REVA UNIVERSITY
Bengaluru, India

10 YEARS OF UNIVERSITY RECOGNITION

20 YEARS OF ACADEMIC EXCELLENCE

(School of Allied Health Sciences)

B. Sc. Nutrition and Dietetics

HAND BOOK

2021

Rukmini Knowledge Park
Kattigenahalli, Yelahanka, Bengaluru – 560064
Phone No: +91-080-46966966, Fax: 080-28478539
www.reva.edu.in

Chancellor's Message

"Education is the most powerful weapon which you can use to change the world."
- Nelson Mandela

There was a time when survival depended on just the realization of physiological needs. We are indeed privileged to exist in a time when 'intellectual gratification' has become indispensable. Information is easily attainable for the soul that is curious enough to go look for it. Technological boons enable information availability anywhere anytime. The difference, however, lies between those who look for information and those who look for knowledge.

It is deemed virtuous to serve seekers of knowledge and as educators it is in the ethos at REVA University to empower every learner who chooses to enter our portals. Driven by our founding philosophy of 'Knowledge is Power', we believe in building a community of perpetual learners by enabling them to look beyond their abilities and achieve what they assumed impossible.

India has always been beheld as a brewing pot of unbelievable talent, acute intellect and immense potential. All it takes to turn those qualities into power is a spark of opportunity. Being at a University is an exciting and rewarding experience with opportunities to nurture abilities, challenge cognizance and gain competence.

For any University, the structure of excellence lies in the transitional abilities of its faculty and its facility. I'm always in awe of the efforts that our academic board puts in to develop the team of subject matter experts at REVA. My faculty colleagues understand our core vision of empowering our future generation to be ethically, morally and intellectually elite. They practice the art of teaching with a student-centered and transformational approach. The excellent infrastructure at the University, both educational and extra-curricular, magnificently demonstrates the importance of ambience in facilitating focused learning for our students.

A famous British politician and author from the 19th century - Benjamin Disraeli, once said 'A University should be a place of light, of liberty and of learning'. Centuries later this dictum still inspires me and I believe, it takes team-work to build successful institutions. I welcome you to REVA University to join hands in laying the foundation of your future with values, wisdom and knowledge.

Dr. P. Shyama Raju

The Founder and Hon'ble Chancellor, REVA University

Vice-Chancellor's Message

The last two decades have seen a remarkable growth in higher education in India and across the globe. The move towards inter-disciplinary studies and interactive learning have opened up several options as well as created multiple challenges. India is at a juncture where a huge population of young crowd is opting for higher education. With the tremendous growth of privatization of education in India, the major focus is on creating a platform for quality in knowledge enhancement and bridging the gap between academia and industry.

A strong believer and practitioner of the dictum "Knowledge is Power", REVA University has been on the path of delivering quality education by developing the young human resources on the foundation of ethical and moral values, while boosting their leadership qualities, research culture and innovative skills. Built on a sprawling 45 acres of green campus, this 'temple of learning' has excellent and state-of-the-art infrastructure facilities conducive to higher teaching-learning environment and research. The main objective of the University is to provide higher education of global standards and hence, all the programs are designed to meet international standards. Highly experienced and qualified faculty members, continuously engaged in the maintenance and enhancement of student-centric learning environment through innovative pedagogy, form the backbone of the University.

All the programs offered by REVA University follow the Choice Based Credit System (CBCS) with Outcome Based Approach. The flexibility in the curriculum has been designed with industry-specific goals in mind and the educator enjoys complete freedom to appropriate the syllabus by incorporating the latest knowledge and stimulating the creative minds of the students. Bench marked with the course of studies of various institutions of repute, our curriculum is extremely contemporary and is a culmination of efforts of great think-tanks - a large number of faculty members, experts from industries and research level organizations. The evaluation mechanism employs continuous assessment with grade point averages. We believe sincerely that it will meet the aspirations of all stakeholders – students, parents and the employers of the graduates and postgraduates of REVA University.

At REVA University, research, consultancy and innovation are regarded as our pillars of success. Most of the faculty members of the University are involved in research by attracting funded projects from various research level organizations like DST, VGST, DBT, DRDO, AICTE and industries. The outcome of the research is passed on to students through live projects from industries. The entrepreneurial zeal of the students is encouraged and nurtured through EDPs and EACs.

REVA University has entered into collaboration with many prominent industries to bridge the gap between industry and University. Regular visits to industries and mandatory internship with industries have helped our students. REVA University has entered into collaboration with many

prominent industries to bridge the gap between industry and University. Regular visits to industries and mandatory internship with industries have helped our students become skilled

with relevant to industry requirements. Structured training programs on soft-skills and preparatory training for competitive exams are offered here to make students more employable. 100% placement of eligible students speaks the effectiveness of these programs. The entrepreneurship development activities and establishment of "Technology Incubation Centers" in the University extend full support to the budding entrepreneurs to nurture their ideas and establish an enterprise.

With firm faith in the saying, "Intelligence plus character –that is the goal of education" (Martin Luther King, Jr.), I strongly believe REVA University is marching ahead in the right direction, providing a holistic education to the future generation and playing a positive role in nation building. We reiterate our endeavor to provide premium quality education accessible to all and an environment for the growth of over-all personality development leading to generating "GLOBAL PROFESSIONALS".

Welcome to the portals of REVA University!

Dr. Dhanamjaya M
Vice-Chancellor, REVA University

MESSAGE FROM THE DIRECTOR

Nutrition and Dietetics is Allied Health Sciences program assimilates in itself a number of disciplines and as such hasgrown rapidly. B Sc in Nutrition and Dietetics offered by REVA University aims to provide the required skills and knowledge necessary to pursue a successful career in Nutrition and Dietetics. This program imparts need based, practical education in contemporary world to develop global competence among students. It strives to prepare students to become leaders in the field of Health Sciences in general and Nutrition and Dietetics in particular by encouraging them to inculcate scientific thinking coupled with creative and innovative ideas.

The program provides hands- on training and practical skills in the field of Health Sciences like Biochemistry, Human Nutrition & Family Meal Management, Microbiology, Instrumentation and Food analysis, Community and Public Health Nutrition, Quality Food Service and Physical Facilities, Bakery Science and Nutrition Counseling in the Allied Health field.

As far as employment is concerned Nutrition and Dietetics has become one of the fast-growing sectors. Employment record shows that Nutrition and Dietetics has a great scope in future. Medical laboratory technician can find careers with Hospitals, Sports Academy and Health care and Food Industries.

The curriculum caters to and has relevance to local, regional, national, global developmental needs. Maximum numbers of courses are integrated with crosscutting issues with relevant to professional ethics, gender, human values, environment & sustainability.

This handy document containing brief information about B.Sc. Nutrition and Dietetics program, scheme of instruction and detailed course content will serve as a guiding path to you to move forward in a right direction.

Dr. Jayashree S
Director
School of Allied Health Sciences

Preface

Higher education across the globe is opening doors of its academic disciplines to the real-world experiences. The disciplinary legitimacy is under critical review. Trans-border mobility and practice learning are being fore-grounded as guiding principles. Interactive learning, bridging disciplines and facilitating learners to gain different competencies through judicious management of time is viewed as one of
the greatest and fascinating priorities and challenges today.

Indian economy is experiencing an upward growth right from the beginning of 21st century necessitating well qualified science graduates to work as scientists, teachers, algorithm developers, computer programmers, professionals and often administrators. At present more than 400 million youth are below 18 years of age and government is committed to increase the GER to 30% by 2020, further necessitating more number of teachers and professors to work in schools and colleges. Research has also been given equal importance. Pivate sector and Corporates are also looking for smart science graduaes in a big way. The B.Sc. Nutrition and Dietetics degree program of REVA University is designed to prepare Biotechnologist, Biochemists, Nutrition & Dietitian, Genetists, Scientists, Teachers, Professionals & Administrators who are motivated, enthuastics & creative thinkers to meet the challenges of growing economy as well as to fulfill the growing aspirations of the youth.

The program has been developed with an emphasis on knowledge assimilation, application, national and international job market and its social relevance. The outcomebased curriculum designed and followed imbibes required theoretical concepts and practical skills in the domain. By undergoing this program, you will develop critical, analytical thinking and problem solving abilities for a smooth transition from academic to real-life work environment. The L: T: P structure of teaching and learning under Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) would certainly help our students learn and build competencies needed in this knowledge based society.

I am sure you will enjoy the curriculum, teaching and learning environment, the vast infrastructure and the experienced teachers involvement and guidance. We will strive to provide all needed comfort and congenial environment for your studies. I wish you and all students' pleasant stay in REVA and grand success in your career.

Dr. Jayashree S.
Professor & Head,
School of Allied Health Science

CONTENTS

RUKMINI EDUCATIONAL CHARITABLE TRUST

It was the dream of late Smt. Rukmini Shyama Raju to impart education to millions of underprivileged children as she knew the importance of education in the contemporary society. The dream of Smt. Rukmini Shyama Raju came true with the establishment of Rukmini Educational Charitable Trust (RECT), in the year 2002. Rukmini Educational Charitable Trust (RECT) is a Public Charitable Trust, set up in 2002 with the objective of promoting, establishing and conducting academic activities in the fields of Arts, Architecture, Commerce, Education, Engineering, Environmental Science, Legal Studies, Management and Science & Technology, among others. In furtherance of these objectives, the Trust has set up the REVA Group of Educational Institutions comprising of REVA Institute of Technology & Management (RITM), REVA Institute of Science and Management (RISM), REVA Institute of Management Studies (RIMS), REVA Institute of Education (RIE), REVA First Grade College (RFGC), REVA Independent PU College at Kattigenahalli, Ganganagar and Sanjaynagar and now REVA University. Through these institutions, the Trust seeks to fulfill its vision of providing world class education and create abundant opportunities for the youth of this nation to excel in the areas of Arts, Architecture, Commerce, Education, Engineering, Environmental Science, Legal Studies, Management and Science & Technology.

Every great human enterprise is powered by the vision of one or more extraordinary individuals and is sustained by the people who derive their motivation from the founders. The Chairman of the Trust is Dr. P. Shyama Raju, a developer and builder of repute, a captain of the industry in his own right and the Chairman and Managing Director of the DivyaSree Group of companies. The idea of creating these top notched educational institutions was born of the philanthropic instincts of Dr. P. Shyama Raju to do public good, quite in keeping with his support to other socially relevant charities such as maintaining the Richmond road park, building and donating a police station, gifting assets to organizations providing accident and trauma care, to name a few.

The Rukmini Educational Charitable Trust drives with the main aim to help students who are in pursuit of quality education for life. REVA is today a family of ten institutions providing education from PU to Post Graduation and Research leading to PhD degrees. REVA has well qualified experienced teaching faculty of whom majority are doctorates. The faculty is supported by committed administrative and technical staff. Over 11,000 students study various courses across REVA's three campuses equipped with exemplary state-of-the-art infrastructure and conductive environment for the knowledge driven community.

ABOUT REVA UNIVERSITY

REVA University has been established under the REVA University Act, 2012 of Government of Karnataka and notified in Karnataka State Gazette dated 7thFebruary, 2013. The University is empowered by UGC to award degrees any branch of knowledge under Sec.22 of the UGC Act. The University is a Member of Association of Indian Universities, New Delhi. The main objective of the University is to prepare students with knowledge, wisdom and patriotism to face the global challenges and become the top leaders of the country and the globe in different fields.

REVA University located in between Kempegowda International Airport and Bangalore city, has a sprawling green campus spread over 45 acres of land and equipped with state-of-the-art infrastructure that provide conducive environment for higher learning and research. The REVA campus has well equipped laboratories, custom-built teaching facilities, fully air-conditioned library and central computer centre, the well planned sports facility with cricket ground, running track & variety of indoor and outdoor sports activities, facilities for cultural programs. The unique feature of REVA campus is the largest residential facility for students, faculty members and supportive staff.

The University is presently offering 23 Post Graduate Degree programs, 20 Degree and PG Degree programs in various branches of studies and has 15000+ students studying in various branches of knowledge at graduate and post graduate level and 410 Scholars pursuing research leading to PhD in 18 disciplines. It has 800+ well qualified, experienced and committed faculty members of whom majority are doctorates in their respective areas and most of them are guiding students pursuing research leading to PhD.

The programs being offered by the REVA University are well planned and designed after detailed study with emphasis with knowledge assimilation, applications, global job market and their social relevance. Highly qualified, experienced faculty and scholars from reputed universities / institutions, experts from industries and business sectors have contributed in preparing the scheme of instruction and detailed curricula for this program. Greater emphasis on practice in respective areas and skill development to suit to respective job environment has been given while designing the curricula. The Choice Based Credit System and Continuous Assessment Graded Pattern (CBCS – CAGP) of education has been introduced in all programs to facilitate students to opt for subjects of their choice in addition to the core subjects of the study and prepare them with needed skills. The system also allows students to move forward under the fast track for those who have the capabilities to surpass others. These programs are taught by well experienced qualified faculty supported by the experts from industries, business sectors and such other organizations. REVA University has also initiated many supportive measures such as bridge courses, special coaching, remedial classes, etc., for slow learners so as to give them the needed input and build in them confidence and courage to move forward and accomplish success in their career. The University has
also entered into MOUs with many industries, business firms and other institutions seeking their help in imparting quality education through practice, internship and also assisting students' placements.
REVA University recognizing the fact that research, development and innovation are the important functions of any university has established an independent Research and Innovation division headed by a senior professor as Dean of Research and Innovation. This division facilitates all faculty members and research scholars to undertake innovative research projects in engineering, science & technology and other areas of study. The interdisciplinary-multidisciplinary research is given the top most priority. The division continuously liaisons between various funding agencies, R&D Institutions, Industries and faculty members of REVA University to facilitate undertaking innovative projects. It encourages student research projects by forming different research groups under the guidance of senior faculty members. Some of the core areas of research wherein our young faculty members are working include Data Mining, Cloud Computing, Image

Processing, Network Security, VLSI and Embedded Systems, Wireless Censor Networks, Computer Networks, IOT, MEMS, Nano- Electronics, Wireless Communications, Bio-fuels, Nano-technology for coatings, Composites, Vibration Energies, Electric Vehicles, Multilevel Inverter Application, Battery Management System, LED Lightings, Renewable Energy Sources and Active Filter, Innovative Concrete Reinforcement, Electro Chemical Synthesis, Energy Conversion Devices, Nano-structural Materials, Photo-electrochemical Hydrogen generation, Pesticide Residue Analysis, Nano materials, Photonics, Nano Tribology, Fuel Mechanics, Operation Research, Graph theory, Strategic Leadership and Innovative Entrepreneurship, Functional Development Management, Resource Management and Sustainable Development, Cyber Security, General Studies, Feminism, Computer Assisted Language Teaching, Culture Studies etc.

The REVA University has also given utmost importance to develop the much required skills through variety of training programs, industrial practice, case studies and such other activities that induce the said skills among all students. A full-fledged Career Development and Placement (CDC) department with world class infrastructure, headed by a dynamic experienced Professor & Dean, and supported by well experienced Trainers, Counselors and Placement Officers. The University also has University-Industry Interaction and Skill Development Centre headed by a Senior Professor & Director facilitating skill related training to REVA students and other unemployed students. The University has been recognized as a Centre of Skill Development and Training by NSDC (National Skill Development Corporation) under Pradhan Mantri Kaushal Vikas Yojana. The Centre conducts several add-on courses in challenging areas of development. It is always active in facilitating student's variety of Skill Development Training programs.

The University has collaborations with Industries, universities abroad, research institutions, corporate training organizations, and Government agencies such as Florida International University, Okalahoma State University, Western Connecticut University, University of Alabama, Huntsville, Oracle India Ltd, Texas Instruments, Nokia University Relations, EMC^2, VMware, SAP, Apollo etc, to facilitate student exchange and teacher–scholar exchange programs and conduct training programs. These collaborations with foreignuniversities also facilitates students to study some of the programs partly in REVA University and partly in foreign university, viz, M.S in Computer Science one year in REVA University and the next year in the University of Alabama, Huntsville, USA.

The University has also given greater importance to quality in education, research, administration and all activities of the university. Therefore, it has established an independent Internal Quality division headed by a senior professor as Dean of Internal Quality. The division works on planning, designing and developing different quality tools, implementing them and monitoring the implementation of these quality tools. It concentrates on training entire faculty to adopt the new tools and implement their use. The division further works on introducing various examination and administrative reforms.

