixative preparation, Preparations of graded alcohols, grossing, Tissue Processing, Decalcification Preparation of blocking and section cutting, staining, mounting and labelling. Staining- Haematoxyline& Eosin stain, PAS stain, Oil Red O'/ Sudan Black stain,	15
III	Receiving of Sample, Labelling and maintenance of registers Preparation of Exfoliative cytological smears Fixation – types and methods, Preparation of smears in interventional cytology, Fixation and stains, . Staining R/E: Preparations of stains, Methods – MGG & PAPs, Mounting, Labelling, Record keeping of reports and blocks, Lab Safety and Quality control.	15
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Students can draw a chart on systematic procedure of tissue processing along with diagram.
- Students can draw a chart on systematic staining procedure with colourful diagrams.
- Students can demonstrate on the working of microtome

Texts Books:-

1. Textbook of pathology, Harsh mohan, 8th edition, Jaypee publishers
2. Bancroft's theory and practice of Histological techniques by S. Kim Suvarna, Christopher Layton, John D. Bancroft, 7th edition, Churchill Livingstone publishers
3. General and Systemic Pathology, James underwood, Simon Cross, 5th edition, Elsevier

References:

1. Textbook of Medical laboratory Technology, 3rd edition, Godkar PB, Bhalani

publishing house

2. Histotechnology, A self-instructional text by Freida L. Carson, 1st edition, Lippincott Williams publishers

Semester -IV Detailed Syllabus

Name of the Subject: Intermediate Microbiology (Theory+Lab) Type of Course: Major		
Paper Code: MLT242M403		Course Level: 200
Total credits: 4	Scheme of Evaluation: T+P	L-T-P-C: 3-0-2-4

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding Microbiology

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on bacteria, fungi, viruses and parasites which are of pathological importance	BT 1
CO 2	Explain the morphology, cultural characteristics, biochemical reactions and lab diagnosis of different microorganisms.	BT 2
CO 3	Identify various parasites through microscopic examination of specimen, understanding the life cycle of parasites and their interaction with host.	BT 3
CO 4	Analyse the various experiments related to fungal disease, toxins, related allergies their diagnosis and susceptibility to drugs.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	BACTERIOLOGY Systemic bacteriology Study of - Staphylococcus, Streptococcus, Pneumococcus, Corynebacterium diphtheriae, Mycobacterium, E. coli, Klebsiella, Salmonella, Pseudomonas, Vibrio with reference to their : - Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis.	11
II	MYCOLOGY- Classification, general structure, physiology, pathogenesis and medical importance of fungi; Aspergillus, candida, Cryptococcus, Trichophyton, Epidermophyton, Cryptococcus, Tinea, Microsporum, Laboratory diagnosis of fungal disease: Subcutaneous mycosis, Systemic Mycoses, Opportunistic Mycoses	11
III	VIROLOGY- Retro viruses - HIV, Hepatitis virus, Pox virus, Picorna virus - Polio - Orthomyxo virus - Influenza - Arbo virus - Chikungunya, Dengue - Herpes and Adeno virus.	11
IV	PARASITOLOGY- Overview of parasite, host, parasitism, Classification, geographical distribution, habitat, morphology, life cycle, pathogenicity (mode of infection, pathogenesis and pathology), laboratory diagnosis and prevention and control of medically important protozoa and helminthes (Entamoeba histolytica, Plasmodium, Leishmania, Wucheria)	11
TOTAL		44

Title of the Paper: Intermediate Microbiology (Lab)

Paper code: MLT242M413

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Culture Techniques Composition of culture media Preparation of media Identification of media & their uses Culture methods & identification of common bacteria on media. Antibiotic sensitivity testing.	15
III	Culture Media used for fungus. Fungal culture Methods of lab diagnosis & virus. Stool examination Identification of different ova & cysts in stool samples.	15
TOTAL		30

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
44	30	16

Experiential learning activities may include:

- Can identify different microorganism under the microscope.
- Draw the chart on different ova and cyst found in stool specimen.

