ROYAL GLOBAL UNIVERSITY
GUWAHATI

ROYAL SCHOOL OF MEDICAL & ALLIED SCIENCES (RSMAS)

DEPARTMENT OF PHYSIOTHERAPY

Course Structure & Syllabus
(Based on National Education Policy 2020)

For Undergraduate Program

BACHELOR OF PHYSIOTHERAPY
(4 Years Single Major)

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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.

Physical Therapy (PT) /Physiotherapy is a movement science with an established theoretical and scientific base and widespread clinical applications in the Prevention, Restoration & Rehabilitation, Maintenance and Promotion of optimal physical function. Physiotherapists diagnose and manage

movement dysfunction and enhance physical and functional abilities. This physical dysfunction may be the sequelae of involvement of any of the systems like Musculoskeletal, Neurological, Cardiovascular, Respiratory, or other body systems.

These practitioners contribute to society and the profession through practice, teaching, administration, and the discovery and application of new knowledge about physiotherapy experiences of sufficient excellence and breadth by research to allow the acquisition and application of essential knowledge, skills, and behaviors as applied to the practice of physiotherapy. Physiotherapists (PT) are autonomous, effective, and compassionate professionals, who practice collaboratively in a variety of healthcare set ups such as neonatal to geriatric, from critical care to community fitness to sports training. Emerging graduate and post graduate students are required to demonstrate a substantial knowledge base, possess skills related to Physiotherapy practices, possess high emotional quotient to address family health and meet community responsibilities, demonstrate gender sensitivity and socio-culturally relevant competence. They should be aware of legal issues governing professional practice and follow evidence-based clinical practices.

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 enough 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 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 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	**20**
	60	**24**	**9**	**8**	**9**	**6**	**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
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

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 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 Physiotherapy

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** ***(The graduates should be able to demonstrate the capability to:)***
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 *(The graduates should be able to demonstrate the capability to:)*
		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

Sl.no.	Graduate Attribute	The Learning Outcomes Descriptors *(The graduates should be able to demonstrate the capability to:)*
		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 *The graduates will acquire the following:*
PLO 1	Knowledge about Physiotherapy Profession	To demonstrate behavioral skills and humanitarian approach while communicating with patients, relatives, society at large and co-professionals
PLO 2	Develop the ability to solve complex problems	To apply and outline pathology of medical conditions in context with Physiotherapy, interpret& use medical communication.
PLO 3	Develop Critical and analytical thinking skills	To apply knowledge of biomechanics of human movement in musculoskeletal, neurological, and cardio-respiratory conditions in planning, recommending, and executing Physiotherapy management. Also, to demonstrate academics skills and knowledge to understand the structural & functionality of human body with applied anatomy and physiology in physiotherapy practice.
PLO 4	Develop and Demonstrate Creativity	To demonstrate academic skills and knowledge related to understanding the structural and functional of human body and applied anatomy, physiology in physiotherapy practice.
PLO 5	Develop effective Communication Skills	To develop communication skills for taking patient assessment and applying examinations skills to deliver proper case specific management program.

Sl.no.	Programme Learning Outcome	The Programme Learning Outcomes Descriptors *The graduates will acquire the following:*
PLO 6	Develop Research-related Skills	To outline and implement Physiotherapy management by co-relating assessment and examination skills of clinical subjects like Orthopedics, General Surgery, Medicine, Neurology, Pediatrics', Dermatology & Gynecology & Obstetrics, Community Medicine.
PLO 7	Develop the ability to Collaborate and execute teamwork	To demonstrate skill in developing teamwork approach in managing various conditions who require multidisciplinary medical management including medical professionals, social workers, and other related professionals.
PLO 8	Develop Leadership Qualities	To demonstrate leadership quality in managing various health conditions pertaining to rehabilitation.
PLO 9	Develop technological and Digital skills	To be able to apply the knowledge of digital and technical skills for presenting seminars, making project reports, case reports of patient assessment.
PLO 10	Develop the ability to Identify & address the Environmental Issues	To describe and analyze concepts of energy conservation, global warming and pollution and justify optimal use of available resources & to demonstrate ability of critical thinking, scientific enquiry, experiential learning, personal finance, entrepreneurship, and managerial skills related to task in day-to-day work for personal & societal growth.

4.3. Programme Specific Learning Outcomes (PSOs):

PSO1. Acquire, assess, apply, and integrate new knowledge, learn to adapt to changing circumstances and ensure that patients receive the highest level of professional care.

PSO2. Establish the foundations for lifelong learning and continuing professional development, including a professional development portfolio containing reflections, achievements and learning needs.

PSO3. Continually and systematically reflect on practice and, whenever necessary, integrate that reflection into action, using improvement techniques and audit.

PSO4. Manage time and prioritize tasks, and work autonomously when necessary and appropriate.

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 BPT 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 semester 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%

7. Programme Structure

SL.NO.	SUBJECT CODE	NAMES OF SUBJECTS	COURSE LEVEL	CREDIT
MAJOR COURSES				
1	PHT242M101/ PHT242M111	Basic Anatomy (T&L)	100	3
2	PHT242M102/ PHT242M112	Electrotherapy-I (T&L)	100	3
MINOR COURSE				
4	PHT242N101	Basics of Physiotherapy	100	3
INTERDISCIPLINARY COURSE				
5	IKS992K101	IKS-I	100	3
ABILITY ENHANCEMENT COURSE				
6	CEN982A101 / BHS982A102	Communicative English and Behavioral Science-I	100	2
SKILL ENHANCEMENT COURSE (SEC)				
7	PHT242S101	Biochemistry	100	3
VALUE ADDED COURSE				
8	VAC-1	To be selected from the pool of courses offered	100	3
TOTAL				**20**
BPT 2ND SEMESTER				
MAJOR COURSES				
1	PHT242M201/PHT242M211	Basic Physiology (T&L)	100	2
2	PHT242M202/PHT242M212	Electrotherapy-II (T&L)	100	2
MINOR COURSE				
4	PHT242N201	Principles of Exercise Therapy	100	3
INTERDISCIPLINARY COURSE				
5	IKS992K201	IKS-2	100	3
ABILITY ENHANCEMENT COURSE (AEC)				
6	CEN982A201 &BHS982A202	Communicative English and Behavioral Science-II	100	2
SKILL ENHANCEMENT COURSE (SEC)				
7	PHT242S201/PHT242S211	Basic Biomechanics (T&L)	100	3
VALUE ADEED COURSE				

8	VAC-2	Selected from the pool of courses offered	100	3
TOTAL				**20**
BPT 3RD SEMESTER				
MAJOR COURSE				
1	PHT242M301/PHT242M311	Advanced Biomechanics-I (T&L)	200	4
2	PHT242M302/PHT242M312	Exercise Therapy-I (T&L)	200	4
MINOR COURSE				
4	PHT242N301	Basic First Aid & Emergency Care	200	4
INTERDISCIPLINARY COURSE				
5	PHT242I301	IKS-3	200	3
ABILITY ENHANCEMENT COURSE (AEC)				
6	CEN982A301&BHS982A302	Communicative English and Behavioral Science-III	200	2
SKILL ENHANCEMENT COURSE (SEC)				
7	PHT242S301	Pathology& Microbiology	200	3
TOTAL				**20**
BPT 4TH SEMESTER				
MAJOR COURSES				
1	PHT242M401/PHT242M411	Advanced Biomechanics-II (T&L)	200	3
2	PHT242M402/PHT242M412	Exercise Therapy-II (T&L)	200	4
3	PHT242M403	General Medicine, Surgery & OBG	200	3
4	PHT242M404	Role of Yoga in Rehabilitation (Major related to IKS)	200	2
MINOR COURSES				
5	PHT242N401	Health & Wellness	200	3
6	PHT242N402	Ergonomics & Occupational Values	200	3
ABILITY ENHANCEMENT COURSE (AEC)				
7	CEN982A401 &BHS982A402	Communicative English and Behavioral Science-IV	200	2
TOTAL				**20**
BPT 5TH SEMESTER				
MAJOR COURSES				
1	PHT242M501	Clinical Orthopedics -I	300	4
2	PHT242M502	Clinical Neurology & Neurosurgery-I	300	4
	PHT242M503	Community Medicine	300	4
3	PHT242M524	Clinical Education-I	300	4

MINOR COURSE				
4	PHT242N501	Professionalism & Values	200	4
Total				**20**
BPT 6th SEMESTER				
MAJOR COURSES				
1	PHT242M601	Clinical Orthopedics -II	300	4
2	PHT242M602	Clinical Neurology & Neurosurgery-II	300	4
3	PHT242M603	Pharmacology	300	4
4	PHT242M624	Clinical Education -II	300	4
MINOR COURSE				
5	PHT242M601	Diabetic Education	200	4
TOTAL				**20**
BPT 7TH SEMESTER				
MAJOR COURSES				
1	PHT242M701/PHT242M711	PT in Orthopedics & Traumatology (T&L)	400	4
2	PHT242M702/PHT242M712	PT in Neuro & Psychosomatic Conditions(T&L)	400	4
3	PHT242M703/PHT242M713	PT in Cardiorespiratory, Surgical & OBG Conditions(T&L)	400	4
4	PHT242M724	Clinical Education -III	400	4
MINOR COURSE				
5	PHT242N701	Health Promotion and Fitness	300	4
TOTAL				**20**
BPT 8TH SEMESTER				
MAJOR COURSES				
1	PHT242M801	Community Based Rehabilitation(T&L)	400	4
2	PHT242M802	Research Methodology	400	4
3	PHT242M823/ PHT242S824	Clinical Education-IV & Research Project	400	12
TOTAL				**20**

8. Detailed Syllabus:

Semester I

Title of the Paper: BASIC ANATOMY **Course: (Major)**

Subject Code: PHT242M101 **Course Level: 100**

Scheme of Evaluation: Theory + Practical

L-T-P-C: 2-0-2-3 **Total credits: 3**

Course Objectives

Identify all gross anatomical structures, particular emphasis will be placed on description of bones, joints, muscles, brain, cardio-pulmonary and nervous systems as these relate to the application of Physiotherapy. Understanding the different types of classification and general features of bone, joints, and muscular tissues.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**explain** the anatomy of upper quadrant including spine, thorax, and upper extremities:	**BT 1**
CO 2	**understand** the bones, joints, soft tissues, muscles related to musculoskeletal system of upper extremities and to localize various surface landmarks of face, neck, spinal cord.	**BT 2**
CO 3	**demonstrate** the bones, muscles, nerves, and ligaments of the upper extremities.	**BT 3**
CO 4	**analyze** the course of peripheral nerves including their functions and structures.	**BT 3**