To motivate the youth and transform them to become innovative entrepreneurs, successful leaders of tomorrow and committed citizens of the country, REVA organizes interaction between students and successful industrialists, entrepreneurs, scientists and such others from time to time. As a part of this exercise great personalities such as Bharat Ratna Prof. C. N. R. Rao, a renowned Scientist, Dr. N R Narayana Murthy, Founder and Chairman and Mentor of Infosys, Dr. K Kasturirangan, Former Chairman ISRO, Member of Planning Commission, Government of India, Dr. Balaram, Former Director I.I.Sc., and noted Scientist, Dr. V S Ramamurthy, Former Secretary, DST, Government of India, Dr. V K Aatre, noted Scientist and former head of the DRDO and Scientific Advisor to the Ministry of Defence Dr. Sathish Reddy, Scientific Advisor, Ministry of Defence, New Delhi and many others have accepted our invitation and blessed our students and faculty members by their inspiring addresses and interaction.

As a part of our effort in motivating and inspiring youth of today, REVA University also has instituted awards and prizes to recognize the services of teachers, researchers, scientists, entrepreneurs, social workers and such others who have contributed richly for the development of the society and progress of the country. One of such award instituted by REVA University is **'Life Time Achievement Award'** to be awarded to successful personalities who have made mark in their field of work. This award is presented on occasion of the **"Founders' Day Celebration"** of REVA University on 6th January of every year in presence of dignitaries, faculty members and students gathering. The first "REVA Life Time Achievement Award" for the year 2015 has been awarded to Shri. Kiran Kumar, Chairman ISRO, followed by Shri. Shekhar Gupta, renowned Journalist for the year 2016, Dr K J Yesudas, renowned play back singer for the year 2017. REVA also introduced "**REVA Award of Excellence"** in the year 2017 and the first Awardee of this prestigious award is Shri Ramesh Aravind, Actor, Producer, Director, Screen Writer and Speaker.

REVA organizes various cultural programs to promote culture, tradition, ethical and moral values to our students. During such cultural events the students are given opportunities to unfold their hidden talents and motivate them to contribute innovative ideas for the progress of the society. One of such cultural events is REVAMP conducted every year. The event not only gives opportunities to students of REVA but also students of other Universities and Colleges. During three days of this mega event students participate in debates, Quizzes, Group discussion, Seminars, exhibitions and variety of cultural events. Another important event is Shubha Vidaaya, - Graduation Day for the final year students of all the programs, wherein, the outgoing students are felicitated and are addressed by eminent personalities to take their future career in a right spirit, to be the good citizens and dedicate themselves to serve the society and make a mark in their respective spheres of activities. During this occasion, the students who have achieved top ranks and wonmedals and prizes in academic, cultural and sports activities are also recognized by distributing awards and prizes. The founders have also instituted medals and prizes for sports achievers every year. The physical education department conducts regular yoga classes everyday to students, faculty members, administrative staff and their family members and organizes yoga camps for villagers around. Recognizing the fast growth of the university and its quality in imparting higher education, the BERG (Business Excellence and Research Group), Singapore has awarded BERG Education Award 2015 to REVA University under Private Universities category. The University has also been honored with many more such honors and recognitions.

Vision

REVA University aspires to become an innovative university by developing excellent human resources with leadership qualities, ethical and moral values, research culture and innovative skills through higher education of global standards.

Misson

- To create excellent infrastructure facilities and state-of-the-art laboratories and incubation centers
- To provide student-centric learning environment through innovative pedagogy and education reforms
- To encourage research and entrepreneurship through collaborations and extension activities
- To promote industry-institute partnerships and share knowledge for innovation and development
- To organize society development programs for knowledge enhancement in thrust areas
- To enhance leadership qualities among the youth and enrich personality traits, promote patriotism and moral values.

Objectives

- Creation, preservation and dissemination of knowledge and attainment of excellence in different disciplines
- Smooth transition from teacher - centric focus to learner - centric processes and activities
- Performing all the functions of interest to its major constituents like faculty, staff, students and the society to reach leadership position
- Developing a sense of ethics in the University and Community, making it conscious of its obligations to the society and the nation
- Accepting the challenges of globalization to offer high quality education and other services in a competitive manner

ABOUT SCHOOL OF ALLIED HEALTH SCIENCES

The School of Allied Sciences offers graduate programs in Medical Laboratory Technology, Medical Radiology and Diagnostic Imaging, also Nutrition and Dietetics which are incredibly fascinating. It aims to attract talented youth and train them to acquire knowledge and skills useful to industrial sectors, research laboratories, and educational institutions. The school presently offers BSc Medical Radiology and Diagnostic Imaging, BSc Medical Laboratory Technology, BSc Nutrition and Dietetics and Diploma in Medial Laboratory Technology.
The School of Allied Health Sciences is shouldered by well qualified, experienced and highly committed faculty. The state-of-the-art infrastructure digital classrooms, well equipped laboratories, conference rooms and the serene academic atmosphere at REVA University will enhance the transfer as well as creation of knowledge. The school provides an interactive, collaborative peer tutoring environment that encourages students to break down complex problems and develop strategies for finding solutions across a variety of situations and disciplines. The school aims to develop a learning community of critical thinkers who serves as models of innovative problems solving in the university environment to enrich their academic and professional careers.

Vision

To nurture intellect, creativity, character and professionalism among students and impart contemporary knowledge in various branches of Biological and Allied health Sciences that are socially relevant and transform them to become global paramedical citizens.

Mission

1. Committed to provide students with well-equipped advanced laboratory and research facilities.
2. To provide highest quality learning environment, teaching methods, programme specific curriculum, and the changing patterns of skills that is demanded by modern health care.
3. To impart knowledge and skill-based training to create cadre of globally competent Biochemistry and Allied Health Care professionals.
4. To provide an opportunity to expose students to intellectual environment and a specialized body of knowledge
5. To develop their proficiency in laboratory techniques in collaboration with leading Heath sectors and Industries.
6. To improve the quality of life and society by teaching moral values and enhancing leadership qualities.

Values

- Excellence in all our academic and research endeavours
- Dedication and service to our stakeholders
- Leadership through innovation
- Accountability and transparency
- Creating conducive academic environment with service motto
- Integrity and intellectual honesty
- Ethical and moral behaviour
- Freedom of thought and expression
- Adaptability to the change
- Team-work.

"The constant questioning of our valuesand achievements is a challenge without which neither science nor society can remain healthy" **— Aage Niels Bohr**

Advisory Board

Sl.No.	Name of the Member	Designation
1	**Dr. Jayashree S** Professor & Head School of Biochemistry, REVA University jayashree.s@reva.edu.in 9880241577	Chairperson
2	**Dr. Sangeeta Pandey** Associate Professor Food Science & Nutrition Mount Carmel College, Bengaluru. pandey.sangeeta@yahoo.com 9535708708	External Member
3	**Dr. C S Vivek Babu** Principal Scientist, CFTRI, Mysore vivekbabu.cs@cftri.res.in 9448581704	External Member
4	**Dr. Keshamma E,** Assistant Professor of Biochemistry, Maharani Cluster University, Palace Road, Bangalore keshamma76@gmail.com 8660688950.	External Member
5	**Dr. Veera Raghavan** Professor School of Allied Health Sciences, REVA University veera.raghavan@reva.edu.in 9880241577	Internal Member
6	**Dr. Sharadamma N** Assistant Professor School of Allied Health Sciences, REVA University sharadamma.n@reva.edu.in 9502639348	Internal Member
7	**Prof. Pooja R Karkera** Assistant Professor School of Allied Health Sciences, REVA University poojar.karkera@reva.edu.in 9741224361	Internal Member

B. Sc Nutrition and Dietetics

Programme Overview

Nutrition science is the study of nutrients that are essential for growth, development and maintenance of good health throughout life. In the present scenario, society needs the awareness regarding their diet and also, people are becoming more nutrition conscious. The common man is gradually switching towards nutrition scientists and dietitians for scientifically proved information on Nutrition and Dietetics. Nutrition-related chronic diseases, are the most common cause of death in the world and present a great burden for society, particularly diseases such as obesity, diabetes, cardiovascular disease, cancer, dental disease, and osteoporosis. Making improvements in terms of diet and physical activity can help reduce the risk of these chronic diseases.

Currently food industry is focusing more on nutrient composition of the products such as calories, percentage of macronutrients, nutraceutical properties etc. Hence it is essential that Nutrition and Dietetics is offered at various levels of education in general and masters in particular. Here the student learns both the rudimentary and application aspects, which includes the investigation and analysis of the requirement along with the skills in dietetics. Job opportunities are wide in the field of nutrition both in public and private sector. Professionals can work at hospitals, fitness centers, food industries, self-employment (small scale industries), entrepreneurship, research and development etc.

Programme Educational Objectives (PEOs)

- To develop knowledge and skilled professionals to perform food and nutrition analysis using various anlytical tools at multi-centric facilities in India and abroad.
- To pursue successful industrial, academic and research careers in specialized fields of food technology.
- To edify students with necessary skills to perform various nutritional procedures in the domain of food and nutrition.
- To inculcate a problem-solving mindset of the students through healthcare and industrial exposure of real-world problems.
- To equip students with good laboratory practices pertaining to nutritional analysis procedures.

The Programme Educational Objectives are to prepare the students:

- State the importance of nutrition and dietics plays important role in health and treatment of the patient.
- Add new procedures and duties to his/her repertoire with ease using the basic knowledge acquired in the nutrition and dietics program and will demonstrate the ability to read and understand a procedure manual in order to perform analysis and testing.
- Utilize quality control methods and standards in maintaining accuracy and precision. Perform some basic preventative maintenance of equipment and instruments.
- Evaluate new methods and procedures with minimal assistance by applying knowledge of principles, procedures, and techniques.
- Recognize a problem and identify the cause; apply the problem-solving approach to situations including making decisions concerning the results of quality control and quality assurance measures.
- Communicate ideas and data and exhibit professional conduct through interpersonal skills with public, patients, and other healthcare professionals, Recognize the need to be responsible for his/her work and to respond to constructive criticism in a positive manner.
- Exhibit compassion and respect for the public and allied health care personnel.
-

- Attend continuing educational programs to establish and maintain continuing education as a function of growth and maintenance of professional competence. Follow established safety procedures in the performance of his/her duties in order to maintain a safe working environment for himself/herself and other employees.

Programme Educational Objectives (PEOs)

The programme educational objectives of the B.Sc Nutrition and Dietetics course is to prepare graduates to

PEO-1	Demonstrate problem solving skills in Performing routine in Nutrition and Dietetics Procedures by communicating effectively either leading a team or as a team member.
PEO-2	Express oral and written interpersonal skills as part of the team to understand, learn and advance their careers through research developments and seeking higher learning.
PEO-3	Understand the professional, ethical and social responsibilities through lifelong learning skills
PEO-4	Acquire higher degree of work in academics and research.

Programme Outcomes (POs)

PO1. Science Knowledge: Apply the knowledge of nutrition and dietetics for the solutions to the problems in various domains particularly for health care and food industries.

PO2. Problem analysis: Identify formulate and analyze problems related to food and nutrition domains of clinically relevant.

PO3. Conduct investigations of relevant problems: Comprehend, analyze, model and solve complex problems in the areas of malnutrition, geriatric nutrition and sports nutrition**.**

PO4. Modern tool usage: Utilize modern tools and modalities in the arena of food technology for better outcomes.

PO5: Environment and sustainability: Understand and appreciate the role of food and nutrition in the development of healthy society

PO6: Individual and team work: Recognize the need to expertise in the areas of nutrition and dietetics by self up gradation through life long learning.

PO7.Communication: Communicate with clarity and coherence, both written and verbally.

PO8. Ethics: Exibit professional responsibility in conducting standardized food analysis.

PO9. Project management and finance: Encourage collaborative learning and analyze the impact of radio diagnostic practices in a global, economic, environmental, and societal context

P10. Life long learning: Use latest computer techniques and tools to carry out scientific investigations and develop new solutions to solve nutritional problems related to society.

Programme Specific Outcomes (PSOs)

After successful completion of the programme, the graduates shall be able to

PSO1. Demonistrate the knowledge Nutrition and Dietics

PSO2. Apply the concepts in the design, development and implementation of application-oriented Nutrition and Dietetics solutions.

PSO3. Comprehend the fundamentals of Nutrition and Dietetics skills and undertake advanced level of knowledge to analyse and create techniques to solve real life problems.

REVA University Regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Science Graduate Degree Programs, 2020

(Framed as per the provisions under Section 35 (ii), Section 7 (x) and Section 8 (xvi) & (xxi) of the REVA University Act, 2012)

1. Title and Commencement:

1.1. These Regulations shall be called the **"REVA University Regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Under Graduate Degree Programs- 2020".**

1.2. These Regulations shall come into force from the date of assent of the Chancellor.

2. The Programs:

The following programs and all Graduate Degree programs to be instituted and introduced in REVA University in coming years shall follow these regulations.

B. Sc in:

Nutrition and Dietetics
Medical Radiology and Diagnostic Imaging
Medical Laboratory Technology

3. Definitions:

Course: Every course offered will have three components associated with the teaching-learning process of the course, namely:

- L= Lecture (ii) T= Tutorial (iii) P=Practice; where:

L stands for **Lecture** session consisting of classroom instruction.

T stands for **Tutorial** session consisting participatory discussion / self-study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands for **Practice** session and it consists of Hands on Experience / Laboratory Experiments / Field Studies / Case Studies that equip students to acquire the much required skill component.

4. Courses of study and Credits

4.1. The study of various subjects in B.Sc., degree program are grouped under various courses. Each of these course carries credits which are based on the number of hours of teaching and learning.

4.1.1. In terms of credits, every **one hour session of L amounts to 1 credit per Semester.**
In terms of credits, every **one hour session of L amounts to 1 credit per Semester** and a minimum of **two hour session of T or P amounts to 1 credit per Semester** over a period of one Semester of 16 weeks for teaching-learning process.

4.1.2. **The total duration of a semester is 20 weeks inclusive of semester-end examination.**

4.1.3. **A course shall have either or all the four components.** That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

4.1.4. The concerned BoS will assign Credit Pattern for every course based on the requirement. However, generally, courses can be assigned with 1-4 Credits depending on the size of the course.

4.1.5. Different **Courses of Study** are labelled and defined as follows:

Core Course:

A course which should compulsorily be studied by a candidate as a core-requirement is termed as a Core course. The CORE courses of Study are of THREE types, viz – (i) Foundation Course (ii) Hard Core Course, and (iiI) Soft Core Course.

a. **Foundation Course (FC)**
b. Foundation Courses are four courses including language study which are mandatory in nature prescribed by the University and should be completed successfully as part of Graduate Degree Program irrespective of the branch of study.
c. **Hard Core Course (HC):**

The **Hard Core Course** is a Core Course in the main branch of study and related branch (es) of study, if any that the candidates have to complete compulsorily.

d. **Soft Core Course (SC):**

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main branch of study or from a sister/related branch of study which supports the main branch of study.

e. **Open Elective Course:**

An elective course chosen generally from other discipline / subject, with an intention to seek exposure to the basics of subjects other than the main discipline the student is studying is called an O**pen Elective Course.**

f. **Clinical Postings /Internship/:**

Clinical Postings /Internship is a special course involving application of knowledge in solving / analysing /exploring a real life situation / difficult problem. An internship carrying **EIGHT** credits and Clinical postings with 2 to 4 credits on each semester. **Project work /Internship may be a hard core or a Soft Core as decided by the BoS / concerned.**

5. Eligibility for Admission:

Pass in PUC/10+2 examination with life science/Biology as compulsory subjects with minimum 45% marks (40% in case of candidate belonging to SC/ST category) in the above subjects taken together of any Board recognized by the respective State Government /Central Government/Union Territories or any other qualification recognized as equivalent thereto.

6. Scheme, Duration and Medium of Instructions:

6.1 The Three Year degree program is of 6 semesters (3 years) duration. A candidate can avail a maximum of 12 semesters (6 years) as per double duration norm, in one stretch to complete the ThreeYear Degree, including blank semesters, if any. Whenever a candidate opts fo blank semester, he/she has to study the prevailing courses offered by the School when he/she resumes his/her studies.

6.2. The medium of instruction shall be English.

7. Credits and Credit Distribution

7.1. A candidate has to earn 120 credits for successful completion of Three Year Degree B.Sc

Nutrition and Dietetics with a distribution of credits as given in Table - 1 below:

Table-1

Credits and Credit Distribution for ThreeYear degree programs

Course Type	**Credits for Three Year Degree (6 semesters)**
Hard Core Course	48
Core Courses	36
Ability Enhancement Course	4
Core Lab	30
RULO	2
Total	120

7.2. The concerned BOS based on the credits distribution pattern given above shall prescribe the credits to various types of courses and shall assign title to every course including project work, practical work, and field work, self-study elective, as **Foundation Course (FC), Hard Core (HC) or Open Elective (OE)**.