Texts:

1. Chartejee K.D. (Editor) (1981) Parasitology (Protozoology and Helminthology), 12th edition, Chaterjee Medical Publishers, India.
2. Textbook of Microbiology, Ananthanarayann, Paniker, Arti Kapil, 9th edition, universities press
3. C.P.Baveja, Textbook of microbiology, 6th edition, Arya Publications

Reference Book:

1. TEXTBOOK OF IMMUNOLOGY by Dr. Ajoy Paul
2. Fields B.N. Knipe D.M., Howley P.M, Chanock R.M. Melnick J. L, Monath T. P. Roizman B., and straus S.E. (2001), Fields Virology Vol 1 and 2. 3rd edition. Lippincott-Raven, Philadelphia PA
3. Textbook of Medical Virology By Baijayantimala Mishra
4. Larone D.H. (2002). Medically important fungi: a guide to identification. ASM Press

Semester -IV
Detailed Syllabus

Name of the Subject: Cytopathology (Theory)	Type of Course: Minor
Paper Code: MLT242N401	Course Level: 200
Total credits: 3	Scheme of Evaluation: T
	L-T-P-C: 3-0-0-3

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding cytopathology

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge on the structure and function of the human body.	BT 1
CO 2	Explain the relation between the different organs and circulating system.	BT 2
CO 3	Organize application of anatomical knowledge with various diseases.	BT 3
CO 4	Analyse the various experiments related to special senses and nervous system.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction: Definition of cytology, Cells & tissues, Normal tissues, Classification of cytology- Exfoliative and interventional cytology, Role of Cytology, Collection of specimens from female genital tract specimen for routine screening: Cervical smear,	16

II	Urinary cytology: Collection of urinary tract specimens, Diagnostic utility of urinary cytology, Progressive changes of the cells: Changes in inflammation, Body cavity Fluids: Effusions, Collection and processing of body cavity fluid specimens.	16
III	Cellular Components in effusions: Fine Needle Aspiration Cytology: Application of FNAC, Advantages of FNAC, General procedure of FNAC, Limitation of FNAC, Wet and Dry fixed smear, its difference, Imprint cytology, Crush Smear cytology, Biopsy sediment cytology	16
IV	Cell block preparation, Cytological fixative and mailing Definition, Types/classification, Aims & object, Materials for establishments of cytological lab, Staining: R/E stain types-Methods, Maintenance, Preparation of stain, Pap's stain, Special stains- MGG, PAS, ZN, Mucicarminetc, Mounting and Labelling.	16
TOTAL		64

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
64	00	26

Experiential learning activities may include:

- Students can recall their knowledge on different staining procedures
- Draw a chart to differentiate normal cell to pathological cells.

Text books:

1. Textbook of pathology, Harsh mohan, 8th edition, Jaypee publishers
2. Bancroft's theory and practice of Histological techniques by S. Kim Suvarna, Christopher Layton, John D. Bancroft, 7th edition, Churchill Livingstone publishers
3. General and Systemic Pathology, James underwood, Simon Cross, 5th edition, Elsevier

References:

1. Textbook of Medical laboratory Technology, 3rd edition, Godkar PB, Bhalani publishing house

2. Histotechnology, A self-instructional text by Freida L. Carson, 1st edition, Lippincott Williams publishers

Semester -IV
Detailed Syllabus

Name of the Subject: Biochemistry IV (Theory)	Type of Course: Minor
Paper Code: MLT242N402	Course Level: 200
Total credits: 3	Scheme of Evaluation: T
	L-T-P-C: 3-0-0-3

Course Objectives

The objective of the course is to introduce students to gain knowledge regarding Biochemistry

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define the basic knowledge proteins, fats , carbohydrates, their classification and functions.	BT 1
CO 2	Explain the structure of DNA and RNA and understand its biological significance	BT 2
CO 3	Inspect the role, classifications, and functions of lipids, carbohydrates, and proteins.	BT 3
CO 4	Analyse the biochemical concept of acids, bases and buffers.	BT 4

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	CARBOHYDRATES: Definition, classification and functions of carbohydrates Common carbohydrates (Glucose, Fructose, Starch, Glycogen, Starch) and their sources, biological significance of carbohydrates.	16

II	PROTEINS: Definition of Proteins, amino acids, polypeptides , biological significance, functions. Amino acids and its classification Essential and Non-essential amino acids. Structural organization of proteins.	16
III	LIPIDS: Definition, functions and classification of lipids. Classification of Fatty Acids with examples and functions of some common lipids (Phospholipids, Glycolipids, Steroids).	16
IV	NUCLEIC ACIDS: Basic idea of the structure of DNA and RNA, Function of DNA and RNA acid-base buffers, Basic idea of acids, bases, Ph, buffer Acid base balance	16
TOTAL		64

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
64	00	26

Experiential learning activities may include:

- Students can make a model of DNA
- Draw a chart classifying proteins, fats and carbohydrates.