COURSE OUTLINE:

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, **cardio-vascular system-** Mediastinum: Divisions and contents Pericardium: Thoracic Wall: position, shape and parts of the	**16**

	heart; conducting System; blood Supply and nerve supply of the heart; names of the blood vessels and their distribution in the body – region wise Applied anatomy. Head and Neck: a. Osteology : Mandible and bones of the skull. b. Soft parts : Muscles of the face and neck and their nerve and blood supply-extra ocular muscles, triangles of the neck, c. Gross anatomy of eyeball, nose, ears and tongue Facial muscles-origin, insertion, actions, nerve supply Temporomandibular joints-structure, types of movement Spine and Thorax: Back muscles-superficial layer, deep muscles of back, their origin, insertion, action, and nerve supply. Vertebral column-structure and development, structure, and joints of vertebrae **Embryology** a) Ovum, Spermatozoa, fertilization and formation of the Germ layers and their derivations. b) Development of skin, Fascia, blood vessels, lymphatic, c) Development of bones, axial and appendicular skeleton and muscles, d) Neural tube, brain vessels and spinal cord, e) Development of brain and brain stem structures Applied Anatomy.	
II	**Musculoskeletal system:** a)Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc) b) Connective tissue classification. c) Bones- Composition & functions, classification and types according to morphology and development. d) Joints-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints. e) Muscles – origin, insertion, nerve supply and actions f) Upper Extremity : a. Osteology : Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges. b. Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity. c. Joints : Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand. d. Arches of hand, skin of the palm and dorsum of hand. g) Lower Extremity a. Osteology : Hip bone, femur, tibia, fibula, patella,	**22**

	tarsals, metartarsals and phalanges. b. Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot. c. Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot. h) Trunk & Pelvis: a. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs b. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc. c. Pelvic girdle and muscles of the pelvic floor.	
III	**Nervous system & Sensory system** a. Organization of Central Nervous system - Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system b) Cranial nerves c) Peripheral nervous system a. Peripheral nerve b. Neuromuscular junction c. Sensory end organs d) Central Nervous System a. Spinal segments and areas b. Brain Stem c. Cerebellum d. Inferior colliculi e. Superior Colliculi f. Thalamus g. Hypothalamus h. Corpus striatum i. Cerebral hemisphere j. Lateral ventricles k. Blood supply to brain l. Basal Ganglia m. The pyramidal system n. Pons, medulla, extra pyramidal systems o. Anatomical integration	**5**
IV	**Cardiorespiratory System:** Outline of respiratory passages Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs – emphasize on bronchopulmonary segments Diaphragm: Origin, insertion, nerve supply and action, openings	**7**

	in the diaphragm. Intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action. **Digestive system, Urinary and Reproductive system:** Parts of digestive system Abdominal cavity – divisions Muscles of abdominal wall, Liver, Pancreas, Spleen, Alimentary canal, Gall bladder, intestine (small & large) Urinary system-kidneys, nephron, bladder, urethra Neurovascular supply Genital system – male and female Reproductive system of male-uterus, ovaries, fallopian tubes, cervix and vagina Reproductive system of female-external and internal genitals **Endocrine system**: Structure, Endocrine glands: Position, shape, size, function, blood supply and nerve supply of the following glands: Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus. Pituitary gland, Thyroid, Parathyroid gland.	
TOTAL		**50**

Text Books:

1.BD Chaurasia's Human Anatomy, Regional and Applied dissection and clinical upper limb thorax, CBS publishers and Distributors Pvt Ltd, Ninth Edition, volume 1,2,3,4.

2.Khurana, I., Khurana, A., (2018).Textbook of anatomy and physiology, 3rd edition.

Reference Books:

1.Tortora, GJ. &DerriksonB.(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.

Title of the Paper: ANATOMY LAB **Total credits: 1.5**

Subject Code: PHT242M111

L-T-P-C:0-0-2-2

Course Objectives

The objective of the course is to introduce students the practical gained regarding anatomy of various structures and the histological appearance of various organs of the human body. Identification of the upper limb bones and their features.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** and understand the normal anatomy of the human body, which will help them to diagnose and treat diseases in the near future.	**BT 1**
CO 2	**Explain** the layers of meninges of the brain and spinal cord and parts of the peripheral nervous system	**BT 2**
CO 3	**Demonstrate** all the muscles, bones, ligaments and nerves of upperlimb and lower limb	**BT 3**
CO 4	A**nalyze and** Identify the parts of the central nervous system; cerebrum, cerebellum, midbrain, pons and medulla oblongata. Spinal cord and parts of the spinal cord	**BT 3**

COURSE OUTLINE:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Features or structures of the upper limb, lower limb , thorax and skull	**10**
II	Attachments, origin, insertion, nerve supply, blood supply and actions for upper limb and lower limb muscles	**10**
III	Joints of upper limb bones, lower limb bones, skull, thorax	**7**
IV	Surface anatomy- upper limb and lower limb, head, spinal cord, head and neck.	**3**
TOTAL		**30**

Text Books:

1.BD Chaurasia's Human Anatomy, Regional and Applied dissection and clinical upper limb thorax, CBS publishers and Distributors Pvt Ltd, Ninth Edition, volume 1, 2,3, 4.

2.Alison,G.Anne,W.(2014). Ross and Wilson Anatomy and Physiology in Health and Illness. Elsevier Health; UK,13th edition.

Reference Books:

1. Tortora, GJ. &DerriksonB.(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.

Experiential learning: Visit to Medical college for anatomy lab exposure.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
50 hours	30 hours	10 hours

Title of the Paper: Electrotherapy-I **Course: Major**

Subject Code: PHT242M102 **Course Level: 100**

Scheme of Evaluation: Theory + Practical **Total credits: 3**

L-T-P-C: 2-0-2-3

Course Objective:

The course objective is that after completion of this course the students will be able to understand the basic aspects of electrotherapy, low frequency current & radiation therapy & utilize contemporary & recent methods to select the most appropriate method to alleviate pain for patients.

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 basics of electricity and its physiological & therapeutic effects gained	**BT 1**

CO 2	**Illustrate** about pain and pain modulation mechanism & **examine** neuromuscular dysfunctions by using electro-diagnostic test.	**BT 2**
CO 3	**Apply** the construction, biophysical principles and effects, dangers, safety measures, judicial use, appropriate methods of application, contraindications of the various low frequency equipment & radiation therapy units.	**BT 3**
CO 4	**Examine** the principles and techniques of different electrotherapy modalities in the restoration of physical function in conditions like nerve injuries.	**BT 4**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	**Physical Principles** 1. Structure and properties of matter – solids, liquids and gases, adhesion, surface tension, viscosity, density, and elasticity. 2. Structure of atoms, molecules, elements, and compounds. Election theory, static and current electricity 3. Conductors, Insulators, Potential Difference, Resistance &Intensity Ohm's Law – Its application to AC &DC currents a) Rectifying Devices–Thermionic valves, Semiconductors, b) Transistors, Amplifiers, Transducers Oscillator circuits c) Capacitance, condensers in DC and AC circuit d) Display devices & indicators – analogue & digital **Effects of Current Electricity:** 1. Chemical effects- Ions and electrolytes, Ionization, Production of an E.M.F by chemical action. 2. Magnetic effects, Molecular theory of magnetism, Magnetic fields, Electromagnetic Induction. 3. Milli ammeter and Voltmeter, Transformers, and choke coil Thermal Effects – Joule's Law and Heat production 5. Physical Principals of light and its properties 6. Electromagnetic spectrum – biophysical application **Electrical supply:** a) Brief outline of main supply of electric current b) Dangers –short circuits, electric shocks c) Precautions – safety devices, earthing, fuses etc. d) First aid & initial management of electric shock **Principles of Application**	10
II	**Low Frequency Currents** a. Introduction to direct, alternating &modified currents.	14

MODULE	TOPICS & COURSE CONTENT	PERIODS
	b. Production of direct current –Physiological and therapeutic effects of constant current anodal and cathodal Galvanism, Ionization, and their application in various conditions. c. Iontophoresis – Principles of clinical application, indication, contraindication, precaution, operational skills of equipment & patient preparation. d. Modified direct current – various pulses, duration and frequency and their effect on Nerve and Muscle tissue. Production of interrupted and surged current and their effects. e. Modified direct current- Physiological and therapeutic effects, principles of clinical application, indications, contra indications, precautions, operational skills of equipment& patient preparation. 6. Transcutaneous Electrical Nerve Stimulations (TENS): - a. Types of Low Frequency pulse widths, frequency & intensities used as TENS applications. b. Theories of pain relief by TENS c. Principle of clinical application, effects & users, indicators, contraindications, precautions, operational skills of equipment and patient preparation.	
III	**Electrical Reactions and Electro-diagnostic tests:** 1. Electrical Stimuli and normal behavior of Nerve and muscle tissue. Types of lesions and development of reaction of degeneration Faradic-Intermittent direct current test, Faradic foot bath 2. S.D Curve and its application Chronaxie, Rheobase &pulse ratio	10
IV	**Radiation Therapy:** a. Infra- red rays- Wavelength, frequency, types & sources of IRR generation, techniques of irradiation, physiological & therapeutic effects, indications, contraindications, precautions, operational skills of equipment & patient preparation. b. Ultra- violet rays (UVR): Wavelength, frequency, types & sources of UVR generation, techniques of irradiation, physiological & therapeutic effects, indications. Contraindications, precautions, operational skills of equipment & patient preparation. Dosimetry of UVR.	10
TOTAL		**44 hours**

Textbooks:

1. Electrotherapy Explained: Principles &Practice – Low & Reed – Butterworth Heinemann.
2. Clayton's Electrotherapy, (9th ed.) Forster & Palastanga Bailliere Tindall.

Reference Books:

1. Jagmohan Singh, Electrotherapy, Jaypee Brothers, 2nd Ed, 2012.
2. Basant Kumar Nanda, Electrotherapy explained, Jaypee Brothers, 1st Ed, 2006.