7.3. Every course including project work, practical work, Clinical Postings, self-study elective should be entitled as Foundation Course (FC), Hard Core (HC) or Soft Core (SC) or Open Elective (OE) by the BoS concerned.

However, following shall be the

RULO (REVA Unique Learning Offerings) courses with credits mentioned against them, common to all branches of study. However, the BOS of respective program/ discipline shall decide about the total credits for RULO courses.

RULO Courses		
Sl. No.	Course Title	Number of Credits
1	Sports, Yoga, Music, Dance, Theatre	2
2	Internship	0
3	Soft Skill Training	0
4	Skill Development Course	0
	Total	2

7.4. The concerned BOS shall specify the desired Program Objectives, Program Educational Objectives, Program Specific Outcomes and Course Outcomes while preparing the curriculum of a particular program.

7.5. A candidate can enrol for a maximum of 27 credits and a minimum of 21 credits per Semester. However, he / she may not successfully earn a maximum of 27 credits per semester. This maximum of 27 credits does not include the credits of courses carried forward by a candidate.

7.6. Only such full time candidates who register for a minimum prescribed number of credits in each semester from I semester to VI semester and complete successfully 144 credits in 6 successive semesters shall be considered for declaration of Ranks, Medals, Prizes and are eligible to apply for Student Fellowship, Scholarship, Free ships, and such other rewards / advantages which could be applicable for all full time students and for hostel facilities.

8. Add-on Proficiency Certification / Diploma:

8.1 Add- on Proficiency Certification:

To acquire Add on Proficiency Certification a candidate can opt to complete a minimum of 2 extra credits either in the same discipline /subject or in different discipline / subject in excess to 144 credits for the Three Year Graduate degree programs.

8.2 Add on Proficiency Diploma:

To acquire Add on Proficiency Diploma, a candidate can opt to complete a minimum of 2 extra credits either in the same discipline /subject or in different discipline / subject in excess to 144 credits for the Three Year Graduate degree programs.

The Add on Proficiency Certification / Diploma so issued to the candidate contains the courses studied and grades earned.

9. Assessment and Evaluation

a) Each course is assessed for a total weight of 100%. Out of the total 100% weight; 50% weight is for Continuous Internal Assessment (CIA or IA) and the remaining 50% for the Semester End Examination (SEE). This is applicable for theory, laboratory, workshop, studio and any such courses.

b) Out of 50% weight earmarked for Internal Assessment (IA)- 15% for test-1, 15% for test-2 and 20% for Assignments and this is applicable for theory based courses

c) The tests and assignments are conducted as per the semester academic calendar provided by the University.

The details as given in the table

Component	**Description**	**Conduction**	**Weight Percentage**
C1	**Test-1: IA1**	**6th week from the starting date of semester**	**15**
	Test-2: IA2	**12th week from the starting date of semester**	**15**
C2	**1 Assignment 1**	**7th week**	**10**
	2 Assignment 2	**13th week**	**10**
C3	**SEE including practical & Clinical Postings Report**	**between 17th Week-20th Week**	**50**
Results to be Announced			**By the end of 21st Week**

Note: IA or CIA includes C1 and C2

Each test must be conducted for a duration of 60 minutes, setting the test question paper for a maximum of 30 marks. The final examination must be conducted for a duration of 3 hours and the question paper must be set for a maximum of 100 marks.

d) Students are required to complete courses like technical skills, placement related courses, Open electives and any such value addition or specialized courses through online platforms like SWAYAM/NPTEL/Any other reputed online education aggregator. Students are required to choose the courses on the advice of their course coordinator/Director and required to submit the course completion certificate along with percentage of marks/grade scored in the assessment

e) conducted by the online education aggregator. If the online education aggregator has issued a certificate along with the grade or marks scored to students, such courses will be considered for SGPA calculations, in case the aggregator has issued only a certificate and not marks scored, then such courses will be graded through an examination by concerned School, in case, if grading is not possible, students will be given a pass grade and award the credit and the credits will not be considered for SGPA calculations. The Online/MOOCs courses will not have continuous internal assessment component.

Such of those students who would like to discontinue with the open elective course that they have already registered for earning required credits can do so, however, they need to complete the required credits by choosing an alternative open elective course.

Setting question paper and evaluation of answer scripts.

i. For SEE, three sets of question papers shall be set for each theory course out of which two sets will be by the internal examiners and one set will be by an external examiner. In subsequent years by carrying forward the unused question papers, an overall three sets of question papers should be managed and depending on the consumption of question papers either internal or external examiner be called for setting the question paper to maintain an overall tally of 3 papers with the conditioned mentioned earlier. The internal examiner who sets the question paper should have been course tutor

ii. The Chairman of BoE shall get the question papers set by internal and external examiners.

iii. The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation. It is the responsibility of the BoE to see that all questions contained in the question paper are within the prescribed syllabus of the concerned course.

iv. There shall be single valuation for all theory papers by internal examiners. However, there shall be moderation by the external examiner who has the subject background. In case no external examiner with subject background is available, a senior faculty member within the discipline shall be appointed as moderator.

v. The SEE examination for Practical work / Field work / Project work/Internship will be conducted jointly by internal and external examiners as detailed below: However, the BoE on its discretion can also permit two internal examiners.

vi. If a course is fully of (L=0):T:(P=0) type or a course is partly P type i.e, (L=3): (T=0) (P=1), then the examination for SEE component will be as decided by the BoS concerned.

10. Evaluation of Practical's and Minor Project / Major Project / Dissertation /Clinical Postings

10.3.1. A practical examination shall be assessed on the basis of:

a) Knowledge of relevant processes;

b) Skills and operations involved;

c) Results / products including calculation and reporting.

10.3.2. In case a course is fully of P type (L=0:T=0:P=4), the performance of a candidate shall be assessed for a maximum of 100 marks as explained below:

a) Continuous Internal assessment (CIA) = 50 marks

b) Semester end practical examination (SEE) = 50 marks.

The 25 marks for continuous assessment shall further be allocated as under (IA or CIA):

I	Conduction of regular practical throughout the semester	20 marks
Ii	Maintenance of lab records /industry reports	15 marks
Iii	Laboratory test and viva	15 marks
	Total	50 marks

The 50 marks meant for Semester End Examination, shall be allocated as under:

I	Conduction of semester end practical examination	30 marks
Ii	Write up about the experiment / practical conducted	10 marks
Iii	Viva Voce	10 marks
	Total	50 marks

10.3.3. The SEE for Practical work will be conducted jointly by internal and external examiners. However, if external examiner does not turn up, then both the examiners will be internal examiners.

10.3.4. In case a course is partly P type i.e, (L=3): (T=0) (P=1), then the examination for SEE component will be as decided by the BoS concerned.

10.3.5. The duration for semester-end practical examination shall be decided by the concerned School Board.

10.4. Evaluation of Internship/Clinical Postings:

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the supervisor. At the end of the semester, the candidate has to submit final report of the project / dissertation, as the case may be, for final evaluation. The components of evaluation are as follows:

1	Intership/Clinical Postings	Should be done a semester before the project semester	Weightage: 0%
2	Intership/Clinical Postings	7^{th} week from the start date of project semester	Weightage: 25%
3	Intership/Clinical Postings	14^{th} Week from the start date of project semester	Weightage: 25%
4	Intership/Clinical Postings	17^{th} -20^{th} Week of project Semester	Weightage: 30% for Dissertation Weightage : 20% for Final Viva Voce

11. Provision for Appeal

If a candidate is not satisfied with the evaluation of C1,C2 components, he/she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered

to levy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows:-

- The Registrar (Evaluation) - Ex-officio Chairman / Convener
- One Senior Faculty Member (other than those concerned with the evaluation of the course concerned) drawn from the school / department/discipline and/or from the sister schools / departments/sister disciplines – Member.
- One Senior Faculty Members / Subject Experts drawn from outside the University school / department – Member.

12. Eligibility to Appear Semester End Examination (SEE)

12.1. Only those students who fulfil a minimum of 75% attendance in aggregate of all the courses including practical courses / field visits etc, as part of the course(s), as provided in the succeeding sections, shall be eligible to appear for SEE examination.

12.2. Requirements to Pass a Course

Students are required to score a total minimum of 40% (Continuous Internal assessment and SEE) in each course offered by the University/ Department for a pass (other than online courses) with a minimum of 25% (12) marks in final examination.

13. Requirements to Pass the Semester

To pass the semester, a candidate has to secure minimum of 40% marks in each subject / course of the study prescribed in that semester.

13.1 Provision to Carry Forward the Failed Subjects / Courses:

A student who has failed in a given number of courses in odd and even semesters of first year shall move to third semester of second and final year of the study. However, he / she shall have to clear all courses of all semesters within the double duration, i. e., within sixyears of admission of the first semester failing which the student has to re-register to the entire program.

13.2. Provision to Withdraw Course:

A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a course, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is Soft Core Course or Open Elective Course. A DROPPED course is automatically considered as a course withdrawn.

13.3. **Re-Registration and Re-Admission:**

a) In case a candidate's class attendance in aggregate of all courses in a semester is less than 75% or as stipulated by the University, such a candidate is considered as dropped the semester and is not allowed to appear for end semester examination (C3) and he / she shall have to seek re-admission to that semester during subsequent semester / year within a stipulated period.

b) In such case where in a candidate drops all the courses in a semester due to personal reasons, it is considered that the candidate has dropped the semester and he / she shall seek re-admission to such dropped semester.

14. Attendance Requirement:

14.1 All students must attend every lecture, tutorial and practical classes, clinical postings.

14.2 In case a student is on approved leave of absence (e g:- representing the university in sports,

games or athletics, placement activities, NCC, NSS activities and such others) and / or any

other such contingencies like medical emergencies, the attendance requirement shall be minimum of 75% of the classes taught.

a) Any student with less than 75% of attendance in aggregate of all the courses including practical courses / field visits etc, during a semester shall not be permitted to appear to the end semester (C4) examination and such student shall seek re-admission as provided in 7.8.4.

b) Teachers offering the courses will place the above details in the School Board meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Director of the School before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Registrar & Registrar (Evaluation).

15. Absence during Mid Semester Examination:

In case a student has been absent from a mid-semester (C1, C2) examination due to the illness or other contingencies he / she may give a request along with necessary supporting documents and certification from the concerned class teacher / authorized personnel to the concerned Head of the School, for make-up examination. The Head of the School may consider such request depending on the merit of the case and after consultation with course instructor and class teacher, and arrange to conduct a special test for such candidate(s) well in advance before the C3 examination of that respective semester. Under no circumstances C1, C2 test shall be held after C3 examination.

16. Grade Card and Grade Point

16.1. Provisional Grade Card: The tentative / provisional grade card will be issued by the Registrar (Evaluation) at the end of every semester indicating the courses completed successfully. The provisional grade card provides **Semester Grade Point Average** (SGPA).

16.2. Final Grade Card: Upon successful completion of M.Sc., Degree a Final Grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Registrar (Evaluation).

16.3. The Grade and the Grade Point: The Grade and the Grade Point earned by the candidate in the subject will be as given below.

Marks P	Grade G	Grade Point (GP=V x G)	Letter Grade
90 >100	10	v*10	O
80 > 90	9	v*9	A+
70 > 80	8	v*8	A
60 > 70	7	v*7	B+
55 > 60	6	v*6	B
50 > 55	5.5	V*5.5	C +
40 > 50	5	v*5	P
0-40	0	v*0	F
ABSENT			AB

O - Outstanding; A-Excellent; B-Very Good; C-Good; D-Fair; E-Satisfactory; F – Fail

Here, P is the percentage of marks (P=[C1+C2+C3]) secured by a candidate in a course which is

rounded to nearest integer. V is the credit value of course. G is the grade and GP is the grade point.

16.3.1. Computation of SGPA and CGPA

The Following procedure to compute the Semester Grade Point Average (SGPA)

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student in a given semester, i.e:

SGPA (Si) = ∑(Ci x Gi) / ∑Ci where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

Illustration for Computation of SGPA and CGPA

Illustration No. 1

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course 1	4	A+	9	4X9=36
Course 2	4	A	8	4X8=32
Course 3	3	B+	7	3X7=21
Course 4	3	O	10	3X10=30
Course 5	3	P	5	3X5=15
Course 6	3	B	6	3X6=18
Course 7	2	O	10	2X10=20
Course 8	2	A	8	2X8=16
	24			188

Thus, **SGPA = 188 ÷ 24 = 7.83**

Illustration No. 2

Course	Credit	Grade letter	Grade Point	Credit Point (Credit x Grade point)
Course 1	4	A	8	4X8=32
Course 2	4	B+	7	4X7=28
Course 3	3	A+	9	3X9=27
Course 4	3	B+	7	3X7=21
Course 5	3	B	6	3X6=18
Course 6	3	P	5	3X5=15
Course 7	2	B+	7	2X7=21
Course 8	2	O	10	2X10=20
	24			175

Thus, **SGPA = 175 ÷ 24 = 7.29**

Illustration No.3

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade point)
Course 1	4	O	10	4 x 10 = 40
Course 2	4	A+	9	4 x 9 = 36
Course 3	3	B+	7	3 x 7 = 21
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	B+	7	3 x 7 = 21
Course 7	2	A+	9	2 x 9 = 18
Course 8	2	A+	9	2 x 9 = 18
	24			199

Thus**, SGPA = 199 ÷ 24 = 8.29**

Cumulative Grade Point Average (CGPA):

Overall Cumulative Grade Point Average (CGPA) of a candidate after successful completion of the required number of credits (96) for Two year Post Graduate degree program is calculated taking into account all the courses undergone by a student over all the semesters of a program i. e.,

$CGPA = \sum(Ci \times Si) / \sum Ci$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration: No.1

CGPA after Final Semester

Semester (ith)	No. of Credits (Ci)	SGPA (Si)	Credits x SGPA (Ci X Si)
1	24	6.83	24 x 6.83 = 163.92
2	24	7.71	24 x 7.71 = 185.04
3	24	8.68	24 x 8.68 = 208.32
4	24	9.20	24 x 9.20 = 220.80
Cumulative	96		778.08

Thus, CGPA = 24x6.83+24x7.13+24x8.68+24x9.20 = 8.11

16.3.2. CONVERSION OF GRADES INTO PERCENTAGE:

Conversion formula for the conversion of CGPA into Percentage is:

Percentage of marks scored = CGPA Earned x 10

Illustration: CGPA Earned 8.10 x 10=81.0

16.3.3. Classification of Results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	Grade (Numerical Index) G	Letter Grade	Performance	FGP Qualitative Index
9 >= CGPA 10	10	O	Outstanding	Distinction
8 >= CGPA < 9	9	A+	Excellent	
7 >= CGPA < 8	8	A	Very Good	First Class
6 >= CGPA < 7	7	B+	Good	
5.5> = CGPA < 6	6	B	Above average	Second Class
> 5 CGPA < 5.5	5.5	C	Average	
> 4 CGPA <5	5	P	Pass	Satisfactory

Overall percentage=10*CGPA

17. Challenge Valuation

a. A student who desires to apply for challenge valuation shall obtain a photo copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 10 days after the announcement of the results. This challenge valuation is only for SEE.

The answer scripts for which challenge valuation is sought for shall be evaluated by the external examiner who has not involved in the first evaluation. The higher of two marks from first valuation and challenge valuation shall be the final.

b. With regard to any specific case of ambiguity and unsolved problem, the decision of the Vice-Chancellor shall be final.