Textbook:

1. Leininger, Principles of Biochemistry. 7th Edition, 2017.
2. Robert K. Murry, Daryl K. Granner and Victor W. Rodwell., Harper’s Biochemistry. 30th Edition, 2015
3. D. Satyanarayana and Chakrapani, Biochemistry.5th Edition, 2017.

Reference Book:

2. Robert Horton H, Laurence A Moran, Gray Scrimgeour K. Principles of Biochemistry, 4th Edition, 2006, Pearsarson Publisher. ISBN-13: 978-0321707338Conn and Stumpf, Outlines of Biochemistry, 5th Edition, 2006.

Level: Semester IV

Detailed Syllabus

Name of the Subject: Behavioural Sciences – IV	Type of Course: BHS
Paper Code: BHS982A404	
Total credits: 1	

Course Objectives

To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations.

Course Outcomes:

SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the importance of individual differences	BT 1
CO 2	Develop a better understanding of self in relation to society and nation	BT 1
CO 3	Facilitation for a meaningful existence and adjustment in society	BT 1

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Managing Personal Effectiveness Setting goals to maintain focus, Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness), Integration of personal and organizational vision for effectiveness, A healthy balance of work and play, Defining Criticism: Types of Criticism, Destructive vs Constructive Criticism, Handling criticism and interruptions.	4
II	Positive Personal Growth Understanding & Developing positive emotions, Positive approach towards future, Impact of positive thinking, Importance of discipline and hard work, Integrity and accountability, Importance of ethics in	4

	achieving personal growth.	
III	Handling Diversity Defining Diversity, Affirmation Action and Managing Diversity, Increasing Diversity in Work Force, Barriers and Challenges in Managing Diversity.	4
IV	Developing Negotiation Skills Meaning and Negotiation approaches (Traditional and Contemporary) Process and strategies of negotiations. Negotiation and interpersonal communication. Rapport Building – NLP.	4
TOTAL		16

Text books

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer & Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc.

Level: Semester IV

Detailed Syllabus

Name of the Subject: Employability and Communication	Type of Course: AEC
Paper Code: CEN982A401	Course level: 200
Total credits: 1	L-T-P-C: 1-0-0-1

Course Objectives

This course is designed to enhance employability and maximize the students' potential by introducing them to the principles that determine personal and professional success, thereby helping them acquire the skills needed to apply these principles in their lives and careers.

Course Outcomes:

SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate understanding the importance of verbal and non-verbal skills while delivering an effective presentation.	BT 1

CO 2	Develop professional documents to meet the objectives of the workplace	BT 2
CO 3	Define and identify different life skills and internet competencies required in personal and professional life.	BT 3

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	Presentation Skills Importance of presentation skills, Essential characteristics of a good presentation, Stages of a presentation, Visual aids in presentation, Effective delivery of a presentation	5
II	Business Writing Report writing: Importance of reports, Types of reports, Format of reports, Structure of formal reports Proposal writing: Importance of proposal, Types of proposal, structure of formal proposals - Technical articles: Types and structure	5
III	Preparing for jobs Employment Communication and its Importance, Knowing the four step employment process, writing resumes, Guidelines for a good resume, Writing cover letters Interviews: Types of interview, what does a job interview assess, strategies of success at interviews, participating in group discussions.	5
IV	Digital Literacy and Life Skills Digital literacy: Digital skills for the '21st century', College students and technology, information management using Webspaces, Dropbox, directory, and folder renaming conventions. Social Media Technology and Safety, Web 2.0. Life Skills: Overview of Life Skills: Meaning and significance of life skills, Life skills identified by WHO: self-awareness, Empathy, Critical thinking, Creative thinking, Decision making, problem solving, Effective communication, interpersonal relationship, coping with stress, coping with emotion.	5

	Application of life skills: opening and operating bank accounts, applying for pan, passport, online bill payments, ticket booking, gas booking	
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Keywords: Employability, business writing, presentation skills, life skills

Text:

1. Business Communication by PD Chaturvedi and Mukesh Chaturvedi

References:

1. Business Communication by Shalini Verma References:
2. Technical Communication by Meenakshi Raman and Sangeeta Sharma

CREDIT DISTRIBUTION		
LECTURE/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
15 hrs	-	10 hours <ul style="list-style-type: none"> - Movie/ Documentary - screening - Field visits - Peer teaching - Seminars - Library visits