Subject: Electrotherapy Lab I

Subject Code: **PHT242M112**

Course Outline:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	1. To experience sensory and motor stimulation of nerves and muscles by various types of low frequency currents on self. 2. To locate and stimulate different motor points region wise including the upper and lower limb, trunk & face.	10 hours
II	3. Therapeutic application of different low frequency currents, Faradic foot bath, Faradism under pressure, Iontophoresis. 4. To study TENS stimulations, its operation and application – region wise	10 hours
III	5. To study the reactions of degeneration of nerves to plot strength duration curves. 6. To find chronaxie and Rheobase.	6 hours
IV	7. To study the different types of Ultraviolet units, their operation, assessment of test dose and application of UVR- region wise. 8. To study the various types of Infrared lamps and their application to body region wise.	10 hours
	TOTAL	**30 hours**

Textbooks:

1.Electrotherapy Explained: Principles &Practice – Low & Reed – Butterworth Heinemann.

2.Clayton's Electrotherapy, (9th ed.) Forster & Palastanga Bailliere Tindall.

Reference Books:

1. Jagmohan Singh, Electrotherapy, Jaypee Brothers, 2nd Ed, 2012.

2. Basant Kumar Nanda, Electrotherapy explained, Jaypee Brothers, 1st Ed, 2006.

Experiential Learning: Field visits to institutions & diagnostic centres for orientation to electrodiagnostic tests.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the Paper: BASICS OF PHYSIOTHERAPY **Course: Minor**

Subject Code: PHT242N101 **Course Level: 100**

Scheme of Evaluation: Theory **Total credits: 3**

L-T-P-C: 3-0-0-3

Course Objectives

It is designed to provide students the knowledge of the structure of the human body which is the foundation of physiotherapy. Studies are concerned with the structural and functional anatomy of the limbs and thorax. Particular attention is paid to the muscles, bones, and joints of the regions. The head and neck, cardiovascular, respiratory, and central nervous system (CNS) are studied. This will help the students to understand how the human body works.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**relate** and understand the normal anatomy of the human body.	**BT 1**
CO 2	**explain** the various parts of the brain and spinal cord and parts of the central and peripheral nervous system	**BT 2**
CO 3	**identify** all the muscles, bones, ligaments, and nerves of upper limb	**BT 3**
CO 4	**classify** different systems of the human body and its function	**BT 4**

COURSE OUTLINE:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**ANATOMY** 1. Head and Neck: a) Osteology: Mandible and bones of the skull. b) Soft parts: Muscles of the face and neck and their nerve and blood supply –extra ocularmuscles, triangles of the neck. c) Gross anatomy of eyeball	**15**
II	2. Thorax: a) Cardiovascular System: Definition, Layers of the heart Thoracic wall: position, shape, and parts of the heart; conducting System; blood.	**15**

	Structure and blood supply of the heart; names of the blood vessels and their distribution region wise. b) Respiratory system: Pleura and lungs: position, parts, structure, and function of lungs emphasize bronchopulmonary segments. Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm. Intercostals muscles and Accessory muscles of respiratory: Origin, insertion, nerve supply and action.	
III	3. Trunk & Pelvis: a) Osteology: Cervical, thoracic, lumbar, sacral, and coccygeal vertebral and ribs b) Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter – vertebral disc, abdominal muscle. c) Lower limb osteotomy: Femur, Tibia, Fibula	**15**
IV	4. Neuro Anatomy a) Organization of Central Nervous system – Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory, and urogenital system b) Cranial nerves c) Peripheral nervous system a. Peripheral nerve b. Neuromuscular junction	**15**
TOTAL		**60 hours**

Textbook:

1. Alison, G. Anne, W. (2014). Ross and Wilson Anatomy and Physiology in Health and Illness. Elsevier Health; UK,13th edition.
2. BD Chaurasia's Human Anatomy, Regional and Applied Dissection and clinical upper limb, thorax, CBS publishers and distributors Pvt Ltd, 9th edition, Vl 2.

Reference Books:

3. Low & Reed, Basic Biomechanics explained –Butterworth Heinmann, 5th Edition.
4. Chaudhari, S.K, Concise Medical Physiology, New Central Agency, Calcutta, 1st edition

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Title of the Paper: Biochemistry **Course: SEC -1**

Subject Code: PHT242S101 **Course Level: 100**

Scheme of Evaluation: Theory **Total credits: 3**

L-T-P-C: 3-0-0-3

Course Objectives

After completion of the course the students will be able to learn about biochemical functions and metabolism. Acquire knowledge in biochemistry that is required to be practiced in community and all other levels of healthcare system. Understand various relevant medical investigations which will help to diagnose a pathological condition.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	describe carbohydrate, fat and protein metabolism, classification, digestion, absorption, regulation, and clinical application.	**BT 1**
CO 2	define bio-enzymes, classify, factors affecting enzyme action and therapeutic uses.	**BT 2**
CO 3	discuss normal levels in body fluids required for functioning and their abnormal levels to understand the disease process.	**BT 3**
CO 4	demonstrate knowledge related to biochemical mechanisms of muscle contraction and biochemistry of connective tissue and apply these in treating various pathological conditions.	**BT 3**

COURSE OUTLINE:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Introduction to Biochemistry: A historical perspective. Amino acids & Proteins: Structure & Function. Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing	**20**

	protein structure and shape. Different Level of structural organization of proteins, Protein Purification. Denaturation and renaturation of proteins. Fibrous and globular proteins. Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero Polysaccharides, Mucopolysaccharides, Bacterial cell wall polysaccharides, Glycoprotein's, and their biological functions.	
II	Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, Prostaglandins, Cholesterol. Nucleic acids: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, purines &pyrimidines, biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z – DNA, denaturation and re maturation of DNA.	**20**
III	Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric &oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity, common features of active sites, enzyme specificity: types & theories, Biocatalysts from extreme thermophilic and hyperthermophilicarchaea and bacteria. Role of: NAD+, NADP+, FMN/FAD, coenzymes A, Thiamine pyrophosphate, Pyridoxal phosphate, lipoic-acid, Biotin vitamin B12, Tetrahydrofolate and metallic ions	**10**
IV	Carbohydrates Metabolism: Reactions, energetics, and regulation. Glycolysis: Fate of pyruvate under aerobic and anaerobic conditions. Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis and glycogen synthesis. TCA cycle, Electron	**10**

	Transport Chain, Oxidative phosphorylation. ß-oxidation of fatty acids.	
TOTAL		**60**

Textbooks:

1. Chatterjee M.N, Textbook of Biochemistry –Jaypee Brothers, 8th edition.
2. Vasudevan D.M, Textbook of Biochemistry for medical students -Jaypee Brothers, 8th edition.

Reference Books:

1.Marshall &Bangert, Clinical Biochemistry – Metabolic & Clinical aspects – Churchill Livingstone, 3rd edition.

2.Southland V.A, Biochemistry – Churchill Livingstone, 5th edition.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Semester II

Title of the Paper: BASIC PHYSIOLOGY **Course: Major**

Subject Code: PHT242M201 **Course Level: 100**

Scheme of Evaluation: Theory & Practical **Total credits: 3**

L-T-P-C: 2-0-2-3

Course Objectives

The objective of the course is to demonstrate and understand elementary human physiology dealing with cells, skin, muscle, blood, and other important systems of the body. Detailed knowledge of different types and functions of blood cells. Alteration of normal physiology in terms of different diseases.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** different tissues & organs of different systems of human body.	**BT 1**
CO 2	**relate** how abnormal Physiology affects human function and dysfunction of the human body.	**BT 2**
CO 3	**identify** various structural and functional importance of cell, muscle and skin and explain different tissues & organs of different systems of human body.	**BT 2**
CO 4	**examination** of normal human physiology with special emphasis on the functioning of the cardiovascular, musculoskeletal, and nervous systems.	**BT 3**

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	**10**

	Homeostasis **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	
II	**Cardiovascular system Physiology:** Conducting system-components, impulse conduction. Heart valves Cardiac cycle- definition, 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. Basic idea of ECG **Respiratory System** **Digestive System** Digestion & absorption of nutrients Gastrointestinal secretions & their regulation Functions of Liver & Stomach.	**10**
III	**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	**10**

	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 **Nervous system** Introduction, central and peripheral nervous system, functions of nervous system Reflexes- monosynaptic, polysynaptic, superficial, deep & withdrawal reflex Sense organ, receptors, electrical & chemical events in receptors Sensory pathways for touch, temperature, pain, proprioception & others Control of tone & posture Motor mechanism: motor cortex, motor pathway: the descending tracts pyramidal& extra pyramidal tracts-origin, course, termination &functions. Upper motor neuron and lower motor neuron paralysis. Spinal cord lesions- complete transection &hemi section of the spinal cord Autonomic nervous system Hypothalamus	
IV	**Male & female reproductive system** Male - Functions of testes, pubertal changes in males, testosterone - action & regulations of secretion. Female - Functions of ovaries and uterus, pubertal changes, menstrual cycle, estrogens and progesterone - action and regulation **Renel System** Physiology of kidney and urine formation Glomerular filtration rate, clearance, Tubular function Water excretion, concentration of urine-regulation of Na+, Cl-, K+ excretion Physiology of urinary bladder	**14**

	Endocrinology Physiology of the endocrine glands	
TOTAL		**44 hours**

Textbooks:

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

Reference Books:

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

Title of the Paper: Basic Physiology Lab

Subject Code: PHT242M211

Course Outline:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	1. Appropriately utilize laboratory equipment such as microscope, test tube etc. 2. Appropriate safety & ethical standards during lab time. 3. Pulse – Introduction. Identification and location 4. Examination of pulse. 5. Blood pressure – introduction, types, and its applied physiology. 6. Learn methods of measuring blood pressure. 7. Examination of Blood pressure	10

II	1. Estimate of Haemoglobin, R.B.C., W.B.C., TLC, DLC, ESR count and Its method of measuring. 2. Normal values & applied physiology of the above components. **3.** Blood indices, Blood grouping, Bleeding& Clotting time. **4.** Methods of examination.	10
III	1. Respiratory rate – introduction and its applied physiology 2. Methods of examination of respiratory rate. 3. Spirometry to measure various lung capacities & volumes. 4. Tidal volume, IRV, IC, ERV, EC, residual volume on Spirometry	5
IV	1. Reflexes – Introduction 2. Types of reflexes 3. Reflex arch 4. Examination of various reflexes 5. Applied physiology	5
	Total	**30 hours**

Textbooks for Physiology:

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

Reference Books for Physiology:

1.Chaudhari, S.K, Concise Medical Physiology, New Central Agency, Calcutta, 4th Edition