Mapping of PEOS with Respect to Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PE01	√	√	√	√	√	√	√	√	√	√
PE02	√	√	√	√	√	√	√	√	√	√
PE03	√	√	√	√	√	√	√	√	√	√
PE04	√	√	√	√	√	√	√	√	√	√

Attainment of CO (Course Outcome)

CO Attainment	Value
0.4 - 0.6	1
0.6 – 0.75	2
> 0.75	3

Mapping of Course Outcomes with programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3

B21AHE102	CO1	3	2	3	3	3	2	2	2			2	1	1
	CO2	2	3	1	3	1	3	2	2			1	1	1
	CO3	1	2	2	3	1	3	3	3			2	1	2
	CO4	3	3	2	3	1	3	2	3			1		2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0101	CO1	2	3	3	3	1	2	2	3			2	1	2
	CO2	3	2	3	3	1	2	2	3			2	2	1
	CO3	2	2	3	3	2	1	3	3			1	1	2
	CO4	3	3	2	3	1	1	3	2			2	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0102	CO1	2	3	2	3	1	3	1	1			1	2	2
	CO2	2	3	3	3	1	1	2	3			2	2	2
	CO3	3	3	3	2	1	1	2	1			1	2	1
	CO4	3	2	1	3	1	3	2	3			1	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0103	CO1	3	1	3	3	2	1	3	2			1	1	1
	CO2	3	3	2	3	1	1	2	3			1	2	2
	CO3	2	3	2	3	2	1	2	3			2	1	1
	CO4	1	3	2	3	2	3	2	3			2	2	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0104	CO1	3	3	1	2	1	1	2	---			1	1	1
	CO2	2	2	1	--	--	--	1	--			1	1	2
	CO3	3	2	1	2	--	1	1	--			2	2	2
	CO4	3	3	2	3	--	1	1	--			2	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0105	CO1	1	1	3	3	1	1	--	--	--	1	3	1	1
	CO2	2	1	3	3	1	3	2	--	--	--	3	1	1
	CO3	2	1	3	3	1	2	2	3	--	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	--	3	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0106	CO1	1	1	3	3	1	1	--	--	--	1	3	1	2
	CO2	3	1	2	3	1	2	2	--	--	--	3	2	3
	CO3	2	1	3	2	1	2	1	2	--	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0107	CO1	1	1	3	3	1	1	--	2	--	1	3	2	2
	CO2	2	1	3	3	1	3	2	--	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	--	--	3	3	3
	CO4	2	1	2	3	2	2	1	3	--	--	3	2	3
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21LHM201	CO1	2	2	3	3	1	2	3	1			1	1	2
	CO2	3	2	2	3	3	2	2	2			2		1

	CO3	2	3	3	3	3	2	3	3			2	1	2
	CO4	1	3	3	3	2	2	3	3			1		2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0201	CO1	3	2	3	3	2	1	1	2			1	1	2
	CO2	2	3	2	3	1	1	3	2			2	1	2
	CO3	2	2	3	3	1	2	3	2			2	2	2
	CO4	2	3	3	3	2	3	3	3			2	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0202	CO1	3	2	2	2	1	1	2	3			2	1	2
	CO2	3	3	2	3	2	1	2	3			1	2	2
	CO3	2	3	2	3	1	2	2	2			1	1	2
	CO4	2	2	2	3	2	3	2	3			1	2	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0203	CO1	3	1	1	3	1	2	2	1			2	1	1
	CO2	3	1	1	3	1	2	2	1			1	1	2
	CO3	3	1	1	3	1	2	3	1			1	1	1
	CO4	3	1	1	3	1	2	2	1			2	2	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0204	CO1	3	2	1	3	1	1	2	2			2	2	1
	CO2	3	2	2	3	1	1	2	2			1	2	2
	CO3	3	3	3	2	2	2	3	3			1	2	2
	CO4	2	3	3	3	2	2	3	3			2	2	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0205	CO1	1	2	3	3	1	1	1	--	--	1	3	1	1
	CO2	2	1	3	3	1	3	2	--	--	--	3	1	1
	CO3	2	2	3	1	1	2	2	2	--	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	--	3	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0206	CO1	1	1	3	3	1	1	1	--	--	1	3	1	2
	CO2	3	1	2	2	1	2	2	--	--	--	3	2	3
	CO3	2	2	3	2	1	2	1	2	--	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0207	CO1	1	1	3	3	1	1	1	2	--	1	3	2	2
	CO2	2	2	3	2	1	3	2	1	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	--	--	3	3	3
	CO4	2	1	2	3	2	2	1	3	--	--	3	2	3
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0301	CO1	3	1	2	2	--	1	1	--			1	1	2
	CO2	3	2	2	3	--	1	2	--			1	2	1
	CO3	3	3	2	1	--	1	2	--			2	1	2
	CO4	3	3	2	3	--	1	2	--			1	1	2

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0302	CO1	1	3	2	2	3	2	3	3			1	1	2
	CO2	1	3	3	3	1	1	3	3			2	2	1
	CO3	1	3	3	3	1	2	2	3			1	1	2
	CO4	2	3	2	3	1	2	2	2			2	2	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0303	CO1	3	3	2	3	1	1	2	3			1		2
	CO2	3	3	2	3	1	1	2	3			2	1	2
	CO3	3	3	2	3	1	1	2	3			2	1	1
	CO4	3	3	2	3	1	1	2	3			1	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0304	CO1	3	3	2	3	3	2	1	2			1	2	2
	CO2	3	3	2	3	3	2	1	2			2	2	2
	CO3	3	3	2	3	2	3	1	2			2	1	1
	CO4	3	3	2	3	2	3	1	2			2	2	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0305	CO1	3	1	1	1	1	1	1	--			1	1	2
	CO2	3	1	1	2	1	1	2	--			2	2	1
	CO3	2	3	2	2	--	1	2	--			1	1	2
	CO4	1	3	3	3	--	1	2	--			2	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0306	CO1	1	2	3	3	1	1	1	1	1	1	3	1	1
	CO2	2	1	3	3	1	3	2	1	1	--	3	1	1
	CO3	2	2	3	1	1	2	2	2	1	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	1	3	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0307	CO1	1	1	3	3	1	1	1	1	--	1	3	1	2
	CO2	3	1	2	2	1	2	2	1	--	1	3	2	3
	CO3	2	2	3	2	1	2	1	2	1	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0308	CO1	1	1	2	3	1	1	1	2	1	1	3	2	2
	CO2	2	2	3	2	2	3	2	1	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	1	1	3	3	3
	CO4	2	1	2	2	3	2	1	3	--	1	3	2	3
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HS0401	CO1	2	1	1	1				2			2	1	1
	CO2	2	1	2	1	2			2			2	2	2
	CO3	3	2	1	1		1					2	2	2
	CO4	2	1	2	1	2			1			2	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3

B21HC0401	CO1	3	3	3	3	1	1	3	2			2	1	1
	CO2	3	2	1	3	1	3	1	3			2	1	2
	CO3	3	1	1	3	1	3	1	2			2	2	1
	CO4	3	3	3	3	1	3	2	3			1	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0402	CO1	3	3	2	2	1	2	2	2			2	2	1
	CO2	3	3	2	2	1	3	2	2			1	1	2
	CO3	3	3	1	2	1	2	3	3			2	1	2
	CO4	3	3	1	2	1	3	3	3			2	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0403	CO1	1	3	2	2	--	1	2	--			2	1	1
	CO2	1	3	3	2	--	--	1	--			2	2	1
	CO3	2	3	2	3	--	--	--	--			1	1	2
	CO4	2	3	2	3	--	--	--	--			1	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0404	CO1	3	3	2	3	1	2	2	3			1	1	2
	CO2	3	3	2	3	1	2	2	3			2	2	1
	CO3	3	3	1	3	1	1	2	2			1	1	2
	CO4	3	3	1	3	1	1	2	2			2	2	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0405	CO1	1	2	3	3	1	1	1	1	1	1	3	1	1
	CO2	2	1	3	3	1	3	2	2	2	1	2	1	1
	CO3	2	2	3	1	1	2	2	2	1	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	1	1	3	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0406	CO1	1	1	3	3	1	1	1	1	--	1	3	1	2
	CO2	3	1	2	2	1	2	2	1	1	1	3	2	3
	CO3	2	2	3	2	1	2	1	2	1	--	1	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0407	CO1	1	1	2	3	2	1	1	2	1	1	2	2	2
	CO2	2	2	3	2	2	3	2	1	1	--	3	3	2
	CO3	2	2	1	3	1	2	2	2	1	1	3	3	3
	CO4	2	1	2	2	3	2	1	3	1	1	3	2	3
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0501	CO1	3	2	3	3	1	1	2	3			1	1	2
	CO2	2	3	2	3	1	1	2	3			2	2	1
	CO3	3	3	2	2	1	1	2	3			1	1	2
	CO4	2	3	1	3	1	1	2	3			1	2	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0502	CO1	3	2	2	1	--	1	--	--			1	2	2
	CO2	2	2	2	2	--	--	--	--			2	2	1

	CO3	3	1	1	2	--	1	1	--			1	1	2
	CO4	2	3	3	1	--	1	--	--			1	2	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0503	CO1	3	3	2	1	1	1	2	3			1	2	2
	CO2	2	3	3	2	1	1	2	2			1	1	2
	CO3	3	2	3	1	1	2	3	2			1	1	1
	CO4	2	3	2	1	1	1	2	2			2		1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0504	CO1	3	3	1	3	1	2	3	1			1	2	1
	CO2	3	3	1	3	1	2	3	1			1	1	2
	CO3	3	3	1	3	1	2	3	1			1	2	2
	CO4	3	3	1	3	1	2	3	1			1	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0505	CO1	1	3	2	2	--	--	1	--			2	2	2
	CO2	1	3	3	2	--	--	1	--			1	2	1
	CO3	2	2	2	2	--	1	1	--			2		1
	CO4	1	2	2	1	--	--	1	--			1	2	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
B21HC0506	CO1	1	1	3	3	1	1	--	--	--	1	3	1	1
	CO2	2	1	3	3	1	3	2	--	--	--	3	1	1
	CO3	2	1	3	3	1	2	2	3	--	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	--	3	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0507	CO1	1	1	3	3	1	1	--	--	--	1	3	1	2
	CO2	3	1	2	3	1	2	2	--	--	--	3	2	3
	CO3	2	1	3	2	1	2	1	2	--	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0508	CO1	1	1	3	3	1	1	--	2	--	1	3	2	2
	CO2	2	1	3	3	1	3	2	--	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	--	--	3	3	3
	CO4	2	1	2	3	2	2	1	3	--	--	3	2	3
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0601	CO1	3	1	1	3	1	2	2	1			2	1	2
	CO2	3	1	1	3	1	2	2	1			2		1
	CO3	3	1	1	3	1	2	2	1			2	2	1
	CO4	3	2	3	3	1	1	2	3			2	1	1
Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0602	CO1	3	2	2	3	1	2	3	3			1	1	1
	CO2	2	3	3	3	1	3	2	2			1	1	2
	CO3	3	2	3	3	1	2	2	3			2	1	1
	CO4	2	3	3	3	1	2	2	3			2	1	1

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0603	CO1	3	1	1	1	--	--	--	--			1	1	2
	CO2	2	3	2	2	1	--	1	--			2	1	1
	CO3	3	3	2	2	--	--	--	--			2	1	1
	CO4	3	1	1	2	--	--	--	--			2	2	1
Course Code	POs/ Cos	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0604	CO1	1					3	2	2			2	1	1
	CO2						2		2			2		1
	CO3	1					3	2	2			2	1	1
	CO4						2		2			2		1

Mapping of PEOs with Respect to POs

	PO1	P2	PO3	PO4	PO5	PO6	P7	PO8	PO9	PO 10	PSO1	PSO2	PSO3
PEO1	√	√	√	√	√	√	√	√	√	√	√	√	√
PEO2	√	√	√	√	√	√	√	√	√	√	√	√	√
PEO3	√	√	√	√	√	√	√	√	√	√	√	√	√
PEO4	√	√	√	√	√	√	√	√	√	√	√	√	√

B. Sc (Nutrition and Dietetics)

Scheme of Instruction and Detailed Syllabus

(Effective from the Academic Year 2021-24)

CC = Core Course; SEC= Skill Enhancement Course; HC = Hard Course

CL=Core Lab; AEC = Ability Enhancement Course

Scheme of Instruction **Duration: 6 Semesters (3 Years)**

FIRST SEMESTER

SL.	Course Code	Title of the Course	CC/FC/ HC/SC	Credit Pattern				Hours
				L	T	P	Total	
1	B21AHE102	Communicative English	FC	2	0	0	2	3
2	B21HC0101	Introduction to Food and nutrition	CC	2	1	0	3	4
3	B21HC0102	Human physiology-I	CC	2	1	0	3	4
4	B21HC0103	Instrumentation and Food analysis	HC	2	1	0	3	4
5	B21HC0104	Fundamentals of Food Science	HC	2	1	0	3	4

		Practicals						
6	B21HC0105	Human Physiology -I	HC	0	0	2	2	3
7	B21HC0106	Nutritional biochemistry-I	HC	0	0	2	2	3
8	B21HC0107	Fundamentals of Food Science	HC	0	0	2	2	3
Total Credits				**10**	**4**	**6**	**20**	**28**
SECOND SEMESTER								
1	B21LHM201	Constitution of India & Professional Ethics	MC	0	0	0	0	3
2	B21HC0201	Human Nutrition & Family Meal Management	HC	3	1	0	4	4
3	B21HC0202	Fundamentals of Nutritional biochemistry	HC	2	1	0	3	4
4	B21HC0203	Human physiology -II	CC	2	1	0	3	4
5	B21HC0204	Food Sanitation	HC	3	1	0	4	4
		Practicals						
6	B21HC0205	Nutritional biochemistry - II	CL	0	0	2	2	3
7	B21HC0206	Human Nutrition & Family Meal Management	CL	0	0	2	2	3
8	B21HC0207	Food sanitation	CL	0	0	2	2	3
Total Credits				**10**	**4**	**6**	**20**	**28**
THIRD SEMESTER								
1	B21HC0301	Nutrition and health education	SEC	2	0	0	2	3
2	B21HC0302	Nutraceutical and functional food	HC	2	1	0	3	4
3	B21HC0303	Food Microbiology	HC	2	1	0	3	4
4	B21HC0304	Community and Public Health Nutrition	CC	2	1	0	3	4
5	B21HC0305	Clinical Nutrition -I	CC	2	1	0	3	4
		Practicals						

6	B21HC0306	Food Microbiology	HC	0	0	2	2	3
7	B21HC0307	Community and Public Health Nutrition	HC	0	0	2	2	3
8	B21HC0308	Clinical Nutrition-I	HC	0	0	2	2	3
Total Credits				**10**	**4**	**6**	**20**	**28**
FOURTH SEMESTER								
1	B21HS0401	Environmental Science and Health	SEC	2	0	0	2	3
2	B21HC0401	Food Service Management	CC	2	1	0	3	4
3	B21HC0402	Food Product Development and Quality control	CC	2	1	0	3	4
4	B21HC0403	Bakery Science	HC	2	1	0	3	4
5	B21HC0404	Food Packaging	HC	2	1	0	3	4
		Practicals						
6	B21HC0405	Bakery Science	HC	0	0	2	2	3
7	B21HC0406	Food Product Development	HC	0	0	2	2	3
8	B21HC0407	Food Service Management	HC	0	0	2	2	3
Total Credits				**10**	**4**	**6**	**20**	**28**
FIFTH SEMESTER								
1	B21HC0501	Nutrition for Sports and Exercise	CC	2	0	0	2	4
2	B21HC0502	Food Processing	CC	2	0	0	2	4
3	B21HC0503	Basics of Bio Informatics	HC	2	0	0	2	4
4	B21HC0504	Quality Food Service and Physical Facilities	HC	2	1	0	3	4
5	B21HC0505	Clinical Nutrition - II	HC	2	1	0	3	3
6	B21HCON01	SWAYAM/ MOOC	SEC	2	0	0	2	4
		Practicals						
7	B21HC0506	Assesment of Food Quality	HC	0	0	2	2	3

8	B21HC0507	Clinical Nutrition - II	HC	0	0	2	2	3
9	B21HC0508	Nutrition for Sports and Exercise	HC	0	0	2	2	3
Total Credits				**10**	**4**	**6**	**20**	**32**
SIXTH SEMESTER								
1	B21HC0601	Nutrition Counseling	CC	2	1	0	3	4
2	B21HC0602	Entrepreneurship development	CC	2	0	0	2	3
3	B21HC0603	Project work	HC	0	0	10	10	15
4	B21HC0604	Internship	HC	0	0	5	5	6
Total Credits				**4**	**1**	**15**	**20**	**28**
Total Credits of all Semesters							**120**	**172**

DETAILED SYLLABUS
SEMESTER I:

B21AHE102	**Communicative English**	**L**	**T**	**P**	**C**
Duration: 3hrs/wk		**2**	**0**	**0**	**2**

Prerequisites:

Knowledge of intermediate English Grammar and LSRW skills

Course objectives:

1. To develop basic communication skills in English for the learners of Bachelor of Science.
2. To prioritize listening and reading skills among the learners.
3. To simplify writing skills needed for academic as well as workplace context.
4. To examine that the learners use the electronic media such as internet and supplement the learning materials used in the classroom.

Course outcome: On completion of the course, students will be able to:

On completion of the course, students will be able to:

CO1. Interpret audio files and comprehend different spoken discourses/ excerpts in different accents (Listening Skills).

CO2. Demonstrate speaking ability with clarity, confidence and comprehension and communicate with one or many listeners using appropriate communicative strategies (Speaking Skills).

CO3. Make use of reading different genres of texts adopting various reading strategies (Reading Skills).

CO4. Develop the ability to write cohesively, coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic (Writing Skills).

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2	PSO3
B21AHE102	CO1	3	2	3	3	3	2	2	2			2	1	1
	CO2	2	3	1	3	1	3	2	2			1	1	1
	CO3	1	2	2	3	1	3	3	3			2	1	2
	CO4	3	3	2	3	1	3	2	3			1		2

Course Content: **Total Hours: 26 hrs**

Unit-I: Functional English

7 Hours

Remedial Grammar: Past Simple; Past Continuous; Irregular Verbs
Writing Skills: Paragraph Writing
Activities: Conversations; Leaving Phone Messages
Literature: Chief Seattle – The End of Leaving and Beginning of Survival

Unit-II: Interpersonal Skills

6 Hours

Remedial Grammar: Present Simple & Present Continuous; Activity & State Verbs
Writing Skills: Official Letters
Activities: Making Apologies; Invitations & Making Arrangements
Literature: Ruskin Bond – Tiger in the Tunnel

Unit-III: Multitasking Skills

6 Hours

Remedial Grammar: Present Perfect; For, Since & How Long; -ed & -ing adjectives; Prefix Opposites of Adjectives
Writing Skills: Note Making
Activities: Agreeing & Disagreeing with Opinions
Literature: Jesse Owens - My Greatest Olympic Prize

Unit-IV: Communication Skills

6 Hours

Remedial Grammar: Collocations; Prepositions
Writing Skills: Precise Writing
Activities: Offers, Suggestions & Requests
Literature: Avijit Pathak – Onscreen Magic

Reference Books:

1. Green, David. *Contemporary English Grammar Structures and Composition*. New Delhi: MacMillan Publishers, 2010.
2. Thorpe, Edgar and Showick Thorpe. *Basic Vocabulary*. Pearson Education India, 2012.
3. Leech, Geoffrey and Jan Svartvik. *A Communicative Grammar of English*. Longman, 2003.
4. Murphy, Raymond. *Murphy's English Grammar with CD*. Cambridge University Press, 2004.

5. Rizvi, M. Ashraf. *Effective Technical Communication*. New Delhi: Tata McGraw-Hill, 2005.
6. Riordan, Daniel. Technical Communication. New Delhi: Cengage Publications, 2011.
7. Sen et al. Communication and Language Skills. Cambridge University Press, 2015.

B21HC0101	Introduction to Food and Nutrition	L	T	P	C
Duration: 3 hrs/wk		2	1	0	3

Prerequisites:
Knowledge of basic concept of food, Nutrients and Nutrition

Course objectives:
1. To understand the functions and role of nutrients, their requirements and the effect of deficiency and excess (in brief)
2. To understand the concept of an adequate diet and the importance of nutrients in recommended Dietary Allowances, Estimated Average Requirement (EAR)

Course outcome: On completion of the course, students will be able to:
CO1 . understand the functions and role of different nutrients, their role in making foods choices and obtaining an adequate diet.
CO2 . able to apply basic nutrition knowledge on macronutrients, their requirements and the effect of deficiency and excess
CO3 . gain knowledge about energy requirements and the Recommended Dietary Allowances.
CO4 . able to learn the importance of various vitamins & minerals in maintaining health.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0101	CO1	2	3	3	3	1	2	2	3			2	1	2
	CO2	3	2	3	3	1	2	2	3			2	2	1
	CO3	2	2	3	3	2	1	3	3			1	1	2
	CO4	3	3	2	3	1	1	3	2			2	1	1

Course Content: **Total Hours: 48 hrs**

UNIT-I **12 Hrs**

Science of Nutrition, Concept of Nutrition- Definition of nutrition, health, nutritional status and Malnutrition. Food Adulteration, Food Laws, Food Guide, RDA- Definition, factors affecting RDA and methods used for deriving RDA, concept of EAR and my plate.

Carbohydrates - Definition, composition, functions, maintenance of blood sugar levels, requirement, sources, digestion and absorption; Dietary fiber- Definition, classification, physiological effects and sources.

UNIT-II **12 Hrs**

Proteins- Definition, composition, nutritional classification of proteins and amino acids, functions, sources, requirements, digestion and absorption. Evaluation of protein quality: PER, BV, NPU and Chemical score.
Lipids- Definition, composition, functions, sources, requirements, digestion and absorption. Essential fatty acids – Definition, functions, sources and effects of deficiency.

UNIT- III **12 Hrs**

Energy- Definition, units of measurement, direct and indirect calorimetry; Determination of energy value of food, Total Energy requirement, Factors affecting physical activity, Factors affecting Basal Metabolic Rate, factors affecting Thermic effect of food, Recommended Dietary Allowances and Sources

UNIT- IV **12 Hrs**

Macro Minerals- Calcium and Phosphorous: Functions, requirements, sources and effects of deficiency. Micro minerals- Iron, Iodine, Copper, Fluorine and Zinc: Functions, sources, requirements and effects of deficiency. Sodium and Potassium: Functions, sources, requirements and effects of imbalances.
Fat soluble Vitamins – Vitamin A, D, E and K: Functions, requirements, sources and effects of deficiency. Water Soluble Vitamins – Thiamine, riboflavin, niacin, ascorbic acid, folic acid, vitamin B6 and vitamin B12: Functions, requirements, sources and effects of deficiency.

REFERENCES:

1. Sumathi R. Mudambi, Rajagopal, M.V., Fundametals of Foods and Nutrition, New Age International (P) Ltd, Publishers, Third edition, 1997.
2. Srilakshmi B., Nutrition Science, New Age International (P) Ltd, Publishers, Fifth multi colour edition, 2016.
3. Mangala Kango, Normal Nutrition, Curing diseases through diet, CBS Publications, First edition, 2005.
4. Paul.S., Text Book of Bio-Nutrition, Fundamental and Management, RBSA Publishers, 2003.
5. Sue Rodwell Williams, Nutrition and Diet Therapy, C.V. Melskey Co., 6th edition, 2000.
6. Mahtab. S.Bamji, Kamala Krishnaswamy and G.N.V Brahmam, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition. 2009.
7. ICMR short report on RDA and EAR 2020.

B21HC0102	**Human Physiology - I**	L	T	P	C
Duration: 3 hrs/wk		**2**	**1**	**0**	**3**

Prerequisites:

Knowledge of basic concept of human organs and system

Course Objective:

1. To understand the structure and functions of cell

2. To understand the structure and functions of different organ systems and their influence on nutrition

Course Outcome: On completion of the course, students will be able to:

CO1. learn about structures and function of basic unit of life: cell, components of blood cell, blood component, lymphatic system and related lab technique. Able to understand cardiovascular system, cardiac cycle, blood pressure & heart rate

CO2. Achieve knowledge about Nervous system, It's various part and their function. It's complex mode of action, synapse, reflex

CO3. will acquire active knowledge of muscle and bones and their components.

CO4. Able to understand the physiology and working principle of excretory system.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0102	CO1	2	3	2	3	1	3	1	1			1	2	2
	CO2	2	3	3	3	1	1	2	3			2	2	2
	CO3	3	3	3	2	1	1	2	1			1	2	1
	CO4	3	2	1	3	1	3	2	3			1	1	2

Course Content: **Total Hours: 48 hrs**

UNIT- I **12 Hours**

Unit of Life: Structure and functions of cell with special reference to Plasma membrane (Fluid Mosaic Model), Mitochondria, Ribosome, Endoplasmic reticulum. Nucleus (nuclear membrane, nuclear chromatin and nucleolus). Nucleotide, Homeostasis, Positive and negative feedback, classification and functions of basic tissues

Blood & Circulatory system: Composition, Functions, Hemopoiesis, Erythropoiesis, Anemia, Haemostasis, Blood groups. Circulatory System: Functional anatomy of the heart, Properties of cardiac muscles, Conducting system of the heart, Pressure changes during cardiac cycles, , Arterial and venous blood pressure. Hypertension: Definition & types

UNIT- II **12 Hours**

Nervous System:

Structure of Neuron, Nerve Impulse, Myelinated & non-Myelinated nerve, CNS & PNS. Brief account of resting, Membrane Potential, Action Potential & conduction of Nerve impulse,

Neurotransmitters- definition, classification, synapse: chemical Synapse (Excitatory, Inhibitory), Electrical Synapse, Concept on sympathetic and parasympathetic nervous system

UNIT- III **12 Hours**

Muscular System:

Muscle Types, Gross structure, Functional differences with reference to Properties, Muscular Contraction and Relaxation, Energy sources, Neuromuscular junction, Sarcotubular system, smooth Muscle, Mechanism of Contraction. Formation and functions of muscles, Mechanism of muscle contraction, isometric and isotonic muscle contraction

UNIT -IV **12 Hours**

Excretory System: Structure and functional unit of kidney, kidney hormones, regulation of acid-base balance, electrolyte and water balance. Mechanism of urine formation and composition of urine. Urine analysis for abnormal constituents, tubular function tests. Nephritis and nephrosis. Dialysis

REFERENCES:

1. Ross & Wilson, (2014),Anatomy & Physiology in health & illness,11th edition, ElsevierPublications
2. Sujit Chaudhury,(2011),Concise Medical Physiology,6th edition,NCBA
3. Sembulingam k,(2012),Essentials of Medical Physiology,6th edition, Jaypee Publications
4. GuytonandHall,(2011)TextbookofMedicalPhysiology,12th Edition,Saunder/Elsevier
    a. Gerard J. Tortora and Bryan H.Derrickson,(Principles of Anatomy andPhysiology, 14th edition, Wileypublications
5. Textbook of Medical Physiology by G.K.Pal.

B21HC0103	Instrumentation and Food Analysis	L	T	P	C
Duration: 3 hrs/wk		2	1	0	3

Prerequisites:
Knowledge of basic physical chemistry

Course objective:
1. The objective of the course is to understand the principle, instrumentation and application of various analytical techniques used for biochemical characterizations.
2. To understand working Principle and theory of analytical chemistry applied in food science & Nuritional Biochemistry

Course Outcomes: After completing the course the student shall be able to:
CO1. Learn Principle, working, care & maintenance and calibration of different instruments required for food chemistry
CO2. gain knownledge on chemistry of solution, P^H, Buffers, indicators

CO3. learn about theory and principles of Proximate analysis of food

CO4. Get knowledge on working principle of qualitative and quantitative analysis of Macronutrients, elementary knowledge of food pigments and analysis of enzymes

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0103	CO1	3	1	3	3	2	1	3	2			1	1	1
	CO2	3	3	2	3	1	1	2	3			1	2	2
	CO3	2	3	2	3	2	1	2	3			2	1	1
	CO4	1	3	2	3	2	3	2	3			2	2	1

Course Content: **Total Hours: 48 hrs**

UNIT-I **12 Hours**

Instruments (Theory and demonstration): Principle, working, care & maintenance and calibration of Weighing balance, Hotplate, Magnetic stirrer, Centrifuges, Lyophilizer Incubator, Hot air oven, Colorimeter, Spectrophotometer, Water distillation plant, Deionizers, pH paper, pH meter, method of pH measurement. Types of electrodes, salt bridge solution. Use, care and maintenance of electrodes.

UNIT-II **12 Hours**

Preparation of solution and reagents, normal solution, molar solutions, percent solution, dilutions, w/v, v/v, standard solution. Body fluid dilutions. Units of measurement: SI unit, reference range, units for measurement of enzymes, protein, drugs, hormones, vitamins. Concepts of acid base, hydrogen ion concentration. Ionization of water. Buffers, types, Henderson Hassel back Equation, pH value of a solution, preparation of buffer solutions. Indicators and its types.

Quality control: Accuracy, Precision, Specificity, Sensitivity.

UNIT-III **12Hrs**

Methods of determining Moisture, Definition of water in food, Structure of water and ice, Types of water, Role of water activity, determination of ash, Analysis of Lipids- solubility test, emulsification test, saponification test, iodine value test, acrolein test. Chemical deterioration of fats and oils (auto oxidation, rancidity, lipolysis,)

UNIT-IV **12 Hours**

Analysis of Proteins: qualitative analysis of protein and amino acids: Ninhydrin test, Xanthoproteic acid test, sakaguchi test, biuret test**,** Physicochemical and functional properties of proteins, Carbohydrates Classification, Structure and Chemical reactions of carbohydrates, qualitative analysis of carbohydrates, Vitamins Types (Water soluble vitamins and Fat soluble vitamins); Analysis of Enzyme - Introduction, classification, General characteristics, Important enzymes in food processing, Introduction to food pigments: Natural pigments, synthetic food colour, Analysis of Pigments.

REFERENCES:

1. D M Vasudevan, (2011), Text book of Medical Biochemistry,6th edition Jaypee Publishers
2. M N Chatterjee & Rana Shinde, (2012), A Text book of Medical Biochemistry, 8th edition, Jayppe Publications
3. Singh & Sahni, (2008),Introductory Practical Biochemistry,2nd edition, Alpha Science
4. Lehninger, (2013), Principles of Biochemistry,6th edition, W HFreeman.
5. U Satyanarayan ,(2008), Essentials of Biochemistry,2nd edition, Standard Publishers
6. Medical laboratory Procedure Manual (T-M) by K.L. Mukerjee 1987, Vol.I, II & III Tata McGraw HillPublication.
7. Text book of Medical Biochemistry byRamakrishna
8. Text Book of Clinical chemistry by Norbert Teitz 4. Principles and Techniques of Practical Biochemistry by Wilson andWalker.
9. Clinical Chemistry - Principle and techniques by Rj Henry, Harper & Row Publishers.
10. Schaum's Outline of Biochemistry.Philip W. Kuchel, Ph.D, Simon Easterbrook-Smith, Vanessa Gysbers, J. MitchellGuss
11. Wilson and Walker's Principles and Techniques of Biochemistry andMolecular Biology
12. Pearson's Biochemistry.Christopher K. Mathews, Kensal E. van Holde, DeanR. Appling, Spencer J.Anthony-Cahill
13. Biochemistry. Donald Voet, Judith G. Voet
14. Samson Wrights AppliedPhysiology.
15. Text book of Medical physiology by A.B. Das Mahapatra.

B21HC0104	**Fundamentals of Food Scienece**	L	T	P	C
Duration: 3 hrs/wk		2	1	0	3

Prerequisites:
basic knowledge of food, Nutrients, cooking

Course objective:
1. To know the basic concept of Different food groups and methods and principles involved in cooking.
2. To know the chief nutritionial profile of each category of foodgroups.

Course Outcomes: After completing the course the student shall be able to:
CO1. Know Definition, functional classification and groups of food, cooking methods and their application, different beverages and types
CO2. Learn Structure, composition and nutritive value of cereals, pulses, sugar and their related products
CO3. Get idea on Composition and nutritive value of milk; Milk cookery, Meat structure, Meat cookery, eggs, fish poutry cookery,
CO4. Conceptualise Composition and nutritive value of vegetables, fruits, spices, oil and their related products, their role and application in Food science

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0104	CO1	3	3	1	2	1	1	2	---			1	1	1
	CO2	2	2	1	--	--	--	1	--			1	1	2
	CO3	3	2	1	2	--	1	1	--			2	2	2
	CO4	3	3	2	3	--	1	1	--			2	1	1

Course Content: **Total Hours: 48 hrs**

UNIT-I

12 Hours

Food: Definition, functional classification, groups (4, 5, 7 and 11), food pyramid.

Cooking: Definition and objectives; Methods- Moist heat methods, dry heat methods, combination of both and micro wave cooking; Effect of cooking on nutrients.

Beverages: Classification; Coffee beverage- Constituents and method of preparation; Tea-Types, preparation; Cocoa- Composition, nutritive value and preparation of cocoa beverage; Fruit beverages - Types; Introduction to vegetable juices, milk-based beverages, malted beverages, carbonated non alcoholic beverages and alcoholic beverages.

UNIT-II

12 Hours

Cereals and millets: Structure, composition and nutritive value of rice, wheat and oats; Nutritive value of maize, jowar, ragi and bajra. Cereal cookery: Effect of moist heat- Hydrolysis, Gelatinisation and factors affecting gelatinization, gel formation, retrogradation and syneresis; Effect of dry heat; Role of cereals in cookery.

Pulses: Composition, nutritive value, toxic constituents; Pulse cookery- Effect of cooking, factors affecting cooking quality, role of pulses in cookery, germination and its advantages.

Sugar and related products: Nutritive value, characteristics and uses of various types of sugars; Sugar Cookery- Crystallization and factors affecting crystallization; Stages of sugar cookery; Role of sugar in cookery.

UNIT-III

12 Hours

Milk and milk products: Composition and nutritive value of milk; Milk cookery- Effect of heat, effect of acid and effect of enzymes; Milk products- Non fermented and fermented products (does not include preparation); Role of milk in cookery.