Experiential Learning: Visit to physiology lab in medical colleges around the region.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the Paper: Electrotherapy-II **Course: Major**

Subject Code: **PHT242M202** **Course Level: 100**

Scheme of Evaluation: Theory + Practical **Total credits: 3**

L-T-P-C: **2-0-2-3**

Course Objective:

The course objective is that after completion of this course the students will understand the basic aspects of medium & high frequency currents, thermotherapy, cryotherapy & electrodiagnosis & utilize contemporary & recent methods to select the most appropriate method to alleviate pain for patients.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Explain** the biophysical & bio physiological changes which occur with thermotherapy & cryotherapy	**BT 2**
CO 2	**Identify** the construction, Biophysical principles and effects, dangers, safety measures, judicial use, appropriate methods of application, contraindications of the various medium, high frequency equipment & LASER therapy.	**BT 3**
CO 3	**Analyze** the proper clinical applications for hot packs, paraffin bath, fluid therapy, whirlpool, contrast bath & cryotherapy	**BT 4**
CO 4	**Select** the commonly used electro diagnostic tests like Electromyograph, nerve conduction study in relevant conditions	**BT 5**

COURSE OUTLINE:

MODULE	**TOPICS & COURSE CONTENT**	**PERIODS**
I	1. Review of Neuro- muscular Physiology including effects of electrical stimulation. 2. Physiological responses to heat gain or loss on varioustissues of the body. 3. Therapeutic effects of heat, cold and electrical currents. 4. Physics of sound including characteristics and propagation	10

II	1.**Medium frequency currents** (Interferential Therapy, Russian & Rebox currents) – conceptual framework of medium frequency current therapy, production, biophysical effects, types of therapeutics effects, Techniques of application, indications, Contraindications, Precautions, operational skills, and patient preparation. **2.High frequency currents** a. S.W.D and M.W.D – Production, biophysical effects, types, Therapeutic effects, techniques of application, indications, contraindications, precautions, operational skills, and patient preparation b. High frequency sound waves (Ultrasound) – Production, biophysical effects, types, therapeutic effects, Techniques of application, indications, contraindications, precautions, operational skills, and patient preparation	10
III	1.**Superficial heat-** Paraffin wax bath, moist heat, electrical heating pads a. Mechanism of production b. Mode of heat transfer c. Physiological & therapeutic effects d. Indications, contraindications, precautions, operational skills of equipment & patient preparation 2**. Cryotherapy**: Definition, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, and Methods of application with dosage. **3.Contrast bath**: Definition, Principle, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, and Methods of application 4. Fluid therapy: Construction, Method of application, Therapeutic uses, Indications & Contraindications. 5. Whirlpool bath: Methods of application, Therapeutic uses, Indications & Contraindication	11

IV	1. LASER: Define LASER. Types of LASERS. Principles of Production. Production of LASER by various methods. Methods of application of LASER. Dosage of LASER. Physiological &Therapeutic effects of LASER. Safety precautions of LASER. Classifications of LASER, Energy density & power density. 2.Electro-Diagnosis – a. Instrumentation, definition & basic techniques of E.M.G and E.N.G b. Bio-Feedback – Instrumentation, principles, Therapeutic effects, indications, contraindications, limitations, precautions, operational skills, and patient preparation	13
	TOTAL	**44 hours**

Textbooks:

1.Electrotherapy Explained: Principles &Practice – Low & Reed – Butterworth Heinemann.

2.Clayton's Electrotherapy, (9*t*h ed.) Forster & Palastanga Bailliere Tindall.

Reference Books:

1. Therapeutic Heat and cold – Lehman- Williams & Wilkins.

2.Jagmohan Singh, Electrotherapy, Jaypee Brothers, 2nd Ed, 2012.

Title of the paper: Electrotherapy Lab II

Subject Code: **PHT242M212**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	1.To study an Intermittent therapy unit, its operation, and different methods of application- region wise 2. To study a short-wave diathermy unit, its operation, and different methods of application – region wise.	10

	3. To study a Microwave diathermy unit, its operation unit, its operation, and different methods of application – region wise.	
II	4. To study an Ultrasound unit, its operation, its operation, and different methods of application – region wise. 5. To study a laser unit, its operation, and different methods of application – region wise.	10
III	1.To study various forms of therapeutic cold application region wise including-ice, cold packs, vapour coolant sprays, etc. 2.To study a hydrocollator unit & paraffin wax bath unit, its operations and therapeutic application of Hot packs & paraffin wax-region wise	5
IV	1. To observe various Electro- myography (EMG) procedures. 2. To observe various Electro- neurography (ENG) procedures. 3. To study a Bio feedback unit, its operation, and different methods of application- region wise.	5
	TOTAL	**30 hours**

Textbooks:

1.Electrotherapy Explained: Principles &Practice – Low & Reed – Butterworth Heinemann.

2.Clayton's Electrotherapy, (9*t*h ed.) Forster & Palastanga Bailliere Tindall.

Reference Books:

1. Jagmohan Singh, Electrotherapy, Jaypee Brothers, 2nd Ed, 2012.

2. Basant Kumar Nanda, Electrotherapy explained, Jaypee Brothers, 1st Ed, 2006.

Experiential Learning: Field visit to Electrodiagnostic lab in Medical Institutions.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the Paper: PRINCIPLES OF EXERCISE THERAPY **Course: Minor**

Subject Code: PHT242N201 **Course Level:100**

Scheme of Evaluation: Theory **Total credits: 3**

L-T-P-C: 3-0-0-3

Course Objectives

The objective of the course is after student will be able to apply the different types of exercises in different conditions considering the indications and contraindications of the procedure and describe the effects of the techniques.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**list** and understand the fundamentals of muscle and joint function and describe the use of various equipment and techniques.	**BT 1**
CO 2	**explain** the importance of assessing a patient and the methods of assessment	**BT 2**
CO 3	**develop** the technique of different types of movements, positions, muscle training and fitness training concepts.	**BT 3**
CO 4	**list** the work of the muscles and effects and uses of various fundamental positions.	**BT 4**

COURSE OUTLINE:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Introduction to Exercise Therapy, Principles, Techniques and general areas of its application, assessment, and its importance.	**15 hours**
II	Description of Fundamental starting positions and derived positions including joint positions, muscle work, stability, effects and uses.	**15 hours**
III	Introduction to movements including analysis of joint motion, muscle work and neuro muscular co-ordination.	**15 hours**

IV	Classification of movements- Describe the types, technique of application, indication, contraindications, effects, and uses of the following: a) Active movement b) Passive movement c) Active assisted movement d) Resisted movement	**15 hours**
TOTAL		**60 hours**

Textbook:

1.M. Dena Gardiner, The Principles of Exercise Therapy, Harper Collins Distribution Services, 4th edition.

2.Therapeutic Exercises Foundation and Techniques – Kisner and Colby-F. A Davis.

Reference Books:

1. Practical Exercise Therapy Hollis- Blacwell Scientific Publications.

2. Therapeutic Exercise – Basmajian- Williams and Wilkins.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Title of the Paper: Basics of Biomechanics **Course: SEC-2**

Subject Code: PHT242S201 **Course Level: 100**

Scheme of Evaluation: Theory & Practical **Total credits: 3**

L-T-P-C: 2-0-2-3

Course Objectives

The objective of this course is that after 60 hours of lectures and demonstrations the student will be able to demonstrate an understanding of the principles of biomechanics and biomechanical understanding in application related health and disease pertaining to muscles and joints of upper limb.

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 various terms used in mechanics, biomechanics & kinesiology.	**BT 1**
CO 2	Explain the basic principles of biophysics related to mechanics of movement / motion & apply these principles to simple equipment designs along with their efficacy in Therapeutic Gymnasium & various starting positions used in therapeutics.	**BT 2**
CO 3	Demonstrate movements in terms of anatomical planes and axes, demonstrate various starting & derived positions used in therapeutics.	**BT 3**
CO 4	Apply therapeutic skills of movement examination.	**BT 3**

COURSE OUTLINE:

MODULE	**TOPICS & COURSE CONTENT**	**PERIODS**
I	**Mechanics** - Definition of mechanics and Biomechanics **Motion:** definition, types of motion, plane and axis of motion, factor determining the kind and modification of motion. **Force** - Definition, diagrammatic representation of force, point of application, classification of forces, concurrent, coplanar, and co-linear forces, composition and resolution of forces, angle of pulls of muscle.	10 hours

	Friction **Gravity** - Definition, line of gravity, Centre of gravity	
II	**Equilibrium** - Supporting base, types, and equilibrium in static and dynamic state. **Levers** - Definition, function, classification, and application of levers in physiotherapy & order of levers with example of lever in human body **Pulleys** - system of pulleys, types, and application **Elasticity** - Definition, stress, strain, HOOKE'S Law **Springs** - properties of springs, springs in series and parallel, elastic materials in use.	10 hours
III	**Muscular system**: i)Definition, Properties of muscles, ii) Muscular contraction, iii)Structural classification, iv)Action of muscle in moving bone, direction of pull, angle of pull v)Functional classification Coordination of muscular system.	14 hours
IV	**Joint structures and functions:** **i)** Joint design, Structure of Connective Tissue, **ii)** Properties of Connective Tissue, joint function, changes with disease, injury, immobilization, exercise, overuse.	10 hours

Textbook:

1. Norkins &Levengie, Joint Structure and Function- A Comprehensive Analysis – F. ADavis, 5th Edition

2. Norkins& White, Measurement of Joint Motion–Aguideto Goniometry, F. A Davis, 5th Edition

Reference Books:

1.Low & Reed, Basic Biomechanics explained –Butterworth Heinmann, 5th Edition

2. Soderberg Lippineou, Kinesiology Applied to Pathological Motion, 6th Edition

Experiential Learning: Visit to gait lab in the region.

Subject: Basics of Biomechanics Lab

Subject Code: **PHT242S211**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	Surface anatomy landmarks- Bony landmarks	**10**
II	Surface anatomy landmarks- Muscular and ligamentous	**10**
III	Identify Muscle work of various movements in body at different angle.	**10**
IV	Basic anatomical movements.	**10**

Textbook:

1. Norkins & Levengie, Joint Structure and Function- A Comprehensive Analysis –F. ADavis, 5th Edition
2. Norkins & White, Measurement of Joint Motion–Aguideto Goniometry, F. A Davis, 5th Edition

Reference Books:

1.Margareta Nordin & Victor H. Frankel, Basic biomechanics of the musculoskeletal system, 5th Edition
2. Carol A. Oatis, Kinesiology-the mechanics and pathomechanics of human movements, 3rd edition.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30	16 hours

Experiencial Learning: Visits to gait lab in medical institutions around the region.