Egg: Structure, composition, nutritive value; Egg cookery- Effect of heat, factors affecting coagulation of egg proteins and effect of other ingredients on egg protein; Role of egg in cookery; Home scale method for detecting egg quality.

Meat: Classification, composition, nutritive value, rigor mortis, ageing and tenderizing; Meat cookery-Changes during cooking.

Poultry: Classification, composition and nutritive value.
Fish: Classification, composition, nutritive value, selection and principles of fish cookery.

UNIT-IV

12 Hours

Vegetables: Classification (nutritional), composition, nutritive value; Pigments in vegetables- Water soluble and water insoluble; Enzymes, flavor compounds and bitter compounds; Vegetable cookery- Preliminary preparation, changes during cooking, loss of nutrients during cooking, effect of cooking on pigments, role of vegetables in cookery.

Fruits: Classification, composition, nutritive value, ripening of fruits; Browning- Types and preventive measures.

Spices: General functions, role in cookery; Medicinal value of commonly used spices.

Fats and oils: Composition and nutritive value, basic knowledge about commonly used fats and oils (lard,Ghee,butter, margarine, ground nut oil, coconut oil, soya bean oil, olive oil, rice bran oil, , mustard oil); Spoilage of fat- Types and prevention; Effect of heating, role of fats and oils in cookery.

REFERENCES:

1. Srilakshmi. B. Food Science, New Age International (P) Ltd. Publishers, Sixth edition.2016.
2. Manay Shakunthala, N and Shadaksharaswamy M. Food Facts and Principles, New Age International (P) Ltd Publishers, Reprint 2005.
3. Swaminathan M., Food Science, Chemistry and Experimental foods, Bappo Publishers company Ltd, 1997.
4. Usha Chandrasekar, Food Science in Indian Cookery, Phoenix publishers House Private Limited, 2002.

Practicals

B21HC0105	**Human Physiology -1 Practicals**	**L**	**T**	**P**	**C**
Duration: 3 hrs/wk		**0**	**0**	**2**	**2**

Prerequisites:
Clear theoretical concept of circulatory system, cells etc.

Course objective:
1. To measure clotting time, bleeding time and blood pressure, haemoglobinometry, and determination of blood group.
2. To study components and structures of pre-prepared slides of different tissues.

Course Outcomes: After completing the course the student shall be able to:
CO1. identify components and structures of pre-prepared slides of different tissues
CO2. learn individual clotting time, bleeding time and blood pressure
CO3. handle the haemoglobinometry and detrmination of blood group
CO4. determine hematocrit, separation of blood components through centrifugation

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0105	CO1	1	1	3	3	1	1	--	--	--	1	3	1	1
	CO2	2	1	3	3	1	3	2	--	--	--	3	1	1
	CO3	2	1	3	3	1	2	2	3	--	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	--	3	1	1

Course Content: **Total Hours: 3 hours/ week**

Experiments: -

1. Microscopic study of tissues- epithelial, connective and muscular.
2. Determination of Clotting Time, Bleeding Time
3. Blood pressure Recording
4. Determination of Blood Groups (ABO)
5. Identification of blood cells.
6. Collection of blood sample- Capillary blood from finger tips and venous blood.
7. Separation of blood components (Centrifugation).

B21HC0106	Nutritional Biochemistry -1 Practical	L	T	P	C
Duration: 3 hrs/wk		0	0	2	2

Prerequisites:
Elementory knowledge of biochemical reactions of macro & micro nutrients.

Course objective:
1. To perform Qualitative estimation of macro nutrients.
2. To determine of proximate analysis of food.

Course Outcomes: After completing the course the student shall be able to
CO1. perform qualitative analysis of sugar and amino acids.
CO2. estimate urinary phosphorus, urea, blood glucose and cholesterol using suitable biochemical methods.
CO3. perform proximate analysis of food.
CO4. determine quantitative estimation of protein content of given food sample

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0106	CO1	1	1	3	3	1	1	--	--	--	1	3	1	2
	CO2	3	1	2	3	1	2	2	--	--	--	3	2	3
	CO3	2	1	3	2	1	2	1	2	--	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2

Course Content: **Total Hours: 3 hours/ week**

Experiments: -

1. Qualitative analysis of Carbohydrates
2. Qualitative analysis of amino acids
3. Estimation of Serum Glucose.

4. Determination of moisture & ash content in wheat flour
5. Estimation of ascorbic acid in food.
6. Estimation of protein in milk by biuret method.

B21HC0107	Fundamentals of Food Science Practicals	L	T	P	C
Duration: 3 hrs/wk		0	0	2	2

Prerequisites:
Theoritical knowledge and principles of food science.

Course objective:

1. to study the physical, chemical, and biochemical nature of foods and the principles of food processing**.**
2. To know basic sciences and application of different food groups and their properties in relation to food Science

Course Outcomes: After completing the course the student shall be able to
CO1. Identify different rheological and chemical properties of Food groups like cereals, pulses
CO2. Identify effect of external factors on different components of food
CO3. Demonstrate and identify enzymatic browning in vegetables & fruits
CO4. Determination of smoking point of oils & Stages of Sugar cookery

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0107	CO1	1	1	3	3	1	1	--	2	--	1	3	2	2
	CO2	2	1	3	3	1	3	2	--	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	--	--	3	3	3
	CO4	2	1	2	3	2	2	1	3	--	--	3	2	3

Course Content: **Total Hours: 3 hours/ week**

Experiments: -

1. Study the effect of temperature, time of heating, concentration, addition of sugar and acid on gelatinization of starch.
2. Prepare recipe using principle of gluten formation
3. Demonstrate the effect of soaking, hard water and sodium bi carbonate on cooking quality of pulses.
4. Prepare recipes using whole gram, dhal, pulse flours, sprouted pulses and cereal pulse combination.

5. Demonstrate the factors affecting coagulation of milk protein and prepare milk products.
6. Demonstrate the formation of ferrous sulphide in boiling egg and its preventive measures.
7. Prepare recipes where egg acts as – thickening agent, binding agent, emulsifying agent

8. Demonstrate the effect of acid, alkali and over cooking on vegetables containing different pigments.
9. Demonstrate enzymatic browning in vegetables and fruits and any two methods of preventing it.
10. Determination of Smoking point of 3 edible oils
11. Demonstrate the stages of sugar cookery

12. SEMESTER: II

B21LHM201	Constitution of India & Professional Ethics	L	T	P	C
Duration: 3 hrs/wk		2	0	0	2

Prerequisites:
Basic knowledge of Indian history.

Course Objective: After completing the course the student shall be able to
1. To gain knowledge on Constitution of India and to understand about the fundamental rights, duties and other rights which is been given by our law.
2. To prepare students in the understanding of Constitution perspective and make them face the world as a bonafidecitizen.

Course Outcomes: After completing the course the student shall be able to
CO1: Analyze the Fundamental Rights, Duties and other Rights protected under Indian Constitution
CO2: Demonstrate the practicality of Constitution perspective.
CO3: Make the students face the world as a bonafide citizen.
CO4: Understand different union and state policies and their effect on industrialization in India.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21LHM201	CO1	2	2	3	3	1	2	3	1			1	1	2
	CO2	3	2	2	3	3	2	2	2			2		1
	CO3	2	3	3	3	3	2	3	3			2	1	2
	CO4	1	3	3	3	2	2	3	3			1		2

Course Content: **Total Hours: 48 hrs**

UNIT-1

12 Hrs

Introduction to Constitution of India. Role of Public Sector Undertakings in economic development... Public policy making in India and influence of new globalised world order. I.T. Law in India - Section 4-10 of I.T Act: Cyber laws in India - Section 43-47 of I.T Act -Section 65-78 of I.T Act. E-Governance and role of engineers in E-Governance. Socialist policy of India and its

relevance. Fundamental Duties of the Citizen, Significance and Characteristics. Elements of National Significance; National Flag, National Anthem, National Emblem.

UNIT-II

12 Hrs

Role of Planning Commission in economic development. Finance Commission and centre-State relations. Fundamental Rights and Fundamental Duties. Directive Principles of State Policy. Politics of Industrialization in India and the policy of Liberalization Privatization and Globalization (LPG) Need for reformed engineering serving at the Union and State level. Role of I.T. professionals in Judiciary. Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

UNIT-III **12Hrs**

Judiciary: Supreme Court of Indian, High Court, Right to Information Act 2005, Consumer Protection-Consumer Rights- Caveat Emptor and Caveat Venditor.

Unit-IV **12 Hrs**

Professional Ethics: Definition Scope and need of ethics for professional, Personal Ethics and Business Ethics, Ethical Standards, Duties of Employers and Employees. Due Care theory, Environmental Ethics, Ethical Code of Conduct in ethics. Best Ethical Companiesin India and Abroad; Corporate Social Responsibilities, Code of Conduct and Ethical Excellence

References:

1. An Introduction to the Constitution of India by: Brij Kishore Sharma
2. Relevant document related Government of India Policy.
3. Cyber Law by Dr. Gupta and Agarwal.
4. www.indiancourts.nic.in
5. Public Administration by Awasthi and Maheshwari.
6. M V Pylee, An introduction to Constitution ofIndia

B21HC0201	Human Nutrition & Family Meal Management	L	T	P	C
Duration: 4 hrs/wk		3	1	0	4

Prerequisites:

Basic knowledge of Food, Nutrient, RDA, EAR

Course Objective:

1. To learn different nutritional requirements at different stages of lifecycle.
2. To discuss, contrast and evaluate the roles of nutrition within the complex processes of pregnancy, lactation, child development and ageing.

Course Outcomes: After completing the course the student shall be able to

CO1. learn and apply the latest in research-based nutrient needs of pregnant and lactating females and will gain knowledge on changing nutritional needs of an infant and about complementary feeding**.**

CO2. relate nutrient needs to developmental stages and plan diets which will adequately meet nutritional needs during childhood, school going- age

CO3: learn the impact of growth and development in arriving at the nutritional needs of adolescents, adults and old age

CO4: gain competence on meeting nutrition needs and establishing dietary patterns to promote optimum health and reducing the impact of chronic diseases through effective meal Planning

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0201	CO1	3	2	3	3	2	1	1	2			1	1	2
	CO2	2	3	2	3	1	1	3	2			2	1	2
	CO3	2	2	3	3	1	2	3	2			2	2	2
	CO4	2	3	3	3	2	3	3	3			2	1	1

Course Content: **Total Hours: 48 hrs**

Unit- I

12 Hours

Nutrition during Pregnancy and lactation:

a) Physiological stages of pregnancy b) Effect of Nutritional status on Pregnancy outcome c) Nutritional Requirements d) Guide for eating during pregnancy, Complications of pregnancy and their dietary Implications.

b) **Nutrition during Lactation**: Physiology, Nutritional requirement, lactogauge

c) **Nutrition for Infants**-Composition of human and cow's milk, formulas d) Complimentary foods weaning pattern, composition, general principles in feeding infants, special feeding problems. Characteristics of low-birth weight Infant, small for date babies, pre-term babies

Unit- II

12 Hours

Nutrition during early childhood (Toddler/Preschool) - Growth & nutrient need, nutrition related problems, feeding patterns

Nutrition during School going age a) Growth and Development b) Nutritional Requirement's c) Factors influencing food intake d) Nutritional Concerns e) importance of snacks, school lunch.

Unit -III **12 Hours**

Nutrition for Adolescence: a) Growth and Development-Physiologic changes b) Nutritional Requirements c) Situations with special needs

Nutrition for adults: a) nutrient needs modifications for different activity levels and different income groups.

Nutrition for old Age: a) Process of Aging, b) Nutrient Requirements, Nutrition Related problems of old Age, Nutrition and Bone health in brief) c) Degenerative diseases, d) Health care of elderly and concepts of the use of supplements.

Unit -IV

12 Hours

Introduction to meal management - balanced diet, food groups & balanced diet planning. Food guides for selecting adequate diet.

Meal planning for the family, Indian meal patterns – vegetarian and non-vegetarian. Food faddism and the faulty food habits, Nutritive value of common Indian recepies.

REFERENCES:

1. Guthrie H.A. & Others, "Introductory Nutrition", 1986, 6th ed. Times Mirror/Mosby College Pub Louis.
2. Anderson L. et al, "Nutrition in Health and Disease', 1982, 17th ed, J.B Lippincott Co Philadelphia.
3. Whitney E.N., Hamilton E.N. & Raffes S.R., "Understanding Nutrition", 5th ed. West Pub. Co. New York.
4. Recommended Dietary Intakes for Indians, I.C.M.R. 2020 report
5. Mudambi, S.R. & M.N. Rajagopal - "Fundamentals of Food and Nutrition", 3rd ed. Wiley Eastern Ltc New Delhi-19.
6. Guthrie, H.A,, "Introductory Nutrition", 6th ed., Times Mirror/Mosby College Publ. - St Louis 1989.
7. Worthington Roberts, Bonnie S & others - "Nutrition in Pregnancy & Lactation", 3rd ed. Times Mirror Mosby College, St. Louis, 1985.

B21HC0202	**Fundamental Nutritional Biochemistry**	L	T	P	C
Duration: 3 hrs/wk		**2**	**1**	**0**	**3**

Prerequisites:
Knowledge of chemical Properties of Macro and Micro nutrients and their utilization

Course Objective:
1. To know the principles of biochemistry as applicable to human nutrition.
2. To understand the biological process and systems as applicable to human nutritions.

Course Outcomes: After completing the course the student shall be able to
CO1. Gain knowledge on digestion, Absorption, transport & utilization of macro nutrients and fiber.
CO2. Learn about metabolic and energy pathways utilizing carbohydrate and lipid.
CO3. Learn about metabolic pathways of protein and nucleic acid.
CO4. Understand utilization of energy and micro nutrients through biochemical pathways

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0202	CO1	3	2	2	2	1	1	2	3			2	1	2
	CO2	3	3	2	3	2	1	2	3			1	2	2
	CO3	2	3	2	3	1	2	2	2			1	1	2
	CO4	2	2	2	3	2	3	2	3			1	2	2

Course Content: **Total Hours: 48 hrs**

UNIT- I

12 Hours

Use of food in body - Digestion, Absorption, transport & utilization. Role of fibres in human nutrition.
Carbohydrates: Functions, classification, Digestion, Absorption, utilization, storage in body.
Protein: Functions, classification, Digestion, Absorption, utilization, storage in body
Fats & oils: composition, saturated and unsaturated fatty acids, classification, function, Digestion, Absorption, utilization, storage in body

UNIT -II

12 Hours

Introduction to metabolism- significance of anabolic and catabolic process in body,
Brief concept of Carbohydrate Metabolism: glycolysis, glycogenesis, TCA cycle, gluconeogenesis, HMP shunt, blood glucose regulation, Significance of carbohydrate metabolism in disease.
Lipids- Beta oxidation of fatty acids and the energetics, synthesis of ketone bodies, ketosis, Nutritional significance of ketosis in relation to diseases. Cholesterol & its clinical significance, Lipoproteins in the blood composition & their functions in brief, Atherosclerosis

UNIT- III

12 Hours

Protein Metabolism- amino acids, composition and function, general reactions of amino acid metabolism, synthesis of non essential amino acids, urea cycle
Nucleic acid- composition, functions, classification, structure and properties of DNA, RNA, replication and transcription, translation, genetic code and their biological importance

UNIT IV

12 Hours

Energy metabolism- biological oxidation-citric acid cycle and Electron transport chain, oxidative phosphorylation, energy conservation, high energy phosphate bond;
Vitamins- (water & fat soluble) - definition, classification & functions. Effect of cooking & heat processing on the vitamins of foods.
Acid base balance- concepts & disorders - pH, Buffers, Acidosis, Alkalosis

REFERENCES:

1. Bamji et al. 1996. Text Book of Human Nutrition. New Delhi, Oxford and IBH Publishing Co. Pvt. Ltd.

2. Devlin. T.M.. 1997. Text book of Clinical Biochemistry. New York, John Wiley and Sons.
3. Harper. H.A.. 1997. Review of Physiological Chemistry. 21st edition. Los Angeles, Lange Medical Publications.
4. Leninger. A. L.. 1992. The molecular basic of cell structure and functions. New Delhi, Kalyani Publishers.
5. Ramakrishnan. S. and Venkat Rao.. 1995. Nutritional Biochemistry. Chennai, T.R. Publications.
6. Shils et al. 1994. Modern Nutrition in Health and Disease. Vol. I and II. New York, Lea and Febiger.
7,. U Satyanarayan, (2008), ,2nd edition, Standard Publishers, Essentials of Biochemistry.