Semester III

Title of the Paper: Advanced Biomechanics I **Course: Major**

Subject Code: PHT242M301 **Course Level: 200**

Scheme of Evaluation: Theory + Practical **Total credits: 4**

L-T-P-C: 3-0-2-4

Course Objective:

The objectives of this course are that the students will be able to understand the mechanical phenomenon of the human body which can be applied to human structure and function allowing analysis of human movement and the musculoskeletal system.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** how biomechanical factors influence motion in standing, walking and in various body movements.	**BT 1**
CO 2	**Demonstrate** an understanding of statics, kinematics and kinetic in human movement	**BT 2**
CO 3	**Develop** an understanding of how changes of movement patterns and technique will influence the load on human tissues during movement.	**BT 3**
CO 4	**Analyze** movement and estimate force and estimate force on human structures during sports and exercise.	**BT 4**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	**Muscle Structure and function:** Introduction of muscles, Elements of muscle structure, muscle tension, its classification and the factors effecting muscle function. **Vertebral column:** Introduction, General structures and function. Structure of the cervical spine and Function of cervical region: kinematics and kinetics. Structure of thoracic region: typical thoracic vertebra, intervertebral disc, articulations and the ligaments along with the Function of the thoracic spine: kinematics and kinetics. Structure of the lumbar region: typical lumbar vertebra, intervertebral disc, articulations, ligaments and fascia and function of Lumbar region: kinematics and kinetics. Structure of the sacral region: sacroiliac articulations, ligaments and symphysis pubis articulation. Functions include kinetics and kinematics. Muscles of vertebral column.	14
II	**The thorax and Chest wall:** Introduction, General structure and function of rib cage, articulations of the rib cage muscle, Kinematics of the ribs and manubriosternum, muscles associated with the rib cage, accessory muscles of ventilation. **The Temporomandibular Joint**: Introduction, structures of articular surfaces, disk, capsules & ligaments, upper and lower TMJ joints. Function of TMJ joint, and it's relation with cervical spine.	8

III	**The Shoulder Complex:** Introduction, components of the SC, AC, ST, GH joint. the integrated function of shoulder complex: ST and GH contributions. SC and AC contributions, structural functions and muscles function.	8
IV	**The Elbow complex:** Introduction, articulating surfaces of humerus, radius and ulna, structure of joint capsule, ligament and muscles. Function of elbow joint ((humeroulnar and humeroradial articulation), structure of superior and inferior articulations. **The Wrist and Hand Complex:** Introduction, the wrist Complex- the radiocarpal joint structure, midcarpal joint structure, the function of the wrist complex, the hand complex- carpometacarpal joint, metacarpophalangeal joint, interphalangeal joint.	10
	TOTAL	44 hours

Text Book:

1. Norkins &Levengie, Joint Structure and Function- A Comprehensive Analysis – F.ADavis, 6th Edition

2. Norkins& White, Measurement of Joint Motion–Aguideto Goniometry, F. A Davis, 5th Edition

Reference Books:

1.Margareta Nordin & Victor H. Frankel, Basic biomechanics of the musculoskeletal system, 5th Edition

2. Carol A. Oatis, Kinesiology-the mechanics and pathomechanics of human movements, 3rd edition.

Experiential Learning: Visit to gait lab in the region.

Title of the Paper: Advanced Biomechanics I LAB

Subject Code: PHT242M311

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	Goniometry for cervical, thoracic, and lumber spine movements.	10
II	Goniometry for shoulder complex movements.	5
III	Goniometry for elbow joint movements	5
IV	Goniometry for wrist and hand movements along with proximal and distal-radioulnar joint.	10
	TOTAL	30 hours

Text Book:

1. Norkins &Levengie, Joint Structure and Function- A Comprehensive Analysis – F.ADavis, 6th Edition
2. Norkins& White, Measurement of Joint Motion–A guide to Goniometry, F. A Davis, 5th Edition

Reference Books:

1.Margareta Nordin & Victor H. Frankel, Basic biomechanics of the musculoskeletal system, 5th Edition
2. Carol A. Oatis, Kinesiology-the mechanics and pathomechanics of human movements, 3rd edition.

Experiential Learning: Visit to gait lab in the region.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the Paper: Exercise Therapy-I **Course: Major**

Subject Code: PHT242M302 **Course Level: 200**

Total credits: 4

Marks/ Credits: 100/4

L-T-P-C: **3-0-1-4**

Course Objectives:

The objective of the course is after student will be able to apply the different types of exercises in different conditions considering the indications and contraindications of the procedure and describe the effects of the techniques.

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 fundamentals of muscle and joint function and describe the use of various equipment's and techniques.	**BT 2**
CO 2	**Demonstrate** how to grade the strength of muscle and how to measure the joint range of motion.	**BT 3**
CO 3	**Demonstrate** the technique of different types of movements, massage therapy muscle training and fitness training concepts.	**BT 3**
CO 4	**Analyse** the problem of the patient and plan the treatment required based on problem of the patient.	**BT 4**

COURSE OUTLINE:

Modules	Course Content	Periods
I.	1. Introduction to Exercise therapy, Principles, techniques and general areas of its application, Assessment & its importance. 2. Description of Fundamental starting positions and derives position including joint positions, muscle work, stability, effects and uses. 3. Introduction to Movements including analysis of joint motion, muscle work and Neuro muscular co-ordination. 4. Classification of movements – Describe the types, technique of application, indications, contraindication, effects and uses of the following: a) Active movement b) Passive movement c) Active assisted movement d) Resisted movement 5. To study the principles, techniques of application indication, Contraindication, precaution, effects and uses of Suspension Therapy.	11
II.	1.Manual muscle testing a) Principles and application techniques of Manual muscle testing. b) Testing position, procedure and grading of muscles of the upper limb, lower limb and trunk. 2.Goniometery a) Principles, techniques and application of Goniometer. b) Testing position, procedure and measurement of R.O.M of the joints of upper limbs, lower limbs and trunk.	11
III.	Motor Learning 1. Introduction to motor learning a) Classification of motor skills b) Measurement of motor performance. ii)Introduction to motor control a) Theories of motor control b) Applications	11

IV.	1.Soft tissue manipulation(massage) a) History, various types of soft tissue manipulation b) Physiological effects of soft tissue manipulation on various systems 2.Relaxation and Therapeutic Gymnasium a) Describe relaxation, muscle fatigue, muscle spasm and tension. b) Techniques of relaxation (local and general) c) Effects, Uses and clinical application d) Indication and Contraindication 3.Therapeutic Gymnasium a) Setup of a gymnasium and its importance b) Various equipment's in the gymnasium c) Effects and uses of each equipment.	11
TOTAL		44

Text Book:

1. Therapeutic Exercises Foundation and Techniques – Kisner and Colby-F.A Davis.
2. Principle of Exercise Therapy- Gardiner – C.B.S Delhi.

Reference Books:

1. Practical Exercise Therapy Hollis- Blacwell Scientific Publications.
2. Therapeutic Exercise – Basmajian- Williams and Wilkins.

Subject: Exercise therapy I Lab

Subject Code: PHT242C312

COURSE OUTLINE:

Modules	Course Content	Periods
I.	1. To practice the measurement of ROM of joints – upper limb, lower limb & trunk 2. To practice the grading of muscle strength region wise –upper limb, lower limb and trunk.	10
II	3. Different massage techniques- upper and lower limb. To study the different types of muscle contraction, muscle work, group action of muscles and co-ordinated movements. 4. To practice the various types of suspension therapy and its application on various parts of body-region wise	**10**
III	5. To study the position of joints, muscle work, and stability of various fundamental and derived positions. 6. To study & practice local & general relaxation techniques. 7. To study the structure & function along with application of various equipment in a gymnasium	**5**
IV	7. To study the structure & function along with application of various equipment in a gymnasium	**5**
	TOTAL	**30**

Text Book:

1. Therapeutic Exercise by Carolyn Kisner
2. Principles of Exercise therapy – Dena M. Gardiner

Reference Books:

1.Therapeutic exercise by Basmijjan& Wolf.

2. Muscle testing by Daniel Kendall

Experiential Learning: Visit to any rehabilitation center for practical exposure of exercise therapy on patients.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the Paper: Basic First Aid & Emergency Care

Course: Minor

Subject Code: PHT242N301 **Course Level: 200**

Scheme of Evaluation: Theory **Total credits: 4**

L-T-P-C: 3-0-2-4

Course Objective:

The objective of the course is to empower students to act swiftly, wisely and on time in times of necessity. The overall aims to preserve life, prevent deterioration and promote recovery

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Apply** basic life support skills including cardiopulmonary resuscitation.	**BT 3**
CO 2	**Plan** to provide first aid of simple and multiple system trauma such as: Controlling hemorrhage, Managing Burns and wounds, manually stabilizing injured extremities	**BT 2**
CO 3	**Identify** signs of stroke and heart attack and first aid without delay in transfer.	**BT 3**

CO 4	**Explain** general medical complaints seizures and animal bites (snake /dog bite)	**BT 2**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	First aid basics: introduction, expose to biological hazards, the primary survey, basic measures for first aid. Emergency response: CPR, steps for performing CPR, CPR for newborns and infants, recovery position, first aid in drowning, fractures of bones, causes and types of fractures, dislocation.	11
II	First aid in burns: Types of burns, danger of burns, first aid in dry burns and scalds, electrical burns, chemical burns, sunburn, heatstroke. First aid in wounds and injuries: types of wounds- small cuts and abrasions, Head injury- nose bleed, bleeding gums, bleeding from varicose veins,	11
III	First aid in foreign objects entering the sense organs: foreign body in the eye, ear, nose, skin, swallowing of foreign objects, Chocking. Fractures and first-aid.	11
IV	First aid in poisoning: poisoning by swallowing, gases, injections, skin absorption, Animal bites, snake bites and insect stings.	11
	TOTAL	44 hours

Textbooks:

1. Meenakshi Kubade, First Aid and Emergency Care, 1st Edition, Jain Publications, Jaipur.

First Aid Manual, 11th edition, DK

2. First Aid and Emergency Care by Harris N ,2nd edition, Publisher- AITBS (1 January 2018)

Reference Books:

1.Emergency First Aid, DK

2. First Aid in Emergencies By Aggarwal et al, CBS Publishers

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Title of the Paper: Pathology & Microbiology **Course: SEC**

Subject Code: PHT242S301 **Course Level: 200**

Scheme of Evaluation: Theory **Total credits: 3**

L-T-P-C: 3-0-0-3

Course Objective:

The objectives of the course are to introduce students to acquire knowledge of the Pathology and Microbiology which will help them to learn and apply this knowledge into practice. Through lectures the students will be able to understand about the pathology including immunity, virology, antiseptics and allergy. The subject involves the study of common organisms causing disease including nosocomial infections & precautionary measures to protect one from acquiring infections. By understanding microbiology of diseases is essential to institute appropriate treatment or suggest preventive measures to the patient.

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 microbiology of various conditions, diseases and disorders and changes in structure and function of cells during disease condition gained.	**BT 1**

CO 2	**Explain** how to protect themselves and their patients from infections during their interactions and the cell injury & response of different tissues and organs	**BT 2**
CO 3	**Develop** an essential medical knowledge and broad understanding of human disease.	**BT 3**
CO 4	**Develop** an understanding of the predisposing factors, causes, pathogenesis, morphology, and complications of such diseases.	**BT 3**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	1.**General Microbiology:** Introduction, microscopy and morphology of the bacteria, growth, nutrition and metabolism of the bacteria, sterilisation and disinfection, culture media and methods, identification of the bacteria. **2. Immunology:** Basic principles of immunity, antigen and antibodies-IgM, antigen antibody reactions, complement system, structure and function of the immune system, immune response, immunodeficiency diseases, hypersensitivity, autoimmunity and transplant immunity. 3. **Blood stream and cardiovascular system infections:** Cardiovascular infections: infective endocarditis and acute rheumatic fever. Blood stream infections: bacterial infections- enteric fever, ricketsial infections, brucellosis, leptospirosis. Viral infections- HIV/AIDS,VHF, arboviral VHF. Parasitic infection: Malaria, babesiosis, visceral Leishmaniasis. Fungal infection-systemic candidiasis. **4. GI infections:** Bacterial infections: Food poisoning, infections due to Enterobacteriaceae. Viral infections: Gastroenteritis- Rotavirus and others. Parasitic infections: intestinal protozoan infection, intestinal Helminthic infections.	10
II	**5. Hepatobiliary system infections:** Infective syndromes of hepatobiliary system and abdomen. Viral infections- viruses causing hepatitis, yellow fever and other. Parasitic infections-amoebic liver abscess, hydatid disease, trematode infections and others. **6. Skin, soft tissue and musculoskeletal system infections:** Bacterial Infections: Staphylococcal infections, beta-hemolytic streptococcal infections, gas gangrene and infections due to non-sporing anaerobes, leprosy, Anthrax, actimycosis. Viral Infections- Viral exanthems, Herpesvirus, pox viruses, parovirus, measles, rubella. Parasitic infection, Fungal infections.	10

	7. Respiratory Tract Infections: Infective syndrome of the respiratory tract, bacterial infections- Pharyngitis, Lobar Pneumonia, Atypical Pneumonia, TB and Mycobacterial infections, Pertusis, Pseudomonas. Viral Infections- Myxovirus infections of respiratory tract, coronavirus, Rhinovirus, Epstein Barr virus, Parasitic fungal infections. **8. CNS:** Bacterial infections- bacterial meningitis, tetanus. Viral infections- viral meningitis, myelitis, viral encephalitis and encephalopathy. Parasitic and fungal infections. **9. UTI:** Enterobacteriaceae, enterococcus, viral, fungal and parasitic infections, syphilis, lymphogranuloma venerum, genital herpes, gonorrhea and non-gonococcal urethritis, vulvovaginitis.	
III	**General Pathology** 1. **Introduction to Pathology** **2. Cell injuries, cellular adaptations and cellular ageing:** Aetiology Pathogenesis and morphology of cell injury, intracellular accumulation, cell death and changes after cell death. Adaptive disorders like atrophy, hyperatrophy, hyperplasia, metaplasia and dysplasia. Ageing. **3. Inflammation and Healing: Acute inflammation,** Inflammatory cells and Mediators, Chronic inflammation: Causes, Types, Classification nonspecific and granulomatous with examples. Healing: Regeneration and repair, Skin and tissue wound healing. Healing in specific site including bone healing. 4.**Immunopathology:** The Immune system, Diseases of immunity like AIDS, hypersensitivity reaction, autoimmune disease. Amyloidosis: physical and chemical nature, pathogenesis, classification, diagnosis and prognosis. **5. Infectious diseases and parasitic diseases:** Diseases caused by bacteria, spirochaetes and mycobacteria: plague, anthrax, whooping cough, staphylococcus infections. Diseases caused by Fungi: Mycetoma, candidiasis, mycosis. Parasitic diseases: Malaria, Filariasis, Amoebiasis, Cysticercosis 6**. Neoplasia:** Nomenclature and classification, characteristics of tumours: rate of growth, cancer phenotype and stem cells, clinical and microscopic structures, epidemiology and molecular pathology of cancer, carcinogens and carcinogens, clinical aspects of neoplasia	20

IV	8. **Nutritional Disorders:** obesity, starvation, Protein energy malnutrition, Vitamin deficiency disorders, classification with specific examples. 9. **Genetic Disorders**: genetic diseases like developmental defect, cytogenetic abnormalities, tumours of infancy and childhood. **Systemic pathology** 10. **Hematology:** Constituents of blood and bone marrow, Regulation of hematopoiesis. Erythropoesis, Anemia, Hypochromic Anaemia, megaloblastc anaemia, haemolytic anaemia and anaemia due to blood loss, plastic anaemia and other primary blood disorders, bleeding disorders, disorders of platelets, blood group and blood transfusion. **11. Respiratory System:** paediatric lung disease, pulmonary vascular disease, pulmonary infections, COPD, Chronic restrictive pulmonary disease, tumours of lungs, diseases of pleura. **12. Cardiovascular Pathology:** Normal structure and classification. Heart failure, congenital heart disease, ischaemic heart disease, hypertensive heart disease, Rheumatic Heart disease, non-rheumatic endocarditis, valvular diseases, myocardial diseases, pericardial diseases. **13.The Gastrointestinal tract:** Oesophagus, stomach, small intestine, appendix, large bowel, peritoneum. **14. The liver, biliary tract and exocrine pancreas:** biliary pathology, cholelithiasis, cholecystitis, tumours of biliary tract. LFT, Jaundice-general and neonatal. Hepatic failure,viral hepatitis, cirrhosis, portal hypertension, liver tumours and infection. Pancreatitis. **15. Disorders of leucocytes and lymphoreticular tissue:** Diseases of the gall bladder: Cholecystitis, Cholelithiasis, Carcinoma. Lymphadenitis - Non specific and granulomatous Causes of Lymph Node enlargements. Reactive Hyperplasia, Primary Tumours - Hodgkin's and Non hodgkin's Lymphomas, Metastatic Tumours. Causes of Splenic Enlargements. **16. Musculoskeletal System** : skeletal system, joints nd diseases of the skeletal muscle. **17. Endocrine pathology:** Basic concept of endocries, pituitary gland, adrenal gland, thyroid gland, parathyroid gland, endocrine pancreas including diabetes mellitus. **18. The nervous system:** **CNS: Inflammations and Infections:** TB Meningitis, Pyogenic Meningitis, viral meningitis and Brain Abscess Tuberculosis, Cysticercosis CNS Tumours, Astrocytoma, Neuroblastoma, Meningioma, Medulloblastoma. **PNS:** peripheral neuropathy.	20
	TOTAL	60 hours

Textbooks:

1) Textbook for Pathology- Harsh Mohan-Jaypee Brothers.
2) Essentials of Medical Microbiology –Apurba S Sastry, Sandhya Bhata –Jaypee Brothers

Reference Books:

3. Microbiology: An introduction for the Health Sciences – Ackerman and Richards – W.B. Saunders Co.
4. Pathology: Implications for Physical Therapists – Goodmann and Boissonnault – W.B

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Semester IV

Subject: Advanced Biomechanics II **Course: Major**

Subject Code: **PHT242M401** **Course Level: 200**

Scheme of Evaluation: Theory + Practical **Total credits: 3**

L-T-P-C: **2-0-2-3**

Course Objective:

The objectives of this course is to provide the students an overview of the major challenges in movement biomechanics, the functions of the various structures and learn about the forces involved in the movement.

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Explain** the biological, mechanical, and neurological mechanism by which muscles produce movement.	**BT 2**

CO 2	**Identify** general and specific features of the hip, knee, and ankle complex.	**BT 3**
CO 3	**Analyze** the pathological basis of injury and aging of the hip, knee and ankle complex.	**BT 4**
CO 4	**Analyse** different postural malalignment like scoliosis, kyphosis, lordosis and fixed flexion deformity, about the variation between different pathological gait patterns.	**BT 4**

COURSE OUTLINE :

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	**The Hip Complex:** Structure of the hip joint, function of the hip joint, hip joint forces and muscle function in stance, Hip joint Pathology.	14 hours
II	**The Knee:** Structure of tibiofemoral joint, tibiofemoral joint function, patellofemoral joint.	10 hours
III	**The ankle and Foot complex:** Ankle joint, the sub-talar joint, transverse tarsal joint, tarsometatarsal joint, metatarsophalangeal joint, Planatr arches.	10 hours
IV	**Posture** – dynamic and static posture, kinetic and kinematics of posture, analysis of posture, effect of age, pregnancy, occupation on posture. **Gait** – kinematics and kinetics of gait, gait in running and stair climbing.	10 hours
	Total	44 Hours

Text Book:

1.Norkins & Levengie, Joint Structure and Function- A Comprehensive Analysis – F.ADavis, 6th Edition

2.Norkins & White, Measurement of Joint Motion–A guide to Goniometry, F. A Davis, 5th Edition

Reference Books:

1.Margareta Nordin & Victor H. Frankel, Basic biomechanics of the musculoskeletal system, 5th Edition
2. Carol A. Oatis, Kinesiology-the mechanics and pathomechanics of human movements, 3rd edition.

Experiential Learning: Visit to gait lab in the region.