B21HC0203	**Human Physiology-II**	L	T	P	C
Duration: 3 hrs/wk		2	1	0	3

Prerequisites:
Knowledge of basic concept of human organs and system

Course Objective:
1. To understand the structure and functions of different vital systems of a human body.
2. To understand the physiology of different organ systems and their influence on nutrition.

Course Outcome: After completing the course the student shall be able to
CO1: learn about structures and function of Gastrointestinal system of human body
CO2: Achieve knowledge about endocrine and exocrine and understand different endocrine systems and their functions.
CO3: Know about the physiology and working principle of the sense organs and will be ready to understand respiratory system, transport of oxygen and carbon dioxide and respiratory disease,
CO4: Understand human reproductive system along with the organs and specific physiological condition like conception, lactation and menopause

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0203	CO1	3	1	1	3	1	2	2	1			2	1	1
	CO2	3	1	1	3	1	2	2	1			1	1	2
	CO3	3	1	1	3	1	2	3	1			1	1	1
	CO4	3	1	1	3	1	2	2	1			2	2	1

Course Content: **Total Hours: 48 hrs**

UNIT- I **12 Hours**

Gastro intestinal Sysytem: Organs of GIT and their structure & function. Gastric secretion, Pancreatic secretion, Gastric motility-digestive peristalsis, gastrointestinal hormones. Structure & function of liver, spleen, gall bladder & pancreas. Jaundice, Cirrhosis & Pancreatitis, Digestion and absorption of food

UNIT-II

12 Hours

Endocrine system: Endocrine Glands: Types of different endocrine glands, Structure, secretion and functions of pituitary, thyroid, parathyroid and adrenal gland, pancreas, Hypo and Hyper secretions, various hormonal disorders (Diabetes Mellitus, Diabetes insipidus, Hyper and Hypothyroidism, dwarfism & gigantism)

UNIT-III

12 Hours

Respiratory System: Parts of Respiratory System, Mechanism of breathing, Ventilation, Regulation of respiration, Transport of gases, Hypoxia, Artificial ventilation, non-respiratory functions of the lungs.

Physiology of sense organs: Structure and functions of Sense organs: Eye, Ear, Nose, Skin and Tongue, Disease of Ear and Eye (in brief)

UNIT- IV

12Hours

Reproductive System: Male & Female reproductive organs, Reproductive cycle in female Menstrual cycle, sex hormones, secondary sexual characteristics, puberty, brief process of spermatogenesis, oogenesis, pregnancy, parturition, lactation and menopause, different contraceptive measures.

REFERENCES:

1. Ross & Wilson,(2014),Anatomy & Physiology in health & illness,11th edition, ElsevierPublications
2. Sujit Chaudhury,(2011),Concise Medical Physiology,6th edition,NCBA
3. Sembulingam k,(2012),Essentials of Medical Physiology,6th edition, Jaypee Publications
4. Guyton and Hall,(2011)TextbookofMedicalPhysiology,12th Edition,Saunder/Elsevier
5. Gerard J. Tortora and Bryan H.Derrickson,(Principles of Anatomy andPhysiology, 14th edition, Wileypublications
6. Textbook of Medical Physiology by G.K.Pal.

B21HC0204	**Food Sanitation**	**L**	**T**	**P**	**C**
Duration: 4 hrs/wk		**3**	**1**	**0**	**4**

Prerequisites:

Prior knowledge on personal hygiene and safe food.

Course Objective:

1. To know the importance of sanitation and hygiene in food catering.
2. To understand personal hygiene, cleaning procedures and pest control in food catering.

Course Outcomes:

CO1. To identify and conceptualise Sanitation, Food hygiene, related terminologies

CO2. Learn basics of food production chain from Farm to fork

CO3. Gain knowledge of Personal Hygiene and sanitation, food contamination

CO4.know cleaning procedures, different sanitisers, importance of pest control in Food service areas

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0204	CO1	3	3	2	3	1	2	2	3			1	1	2
	CO2	3	3	2	3	1	2	2	3			2	2	1

	CO3	3	3	1	3	1	1	2	2			1	1	2
	CO4	3	3	1	3	1	1	2	2			2	2	1

Course Content: **Total Hours: 48Hrs**

UNIT-I **12 hours**

Sanitation: Definition and meaning, deteriorative effects of micro organisms- physical and chemical changes; methods of killing micro organism- heat, chemicals and radiation; methods of inhibiting microbial growth- refrigeration, chemicals, dehydration and fermentation

Food Sanitation terminologies-sanitation, hygiene, food contamination, Danger zone, Significance of sanitation in food catering industry

Unit -II **12 hours**

Hygiene in purchase and storage of food-receiving, food storage, general guidelines for storage, dry food storage, refrigerated storage, freezer storage. Hygiene in preparing, holding, serving and display if food, Hygienic procedures in food preparation, hot holding of food, safe use of leftover food, hygiene in food service, protective display of food

Unit -III **12 hours**

Personal hygiene-importance, sanitary habits and practices, protective clothing.

Storage and disposal of waste-classification of waste, solid waste (collection and storage of garbage), methods of disposal of garbage. Contamination of food products: Contamination of red meat, poultry and sea food during processing, contamination of dairy products and other food; contamination of ingredients; other sources of contamination- equipment, employees, air and water, sewage, insects and rodents; protection against contamination- protection against environment, protection during storage, protection against contamination from litter and garbage, protection against toxic substances

Unit-IV **12 hours**

Cleaning procedures-cleaning and sanitising, significance of cleaning programme, cleaning agents and compounds: Characteristics of good cleaning compound, classification- alkaline cleaning compound and acid cleaning compound, synthetic detergents, soaps, solvent cleaners; detergent auxiliaries - protection and cleaning auxiliaries; scouring compounds; selection of effective cleaning compound.

Sanitizers: Meaning, Types: thermal sanitizing, radiation sanitizing and chemical sanitizing types of cleaning equipment-manual, mechanical, post cleaning storage.

Pest control- importance, control of housefly, cockroaches, rodents.

REFERENCES: -

1. Norman G. Marriott, Principles of sanitation, Van Nostrand Reinhold company, Newyork. 1985.
2. Mario Stanga, Sanitation: Cleaning and Disinfection in the Food Industry, Wiley, 2010.
3. Y. H. Hui, L. Bernard Bruinsma, J. Richard Gorham, Wai-Kit Nip, Phillip S. Tong, Phil
4. Ventresca, Food plant sanitation, CRC Press, 2002.
5. Y. H. Hui, Plant sanitation for food processing and food service, CRC Press, 2014.
6. Food Sanitation and Hygiene (Latest Edition) by Sunetra Roday
7. Frazier W.C. and Westhoff D.C., Food Microbiology, 4th Ed., 1988 New York

B21HC0205	Nutritional Biochemistry -II Practical	L	T	P	C
Duration: 3 hrs/wk		0	0	2	2

Prerequisites:
Elementory knowledge of biochemical methods & instruments

Course objective:
1. To perform Qualitative estimation of macro nutrients.
2. To Determine biochemical parameters considered as Nutritional biomarkers from blood smaple

Course Outcomes: After completing the course the student shall be able to
CO1. perform qualitative analysis of Lipids and fats
CO2. study general properties of the enzyme Urease & Achromatic time of salivary amylase.
CO3. Perform suitable test to determine normal & abnormal constituents of urine
CO4. determine quantitative estimation Cholesterol from blood & Glucose from Urine

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0205	CO1	1	2	3	3	1	1	1	--	--	1	3	1	1
	CO2	2	1	3	3	1	3	2	--	--	--	3	1	1
	CO3	2	2	3	1	1	2	2	2	--	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	--	3	1	1

Course Content: **Total Hours: 3 hrs/ Wk**

Experiments:
1. Preparation of phosphate and citrate buffer
2. Estimation of acid value, iodine value, Saponification value of fats
3. Estimation of Calcium in milk
4. Estimation of glucose in urine by Benedict's methods
5. Estimation of Fiber content in food
6. Estimation of blood cholesterol

B21HC0206	Human Nutrition & Family meal Management Practical	L	T	P	C
Duration: 3 hrs/wk		0	0	2	2

Prerequisites:
Elementary knowledge of RDA, EAR, meal planning

Course Objective:

1. To apply knowledge on different nutritional requirements at different stages of lifecycle.
2. To apply knowledge in planning, preparation and calculation of meals suitable for pregnancy, lactation, child development and ageing.

Course Outcomes: After completing the course the student shall be able to

CO1. Learn and apply the latest in research-based nutrient needs of pregnant and lactating females and will gain knowledge on changing nutritional needs of an infant and about complementary feeding**.**

CO2. Relate nutrient needs to developmental stages and plan diets which will adequately meet nutritional needs during childhood, school going- age

CO3: Learn and apply knowledge for planning, preparing and calculating a day's diet for adolescents, adults and old age

CO4: Gain competence on meeting nutrition needs and using it for designing appropriate meals for day-to-day life.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0206	CO1	1	1	3	3	1	1	1	--	--	1	3	1	2
	CO2	3	1	2	2	1	2	2	--	--	--	3	2	3
	CO3	2	2	3	2	1	2	1	2	--	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2

Course Content: **Total Hours: 3 hrs/ Wk**

Experiments:

1. Measurement of food materials using standard measuring cups, spoons and weighing.
2. Preparing a recipe by Moist heat & dry heat method (Pressure cooking, Grilling)
3. Preparing a recipe by frying (deep & shallow fat frying)
4. Planning, Preparation and calculation of Nutrient dense food (Energy, iron, calcium, Protein)
5. Preparation and calculation of nutritive values of common recipes: Pulao, chapathi, vegetable sandwich, sambhar, thick soup, ragi konjee, fruit salad, rice kheer, fruit juice
6. Planning and Preparation and calculation of weaning food
7. Planning and Preparation and calculation of attractive snacks for Preschoolers, Schoolgoing child.
8. Planning and Preparation and calculation of day's diet for Pregnant woman Lactating woman, Adolescent girl and boy
9. Planning and Preparation and calculation of day's diet for adult man and woman

B21HC0207	Practicals	L	T	P	C
Duration: 16 weeks	**Food Sanitation Practical**	0	0	2	2

Prerequisites:

Prior knowledge on personal hygiene and safe food.

Course Objective:

1. To know the importance of sanitation and hygiene in food catering.
2. To understand personal hygiene, cleaning procedures and pest control in food catering.

Course Outcomes:

CO1. To identify and conceptualise Sanitation, Food hygiene, related terminologies
CO2. Learn basics of food production chain from Farm to fork
CO3. Gain knowledge of Personal Hygiene and sanitation, food contamination
CO4.know cleaning procedures, different sanitisers, importance of pest control in Food service areas

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0207	CO1	1	1	3	3	1	1	1	1	--	1	3	1	2
	CO2	3	1	2	2	1	2	2	1	1	1	3	2	3
	CO3	2	2	3	2	1	2	1	2	1	--	1	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2

Course Content: **Total Hours: 3Hrs/ wk**

Experiments:

1. Market survey of cleaning and sanitising agents
2. Hand washing technique
3. Visit to food catering unit to study hygiene and sanitary practices
4. Use of food sanitation checklist-food preparation and handling practices, personal practices, service.
5. Preparation of different module and training of group-D staff in hygiene and sanitation.

SEMESTER: III

B21HC0301	NUTRITION AND HEALTH EDUCATION	L	T	P	C
Duration: 2 hrs/wk		2	0	0	2

1. Concept, objectives and importance of nutrition and health education
2. Principles of health education.
3. Nutrition and health education communication process.
4. Steps in planning health and nutrition education.
5. Methods involved in nutrition and health education
6. Evaluation of nutrition and health education programmes.

CO1: Gain the knowledge and skills on different modes of teaching.
CO2: Gain knowledge on the mass media communication and computers used in health education.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3
	CO1	1	3	2	2	3	2	3	3			1	1	2

B21HC0301	CO2	1	3	3	3	1	1	3	3			2	2	1

Course Content: **Total Hours: 2Hrs/ wk**

Unit-I **12 h**

Methods used in nutrition education: Lecture method, group discussion method, role play or dram method, story - telling, demonstration, brainstorming.

Teaching aids used in nutrition education: Direct and indirect methods, Traditional media methods.
Computers as a tool in Clinical Care: Communication in patient care, Nutritional assessment and support services, Nutritional therapy, Nutrition survey. Nutritional counselling. Patient education and consumer education.

Unit-II 12 h

Diet in Health:

Importance of food in health: Healthy eating during stress, Eating disorders, Super foods, Mindful nutrition, BP diet, Role of nutrients in allergy.

Health education in specific condition:

Need for health education to the following age group – infants, pre-school, school going, adolescents, old age.

Importance of nutrition education on the following specific condition - pregnancy and lactation, surgical conditions.

B21HC0302	**Neutraceutical and Functional Food**	L	T	P	C
Duration: 2 hrs/wk		2	1	0	3

Prerequisites:
Basic Knowledge in Food & Nutrition
Course Objectives:
1. To be aware of the growing importance of functional foods and neutraceuticals & to understand recent trends of food fortification in the market.
2. To know current guidelines and regulations of Nutraceuticals, functional foods in Indian context
Course Outcomes: After completing the course the student shall be able to
CO1: Recognize the growing importance of functional foods and neutraceuticals.
CO2: Gain knowledge of Probiotics & Prebiotics the related recent trends in the market.
CO3: Know implications Effects of processing conditions and storage of functional foods
CO4: Learn about Food Fortification, Need, Objectives, Rationale, Vehicles used for fortification, methods employed.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3

B21HC0302	CO1	1	3	2	2	3	2	3	3			1	1	2
	CO2	1	3	3	3	1	1	3	3			2	2	1
	CO3	1	3	3	3	1	2	2	3			1	1	2
	CO4	2	3	2	3	1	2	2	2			2	2	1

Course Content: **Total Hours: 48 Hrs**

UNIT-I

12 Hrs

Nutraceuticals and functional Foods –Definition, concept. Classification of nutraceuticals and functional foods.

Significance and relevance of nutraceuticals and functional foods in the management of diseases and disorder. Natural occurrence of certain phytochemicals- Antioxidants and flavonoids: omega – 3 fatty acids, carotenoids, dietary fiber, phytoestrogens

UNIT-II

12 Hrs

Prebiotics, probiotics and synbiotics-

Probiotics: Definition, types and relevance; Usefulness in gastro intestinal health and other health benefits; development of a probiotic products; recent advances in probiotics; Challenges and regulatory issues related to probiotic products.

Prebiotics: Prebiotic ingredients in foods; types of prebiotics and their effects on gut microbes; health benefits of prebiotics; recent development in prebiotics, Synbiotics.

UNIT-III:

12 Hrs

Functional foods - Definition, development of functional foods, use of bioactive compounds inappropriate form with protective substances and activators; Effect of environmental condition and food matrix; Effects of processing conditions and storage; Development of biomarkers to indicate efficacy of functional ingredients; Texteured vegetable protein.

UNIT – IV

12 Hrs

Food Fortification and enrichment. Need, Objectives, Rationale, Vehicles used for fortification & enrichment.

Methods employed, Advantages and Disadvantages of fortification, Biofortification – Definition, Need and methodology used, Micronutrients in biofortification – Zinc, Iron and carotene. Applications of neutraceuticals & functional foods. FSSAI regulation on neutraceuticals and functional foods.

REFERENCES: -

1. Wildman, R.E.C. (2007) Handbook of Nutraceuticals and Functional Foods, second edition. CRC Press.
2. Gibson GR & William CM. Functional Foods - Concept to Product. 2000.
3. Goldberg I. Functional Foods: Designer Foods, Pharma Foods. 2004.
4. Brigelius-Flohé, J & Joost HG. Nutritional Genomics: Impact on Health and Disease. Wiley VCH. 2006.
5. Cupp J & Tracy TS. Dietary Supplements: Toxicology and Clinical Pharmacology. Humana Press. 2003.
6. Chaudry, Qasim, Laurence, Watkins, Richard Nanotechnologies in food — 1st edition., 2010.

B21HC0303	Food Microbiology	L	T	P	C
Duration: 2 hrs/wk		2	1	0	3

Prerequisites:

Elementary knowledge of Microbes, Food & Nutrition

Objectives:

1. To provide a working knowledge of the important concepts in food microbiology
2. To gain idea and application of Microbiology in food industry, food sanitation and public health research**.**

Course Outcomes: After completing the course the student shall be able to

CO1. List the important microorganisms involved in food &describe the intrinsic and extrinsic factors affecting the growth of micro-organisms in food, various sources of contamination and principles of food spoilage

CO2. Spoilage of cereals, sugar products, vegetables, fruits, meat and meat product, milk and milk products, fish and sea food, spoilage of canned foods).

CO3. Describe the principles and methods of food preservation.