Title of the Paper: Advanced Biomechanics II LAB

Subject Code: PHT242M311

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	Goniometry – measurement of joint ROM Hip joint	10
II	Goniometry for knee joint movements	10
III	Goniometry for Ankle Joint movements	10
IV	Normal and Abnormal posture, Parameters of gait, Abnormal gait	14
	TOTAL	44 hours

Text Book:

1. Norkins &Levengie, Joint Structure and Function- A Comprehensive Analysis – F.ADavis, 6th Edition

2. Norkins& White, Measurement of Joint Motion–A guide to Goniometry, F. A Davis, 5th Edition

Reference Books:

1.Margareta Nordin & Victor H. Frankel, Basic biomechanics of the musculoskeletal system, 5th Edition
2. Carol A. Oatis, Kinesiology-the mechanics and pathomechanics of human movements, 3rd edition.

Experiential Learning: Visit to gait lab in the region.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the paper: Exercise Therapy II **Course: Major**

Scheme of Evaluation: Theory + Practical **Course Level: 200**

Subject Code: PHT242M402 **Total Credit: 4**

L-T-P-C: **2-1-0-3**

Course Objectives:

The objective of the course is after student will be able to apply the different types of exercises in different conditions considering the indications and contraindications of the procedure and describe the effects of the techniques.

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 fundamentals of use of therapeutic exercise in various conditions.	**BT 2**
CO 2	**Demonstrate** manual therapeutic techniques used in rehabilitation of patients.	**BT 3**
CO 3	**Demonstrate** various specialized techniques used in physiotherapy like PNF, mobilization and manipulation, and group therapy	**BT 3**
CO 4	**Analyse** normal human posture & various normal musculoskeletal movements during Gait, activities of daily living	**BT 4**

COURSE OUTLINE:

Modules	Course Content	Periods
I.	Therapeutic Exercises 1. Principles, classification, techniques, physiological & therapeutic effects, indications & contraindications of therapeutic exercises. 2. Assessment & evaluation of patient (region wise) to plan a therapeutic exercise programme. 3. Joint Mobility – Aetiology of Joint stiffness, general techniques of mobilization , effects, indications, contraindications & precautions. 4. Muscle Insufficiency – Aetiology of muscle insufficiency (strength, tone, power, endurance & volume), general techniques of strengthening, effects, indications, contraindications & precautions. 5. Neuro-muscular Inco-ordination-Review normal neuromuscular coordination, Aetiology of neuromuscular in co-ordination & genetic therapeutic techniques, effects, indications, contraindications & precautions. 6. Functional re-education – General therapeutic techniques to re- educate ADL function.	**14**

II.	Posture, Balance, Gait: 1. Normal Posture – Overview of the mechanism of normal posture. 2. Abnormal Posture – Assessment, Types, Etiogenesis, management including therapeutic exercise. 3. Static and Dynamic Balance – Assessment & management including therapeutic exercises. 4. Gait – Overview of normal gait & its components. 5. Gait deviations – Assessment ,types , etiogenesis, management including therapeutic exercises. 6. Types of walking aids, indications, effects and various training techniques .	**10**
III.	Hydrotherapy 1. Basic Principles of fluid mechanics, as they relate to hydrotherapy 2. Physiological & therapeutic effects of hydrotherapy including joint motility, muscle strengthening & wound care etc. 3. Types of Hydrotherapy equipment, indications, contraindications, operation skills & patient preparation.	**10**
IV.	Special Techniques 1. Introduction to special mobilization & manipulation techniques, effects, indications & contraindications. 2. Conceptual framework, principle of proprioceptive neuromuscular facilitation (PNF) techniques, including indications, therapeutic effects and precautions. 3. Principles of traction, Physiological & therapeutic effects, classification, types, indications, contraindications, techniques of application, operational skills & precautions. 4. Review normal breathing mechanism, types, techniques, indications, contraindications, therapeutic effects & precautions of breathing exercises. 5. Group Therapy – Types, advantages & disadvantages. 6. Exercises for the normal person – Importance and effects of exercise to maintain optimal health & its role in prevention of diseases types, advantages, indications, contraindications & precautions for all age groups. 7. Introduction to Yoga – Conceptual framework, various “asanas”, the body- mind relationship, effects & precautions.	**10**
TOTAL		44

Text Book:

1.Therapeutic Exercises Foundation and Techniques – Kisner and Colby-F.A Davis.

2.Principle of Exercise Therapy- Gardiner – C.B.S Delhi.

Reference Books:

1. Practical Exercise Therapy Hollis- Blacwell Scientific Publications.

2. Therapeutic Exercise – Basmajian- Williams

Title of the Paper: Exercise Therapy-II Lab

Subject Code: PHT242M412

Course Outcomes:

COURSE OUTLINE:

Modules	Course Content	Periods
I.	1.Limb length and limb girth measurement . 2. To study & practice the various techniques of mobilization of joints region wise. 3. To study & practice the various techniques of progressive strengthening exercises of muscles region wise.	**5**
II.	4. To study & practice the use of various ambulation aids in gait training. 5. To assess & evaluate ADL's and practice various training techniques 6. To study & practice mat exercises.	**5**
III	7. To assess & evaluate normal & abnormal posture & practice various corrective techniques. 8. To assess & evaluate equilibrium/ balance & practice various techniques to improve balance and coordination exercises . 9. To study the structure & functions of hydrotherapy equipment's& their applications	**10**

IV	10. To study & practice various traction techniques and stretching exercises. 11. To study & practice various group exercise therapies 12. To practice & experience effects of basic yoga "asanas 13. To study plan & practice exercise programmes for normal person of various age groups**.**	**10**
	Total	**30**

Text Book:

1.Progressive resisted exercises – by Margaret Hollis,

2.Therapeutic Exercise by Carolyn Kisner

Reference Books:

1.Therapeutic exercise by Basmijjan& Wolf.

2 Muscle testing by Daniel Kendall.

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
44 hours	30 hours	16 hours

Title of the paper: General Medicine, Surgery, Obstetrics and Gynaecology Course: Major

Subject Code: PHT242M403 Course Level:200

Scheme of Evaluation: Theory

L-T-P-C: **3-1-0-4 Total credits: 3**

Course Objectives

The objective of this course is to make the students understand the general surgical procedures and enable the students to understand the concepts of various surgical conditions like abdominal surgeries, vascular surgeries , thoracic surgeries and also gynaecological and to introduce the causes, clinical presentation and treatment of various disease of the human body . The course will also enable students to understand the disease pathology and plan strategies to manage them.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** and understand the basic physiology and mechanism of child birth, gynecological problems, urological related conditions etc	**BT 1**
CO 2	**Explain** the various surgical procedures done over human body and also which all are the structures being cut and how to manage the post-surgical patients	**BT 2**
CO 3	**Apply** the management by understanding the various treatment strategies for the diseases.	**BT 3**
CO 4	**Analyze** the disease pathology and plan strategies to manage them.	**BT 4**

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	1. Infection and inflammation-acute / chronic-signs, symptoms, complications & management. 2. Wounds and ulcers– classification, healing, management. 3. Abdominal Surgeries: Surgical anatomy of Anterior Abdominal wall; Surgical approaches; Common abdominal surgeries like Cholecystectomy, Colostomy, Ileostomy, Gastrectomy, Hernias, Appendicectomy, Neprectomy, Prostectomy. 4. Thoracic surgeries**:** Thoracotomy - Definition, Types of Incisions with emphasis to the site of incision, muscles cut and complications. A) Lung surgeries**:** Pnumonectomy Lobectomy, Segmentectomy – Indications, Physiological changes and Complications Thoracoplasty Pleurectomy Pleurodesis and Decortication of the Lung. Intercostal Drainage System B) Cardiac surgeries: An overview of the Cardio-Pulmonary Bypass Machine Extracardiac Operations: Closed Heart surgery, Open Heart surgery. Transplant Surgery – Heart, Lung and Kidney – Indications, Physiological changes and Complications Chest Injuries, evaluation, management. **Peripheral vascular diseases:** Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases: □ Atherosclerosis □ Arteriosclerosis □ Buergers □ Raynauds □ Varicose veins & DVT	**15**
II	**Burns and Plastic Surgery:** □ Burns- causes, classification, ward management, post burn contractures, various Reconstructive & plastic surgeries □ Skin grafts/flaps- pedicle/ Tube /Muscle flap Types, indications with special emphasis to burns/ wounds, ulcers, post surgical head, neck, face defects and reconstruction. □ Hypertropic scar & keloid – management c]-Principles of tendon transfers-with special emphasis to hand, foot & facial paralysis **Emergency Surgical Procedures:** Indications, steps, post operative care:	**15**

	Tracheostomy,Burr-hole Craniotomy,Cranioplasty, Deep brain stimulation, Shunting, Laminectomy, Hemilaminectomy, Microvascular decompression surgery, Embolization, Ablative surgery - Thalamotomy and Pallidotomy, Coiling of aneurysm and Clipping of aneurysm, Neural implantation 1**. Anatomy of female genital system and pelvic floor** **2. Pregnancy:** Normal Gestations, Maternal Physiology in Pregnancy, Musculoskeletal disorders in Pregnancy, Antenatal Care,Prenatal and Perinatal Complications,Labour- Stages, Normal & Complications, Pain relief in Labour, Post Natal – Puerperium, Lactation. **3. Menopause:** Physiology, Complications, Effect on Various systems, Management **4. Uro-genital dysfunction** □ Uterine prolapse – classification & management (Conservative /Surgical) □ Cystocoele, Rectocoele, Enterocoele □ Urinary Incontinence: Types, Causes, Assessment and Management. □ Pelvic Inflammatory Diseases □ Polycystic Ovarian Disease (PCOD) 1 **Surgical Procedures involving child birth** □ Caesarian Section □ Episiotomy **Definition, Indications and Management of the following surgical procedures;** □ Dilatation and Curettage □ Hysterectomy – Total Abdominal and Vaginal Salphigectomy and oopherectomy Neoplasm of Female reproductive organs – surgical management □ Menstrual cycle and its Disorders □ Methods of family planning □Sterility – management □ Multiple gestations	
III	**1. Introduction of modes of transfer of communicable diseases & general preventive measures.** 2. Bacterial Diseases: Tuberculosis, Leprosy, Rhematic fever, Tetanus, Typhoid fever, Diphtheria, Pneumonia, Bacillary Dysentry and Measles. 3. Viral Diseases: Simplex and zoster, Varicella, Measles Mumps, Hepatitis B &C,AIDS& Influenza. 4. Metabolic and Deficiency Diseases: Diabetes, Anemia, Vitamin & Nutritional, Deficiency diseases, diseases of the endocrine glands **Diseases of Respiratory System**: Asthma, Bronchitis, Massive collapse of lungs, Bronchiectasis Bronchial, Pneumonia, lung	**15**

	abscess, Emphysema, Empyema, Paralysis of diaphragm & vocal cords, chronic infection of larynx and trachea, Abnormalities of trachea, infract of lungs, chronic passive congestion, chronic obstruction pulmonary disease, chest wall deformities.	
IV	**Diseases of Circulatory System:** Thrombosis, Embolism, Gangrene, Valvular diseases Hemorrhage, Heart Malformation, various diseases of arteries, diseases of blood forming organs, Anemia, Leukemia, Leukocytosis, Peripheral vascular diseases, diseases of the lymphatic systems. Diseases of the heart-Hypertension, Hypotension, Aortic aneurysm, Endocarditis, Pericarditis, Aortic Regurgitation, Cardiac Failure, coronary heart diseases, congenital heart malformation and its manifestation. **Disease of skin**:-Characteristics of normal skin, abnormal changes, types of skin lesions. 2. Conditions – Leprosy, Acne, Boil, Carbuncles, Impetigo, Infections of skin, Herpes, Urticaria, Psoriasis, Skin disorders associated with circulatory disturbances, Warts, Com. Defects in Pigmentation Psoriasis Leukoderma, Fungal infections, Alopecia, Dermatitis Eczema, Skin – Allergies, Venereal. 1. Diseases of Digestive System: Pharyngitis, spasm of the Esophagus, Diverticulum stenosis, Gastric ulcer, Hematemesis Pyloric stenosis, Dyspepsia, Vomiting, Diarrhea, Duodenal ulcer etc. 2. Diseases of Liver: Jaundice Cirrhosis of liver, Abscess of liver, Ascites. 3. Diseases of kidney: Polyuria, Hematuria, Uremia, Anuria, Nephritis, Urinary infections, Urinary calculi of application-region wise.	**15**
TOTAL		**60 hours**

Text Book:

1.Clinical& Operative surgery by S. Das

1. Davidson's Principles and Practices of Medicine – Edward – Churchill Livingstone

Reference Books:

1.Bailey & Love's short practice of Surgery-21st edition.

2.API - Text book of Medicine – 5th edition

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Title of the Paper: Role of Yoga in Rehabilitation **Course Leve: 200**

Course: Major Related to IKS **Total credits: 2**

Scheme of Evaluation: Theory

Subject Code: PHT242M404

L-T-P-C: 2-0-0-2

Course Objectives

The students will be able to understand ancient yoga & its asanas, the philosophy of yoga, various yoga mudras & relationship of yoga & physiotherapy**.**

Course outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** Yoga & learn about its history & types with psycho-physiological effects on human body	**BT 1**
CO 2	**Illustrate** various kinds of Yogic Asanas with its importance and methods.	**BT 2**
CO 3	**Explain** the techniques and benefits of various forms of pranayama, yogic bandhas & mudras	**BT 2**
CO 4	**Apply** the various types of Yoga techniques in daily life & educate about the importance of Yoga in sports & rehabilitation	**BT 3**

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	a) Meaning, Philosophy, aims and objectives of Yoga. b) Types of Yoga-Raj Yoga, Mantra Yoga, Bhakti Yoga, Karma Yoga and Laya Yoga and their approaches leading to their goal. c) Meaning and Philosophy of Ashtanga Yoga: its eight steps-Yama, Niyama, Asana, Pranayama, Pratyahara, Dharna, Dhyana, Samadhi, role and mode of practice of each step in the attainment of goal, their psycho-physiological effects of human organizer.	**12 hours**
II	a) Asana – in supine lying, prone lying, sitting and standing. Biomechanical analysis of various asanas, muscle work, Indication and contraindications b) Psycho-physiological effects of each category of asanas in general-techniques and benefits of the followings Asanas-Bhujanga, Shalabha, Dhanura,Hal, Matsya, Ushtra, Paschimottan, Vakra, Ardhmatsyendra, Chakra, (Standing), Baka,Mayur, Padma, Sidha, Makar, Shava, Vajra, Supta Vajra and Asona.	**12Hours**
III	a) Pranayama – the basic science of Naadishudhi, Kapalapaathy, Sooryanadi, Bhasthrika, Sheethali, Sheethakari, Brahmari and Moorcha pranayama and relevance to physiotherapy breathing exercises. b) The science of Mudhras and various types. Shathkryas – Basic sciences, indication and contraindication.	**12 hours**
IV	a) Education values of yoga. b) Role of yoga in physical education and sports. c) Relevance of yoga in modern life. d) Relevance of yoga in field of physiotherapy	**12hours**
	Total	**48 hours**

Text Books:

1. Swami Kavalyanad: Yogic Therapy", Kaivalyadhama Lonavala.

2. Joshi, K.S.: Yoga and Personality

References Books:

1. Yoga & rehabilitation by Nilima Patel
2. Swami Satya: Patanjali Raj Yoga

Title of the Paper: Health and Wellness

Course: Minor

Subject Code: PHT242N401 **Course Level: 200**

Scheme of Evaluation: Theory **Total credits: 3**

L-T-P-C: 3-0-0-3

Course Objectives

This objective of the study is to promote an optimal state of physical, emotional, intellectual, social & spiritual well-being of all the citizens of the country, to organize sports and fitness activities outside the regular institutional working hours and To focus on creating the ability for self-discipline and self-control in students by Yoga education.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Distinguish** various diseases and benefits of good food habits.	**BT 3**
CO 2	**Explain** the importance of both physical health and mental health.	**BT 2**
CO 3	**Build** a knowledge regarding spiritual well-being, Emotion and social connect.	**BT 3**
CO 4	**List** the importance of nutrition and health.	**BT 4**

COURSE OUTLINE :

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	a) Meaning, dimensions and approaches to health and wellness, Factors influencing health, Indicators of good health and poor health, Status of health in Jharkhand and India. b) Common diseases- introduction, types & etiology, Communicable diseases- causes & prevention, Obesity, Cardiovascular disorder, Diabetes, Liver diseases, c) Adverse effect of alcohol and tobacco on human health.	**14 hours**
II	a) Nutrients and their function in maintaining good health b) Food pyramid, Meaning, importance, components & sources of balanced diet c) Harmful effects of junk food.	**10 hours**
III	a) Definition, explanation and importance of yoga. b) Historical perspective yoga. c) Definition, types and mental & physical benefits asanas, Different types of asanas – Padmasana, Bhujangasana, Halasana, Shalabhasana, Dhanurasana, Vajrasana, Chakrasana, Shavasana, Pawanmuktasana, Mandukasana and Uttanpadasana. d) Pranayama and its health benefits- Bhastrika, Kapalbhati, Bhya pranayama, Anulom-vilom, Bhramari, Udgeeth	**14 hours**
IV	a) Definition, Meaning & Importance of Physical education b) History, Principle and Foundation of physical education c) Components of physical fitness and wellness d) Sports Training Institutions in India e) Physical Education and sports as a need for the Society f) Stretching exercises, warming up and limbering down exercises, Cardiovascular exercises, g) Rules and regulations of some important games-Football, Volleyball, Basketball, Badminton, Table tennis, Hockey and Cricket.	**10 hours**
	Total	**48 hours**

Text Books:

1. B.K.S Iyengar (2000), Yoga Deepika, Vivekanand Kendra Publisher Bangalore
2. A.K. Upal, Principles of sports training (2001), Friends Publication, Delhi

Reference Books:

1. B. C. Rai, Health Education and Hygiene, Prakashan Kendra, Lucknow
2. K. K. Verma, Health and Physical Education (2005), Prakash Brothers, Ludhiana

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours

Title of the Paper: Ergonomics and Occupational Values

Course: Minor

Subject Code: PHT242N402 **Course Level: 200**

Scheme of Evaluation: Theory **Total credits: 3**

L-T-P-C: 3-0-0-3

Course Objective:

The objectives of this course are that student will be able to understand the interaction among humans and other elements of a system and will be able to examine and design a proper environment for optimizing well-being and overall performance of a person.

and management of basic ergonomics.

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 various ergonomic aspects related to posture, movement, work and the importance of having a proper ergonomics.	**BT 1**
CO 2	**Apply** postural analysis knowledge based upon observational skills in workplace	**BT 3**
CO 3	**Identify** the faulty ergonomics and thereby refrain the individual from musculoskeletal problems.	**BT 3**
CO 4	**Examine** whether the environment has been ergonomically designed so that a person can work, live more efficiently and safely.	**BT 4**

COURSE OUTLINE:

MODULE	**TOPICS & COURSE CONTENT**	**PERIODS**
I	• Introduction to ergonomics. • Posture and movement: biomechanical, physiology background. • Anthropometry and its uses in ergonomics	**10**
II	**Ergonomics** • Universal design: principle of universal design, Disability access symbols, purpose of examination, examination strategies • Examination of Home: exterior and interior excessibility. • Examination of workplace: job analysis, FCE, work hardening &conditioning, internal and external accebility. • Community Access: transportation, access to community facilities	**14**

III	**Occupational Hazards** **Physical Hazards** a. Design of static work: standing and seated work : – Work space and work station design for standing and sitting operations. – Effect of wrong postures on cardiovascular and musculoskeletal system – Identification and analysis of posture. b. Design of repetitive tasks – Anatomy and biomechanics of manual handling – Prevention of manual handling injuries in the workplace c. Design of manual handling tasks d. Work Related Musculoskeletal Disorders – Injuries to the upper body at work – Ergonomic Interventions – Disorders of the neck, wrist, shoulders and lower limbs. – Low back disorders	**14**
IV	1. Chemical Hazards 2. Biological Hazards : Hazardous substances and processes	**10**
	TOTAL	**48 hours**

Text Books:

1. Anshel, J. (1968). Visual Ergonomics in the Workplace. Taylor and Francis, London Astrand, P. O.

2. Rodahi,.K. (1986): Textbook Of Work Physiology, McGraw Hill, New York

Reference Books:

1.Ergonomics for Beginners: Jan Dul & Bernerd Weerdmeester, 2nd Edition

2.Physical Rehabilitation, 6th edition, Susan B.O'Sullivan. Thomas J. Schmitz, George D. Fulk

Distribution of Credits		
Theory	**Practicum**	**Experiential Learning**
60 hours	-	30 hours