CO4. Explain the pathogenicity of bacteria involved in food borne infections. significance of Mycotoxins: aflatoxins, various health hazards of food in relation to health and sanitation (Food control agencies and their regulation).

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0303	CO1	3	3	2	3	1	1	2	3			1		2
	CO2	3	3	2	3	1	1	2	3			2	1	2
	CO3	3	3	2	3	1	1	2	3			2	1	1
	CO4	3	3	2	3	1	1	2	3			1	1	2

Course Content: **Total Hours: 48 hrs**

UNIT-I

12 Hrs

Importantance of Microorganisms in food microbiology – Mold, Fungi, Algae, Bacteria and Virus – general characteristics. Contamination of foods – green plants and fruits, animals, sewage, soil, water, air during handling and processing. Spoilage – cause, classification, factors affecting kinds and numbers of microorganisms in food.

UNIT-II

12 Hrs

Spoilage of different groups of foods – cereal and cereal products, vegetables and fruits, meats and meat products, fish and other sea foods, eggs, poultry, milk and milk products and canned foods.
Bacterial agents of food borne illness – Clostridium botulinum, Escherichia coli, Salmonella, Shigella and Staphylococcus - The organism, pathogenesis and clinical features and association with foods.

UNIT III

12 Hrs

Food preservation – Methods and principles of food preservation, delay of microbial decomposition, prevention of microbial decomposition, removal of micro-organisms.

Preservation by use of high temperatures – Factors affecting heat resistance of microorganisms, commercial heat preservation methods –sterilization, canning, pasteurization, blanching.
Preservation by use of low temperatures – Growth of microorganisms at low temperatures, low temperatures storage – cellar, chilling and frozen.

UNIT IV

12 Hrs

Preservation by drying - Methods of drying, factors in control of drying, treatments of foods before and after drying. Preservation by chemicals.
Preservation by Irradiation – Microware radiation, Ultraviolet radiation and ionizing radiation.
Food borne Illness – Food hazards, significance of food borne disease, incidence of food borne illness, risk factors associated with food borne illness.
Bacterial agents of food borne illness – Clostridium botulinum, Escherichia coli, Salmonella, Shigella and Staphylococcus- The organism, pathogenesis and clinical features and association with foods. Significance of HACCP

REFERENCES:-

1. Adams M.R., Moss M.O., Food Microbiology, New age international publishers, New Delhi, 2015.
2. William C Frazier., Dennis C Westhoff., Food Microbiology, McGraw Hill education private limited, New delhi, 2014.
3. Sivasankar., Food Processing and Preservation, PHI Learning private limited New delhi, 2015.
4. Branen A.L. and Davidson, P.M. Antimicrobials in Foods. Marcel Dekker, New Delhi, 1983.
5. Jay J.M., Modern Food Microbiology. 3rd Edn. VNR, New York.utta. 1980 9th Edition, Prism Books Pvt. Ltd.,1986.

B21HC0304	Community & Public health Nutrition	L	T	P	C
Duration: 2 hrs/wk		2	1	0	3

Prerequisites:

Basic Knowlegde of Nutrition, Macro & Micro nutrients

Course Objective:

1. To study the basic concept of community nutrition and to learn the major nutritional problems, their prevention and control.
2. To know the nutrition program and policies working towards interests for public health nutrition in India and foreign countries

Course Outcomes: After completing the course the student shall be able to

CO1. Understanding the health status of population and methods of health promotion and disease prevention.

CO2. Gain knowledge on status of malnutrition, communicable and non-communicable diseases and their pathology**.**

CO3. Learn methods of communication and outreach to community.

CO4. To understand the concept of food and nutrition security.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0304	CO1	3	3	2	3	3	2	1	2			1	2	2
	CO2	3	3	2	3	3	2	1	2			2	2	2
	CO3	3	3	2	3	2	3	1	2			2	1	1
	CO4	3	3	2	3	2	3	1	2			2	2	1

Course Content: **Total Hours: 48 Hrs**

Unit -I **12 Hours**

Introduction: Meaning and scope of public health nutrition, multidisciplinary approach of public health nutrition, concept of food security, nutrition monitoring nutrition surveillance, health economics, Assessment of nutritional status in the community setting: methods: anthropometric methods, biochemical methods, clinical methods: dietary methods.

Unit- II **12 Hours**

Malnutrition: Etiology, prevalence, vicious cycle of malnutrition, economics of malnutrition, Major nutritional problems: prevalence at national and international level, epidemiological factors, prevention and control of IDA, Vitamin A deficiency (VAD), IDD, Coronary heart disease,and obesity. Hypertension, Diabetes Mellitus, Diarrhoea, Prevalence of Zn and Cu deficiency

Unit -III **12 Hours**

Communication to reach community: concept of communication, elements of communication, channels of communication, functions of communication, methods of communication: demonstration, exhibition, preparation of audio-visual aids, concept of IEC (Information, Education and Communication) and BCC (Behaviour Change Communication)

Unit -IV **12 Hours**

Food Security: Nutrition Security, determinants of food security, different levels (national, household and individual), Major factors of food access (Population, food policies and national economy). Role of Government in maintaining Food security.

National Nutrition Programme- objectives and functions of NNP, ICDS, NIDDCP, SFP, Vitamin A Prophyaxis programme, **Organisation to combat Malnutrition**: Objectives abd functions of National agencies- ICMR, NIN, CFTRI, DFRI and International agencies- FAO, WHO, UNICEF

Nutrition monitoring- Objectives and components: Population and key indicators, Objectives and function of NNMB, NFHS, NSSO. **Nutrition surveillance**- Objectives and uses of Nutrition Surveillance system (NSS)

REFERENCES: -

- Park and Park (2015), Preventive and Social Medicine 23rd Edition Bhanot Publisher
- Shubhangini A Joshi (2011), Nutrition and Dietetics, with Indian Case Studies, 3rd Edition Tata McGraw Hill Publication, New Delhi
- Edited by Michael J. Gibney, Barrie M.Margetts, John M. Kearney, Lenore Arab (2004), Public Health Nutrition, Wiley-Blackwell publication.

B21HC0305	Clinical Nutrition-1	L	T	P	C
Duration: 3 hrs/wk		2	1	0	3

Prerequisites:

Elementary knowledge of RDA, EAR, meal planning

Course Objective:

1. To understand the basics of clinical nutrition.
2. To know the diet therapy for infection, fever, gastro-intestinal disorders, cardiovascular disorders, liver disease, burn & weight management.

Course Outcome: After completing the course the student shall be able to

CO1: Learn basic concepts of diet therapy and planning of therapeutic diets.

CO2: Gain knowledge about dietary modifications in various disease conditions.

CO3: To understand nutritional requiremtns and dietary modifications in weight management and surgical condition.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0301	CO1	3	2	1	3	1	1	2	2			2	2	1
	CO2	3	2	2	3	1	1	2	2			1	2	2
	CO3	3	3	3	2	2	2	3	3			1	2	2
	CO4	2	3	3	3	2	2	3	3			2	2	1

Course Content: **Total Hours: 48 hrs**

UNIT – I

12 Hours

Nutritional assessment in clinical conditions:

Introduction, definition, objectives, basic concepts of diet therapy, factors to be considered in planning therapeutic diets

Nutritional assessment in clinical setting, planning of therapeutic diets, the dietitian: Role of dietitian: The hospital & community, code of ethics, responsibilities, the dietitians in India, Indian dietetic Association, Nutrition & diet clinics - Patient's checkup and dietary counseling, educating the patient and follow up. Routine hospital diets – Modifications of Regular diet- Liquid diet (clear liquid & full liquid), soft diet, bland diet, Tube feeding: composition, osmolarity, types of formula, mode of feeding, Parenteral nutrition: PPN, TPN

UNIT – II

12 Hour

Modification of diet in Infections – A. Nutrition during Febrile Disorders: a) Classification of fevers b) Metabolism c) General Dietary Considerations d) Acute & chronic fevers -Typhoid & Tuberculosis **Diet for gastro intestinal disorders-** General Dietary Considerations for healthy gut **Peptic Ulcer Disease –** Etiology, Symptoms, Dietary Management **Intestinal Diseases –** irritable bowel syndrome (IBS), Constipation, Diarrhea.

Diseases of the Small Intestine – Celiac Disease – Gluten Sensitive Enteropathy, Tropical Sprue, Lactose Intolerance, Inflammatory Bowel Disease - Crohn's Disease, Ulcerative Colitis,

Anaemias: General concept, aetiology, classification, and dietary management of Nutritional anaemia.

UNIT – III

12 Hours

Diet for weight management: Assessment of obesity – BMI, Waist Hip-Ratios, Skin folds Thickness, Etiology – Genetic Factors, Physiological Factors, Behavioral factor, complications of obesity, Treatment – Dietary Management, Fad diets and their consequences, Underweight – Etiology, Health hazards, Treatments.

Nutritional problems in infants - Preterm baby- nutritional requirement, feeding problems, management. Problems related to weaning: obesity, underweight, food allergy, refusal to take new foods, choking, diarrhoea, and nutritional problems in old age-osteoporosis, neurological disorders, anaemia, constipation, nutritional problems of adolesecents- eating disorders - Addictive behaviour in annorexia, nervosa, bulimia & alcoholism. Nutritional problems during pregnancy- Anaemia, constipation, oedema, Pica, pregnancy induced Hypertension, Gestational diabetes.

UNIT – IV

12 Hours

Diet for liver disease: Hepatitis: Types, Etiology, Symptoms, treatment, Cirrhosis: Etiology, Clinical Symptoms, Treatment, Hepatic Encephalopathy: Etiology, Clinical Symptoms, Treatment, Diseases of the Gall Bladder: (brief) Cholecystitis and Cholelithiasis,

Nutrition in burns: classification, stages, dietary management in flow phase and anabolic phase

surgical conditions-Pre and post operative conditions, special nutritional requirements**,**

REFERENCES:

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi
2. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
3.
4. Robinson,C.H;Lawler,M.R.Chenoweth,W.L;and Garwick,A.E(1986):Normal and Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co
5. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
6. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi
7. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

B21HC0306	**Food Microbiology**	L	T	P	C
Duration: 2 hrs/wk	**Practicals**	0	0	2	2

Prerequisites:

Elementary knowledge of Microbes, Food & Nutrition

Objectives:

1. To provide a working knowledge of the important concepts in food microbiology
2. To gain idea and application of Microbiology in food industry, food sanitation and public health research**.**

Course Outcomes: After completing the course the student shall be able to

CO1. Identify and use techniques of microbial growth, factors affecting the growth of micro-organisms in food, various sources of contamination and principles of food spoilage

CO2. Prepare special and nurients media suitable for growth of different microbes

CO3. Explain the different techniques used for microbial examination of food

CO4. Identify & describe the principles and methods of food preservation.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0306	CO1	1	2	3	3	1	1	1	1	1	1	3	1	1
	CO2	2	1	3	3	1	3	2	1	1	--	3	1	1
	CO3	2	2	3	1	1	2	2	2	1	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	1	3	1	1

Course Content: **Total Hours: 3Hrs/Wk**

Experiments: -

1. Study of equipments in a microbiology lab.
2. Basic microbiological techniques.
   a. Cleaning and sterilization of glassware.

b. Preparation of nutrient media, cultivation of bacteria, yeasts and moulds.

c. Plating techniques, isolation of micro-organisms by std. plate count.

3. Staining of bacteria: gram-staining.

4. Microbial analysis of food samples-water, milk and its product, fruits and vegetables, canned foods etc

5. Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products.

6. Visits to one food processing units or any other organization dealing with advanced methods in food microbiology.

B21HC0307	Community & Public Health Nutrition Practical	L	T	P	C
Duration: 2 hrs/wk		0	0	2	2

Prerequisites:

Basic Knowlegde of Nutrition, Macro & Micro nutrients

Course Objective:

3. To study the basic concept of community nutrition and to learn the major nutritional problems, their prevention and control.
4. To know the nnutrition program and policies working towards interests for public health nutrition in India and foreign countries

Course Outcomes: After completing the course the student shall be able to

CO1. Preparing and demonstrating of audio-visual aids contributing to health promotion and disease prevention using clinical, dietary, anthropometric and biochemical measures.

CO2. describe the major causes, impact, Prevention and treatment of Malnutrition, communicable and non-communicable diseases and their pathology**.** and clear understanding about the concept of health care delivery at different levels in a community.

CO3.familiar with concept, elements, channels, functions, methods of communication: demonstration, exhibition in a community

CO4.identify, assess, monitor and evaluate the impact of public health programs through visit to a Community setting working to combat Nutrition related Problems(school/ anganwadi/old age home)

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0307	CO1	1	1	3	3	1	1	1	1	--	1	3	1	2
	CO2	3	1	2	2	1	2	2	1	--	1	3	2	3
	CO3	2	2	3	2	1	2	1	2	1	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2

Course Content: **Total Hours: 3Hrs/Wk**

Experments:

1. Preparation and demonstration of audio-visual aids: poster, bar diagram, pie diagram, flash card, flip chart, pull chart, tree chart, power point presentation etc.
2. Assessment of nutritional status by anthropometric methods.
3. Assessment of nutritional status by dietary methods.
4. Planning and preparation of indigenous low cost, nutritious recipe suitable for various vulnerable group
5. Planning and organizing a demonstration/exhibition
6. Visit to community setting working to combat nutrition related Problems: school/ anganwadi/ old age home

B21HC0308	Clinical Nutrition-I Practical	L	T	P	C
Duration: 3 hrs/wk		0	0	2	2

Prerequisites:
Elementary knowledge on RDA, EAR, basic dietary principles of different disease conditions.

Course Objective:

3. To understand the basics of clinical nutrition.
4. To know the diet therapy for infection, fever, gastro-intestinal disorders, cardiovascular disorders, liver disease, burn & weight management.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0308	CO1	1	1	3	3	1	1	1	2	--	1	3	2	2
	CO2	2	2	3	2	1	3	2	1	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	--	--	3	3	3
	CO4	2	1	2	3	2	2	1	3	--	--	3	2	3

Course Content: **Total Hours: 3 hrs/ Wk**

Experiments: -

1. Planning and preparation of following diets:
    a. Regular diet.
    b. clear Liquid diet
    c. full liquid diet
    d. soft diet
    e. High and low caloric diet
    f. Low Fibre & residue diet

2. Planning, preparation and calculation of day's diet for following conditions
    a. acute and chronic febrile condition

    b. obesity & underweight,
    c. Peptic ulcer
    d. diarrhoea, constipation

3. Planning, preparation and calculation of day's diet for following conditions
    a. Hypertension and Atherosclerosis
    b. Viral hepatitis and cirrhosis

4. Planning, preparation and calculation of day's diet for following conditions
a. Low-cost diet for P.E.M

b. Anemia
c. vitamin A deficiency

SEMESTER IV

Course Code	Duration	Course Title	L	T	P	C
B21HS0401	**16 weeks**	**Environmental Science & health**	2	0	0	2

Prerequisite:

Basic knowledge of Environmental Science studied at higher secondary & school level.

Course Objectives:

1. Influence the new patterns of behaviors of individuals, groups and society as a whole towards theenvironment

2. List the knowledge values, attitudes, commitment and skills needed to protect and improve the environment

Course Outcomes: After completeing this course, the student will be able to**:**

CO1. Discuss Foster clear awareness and concern about economic, social, political and ecological interdependence in urban and ruralarea Adapt the environmental conditions and protectit

CO2. Estimate the role of individual, government and NGO in environmentalprotection**.**

CO3. Interpret the new renewable energy resources with high efficiency throughactive research. throughactive research.

CO4. Analyze the ecological imbalances and protectit

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HS0401	CO1	2	1	1	1				2			2	1	1
	CO2	2	1	2	1	2			2			2	2	2
	CO3	3	2	1	1		1					2	2	2
	CO4	2	1	2	1	2			1			2	1	2

Course Content: **Total Hours: 48Hrs**

Unit-I: **12 hrs**

Linkages Between Environment and Health: Understanding linkages between Environment and Public Health Effect of quality of air, water and soil on health. Perspective on Individual health: Nutritional, socio –cultural and developmental aspects, Dietary diversity for good health; Human developmental indices for public health.

Unit-II: **12 hrs**

Climate Change and Implications on Public Health: Global warming – Agricultural practices (chemical agriculture) and Industrial technologies (use of non-biodegradable materials like plastics, aerosols, refrigerants, pesticides): Manifestations of Climate change on Public Health-Burning of Fossil fuels, automobile emissions and Acid rain. *Environmental Management Policies* and *Practices.* Municipal solid waste management: Definition, sources, characterization

collection and transportation and disposal methods. Solid waste management system in urban and rural areas. Municipal Solid waste rules.

Policies and practices with respect to Environmental Protection Act, Forest Conservation Act,Wild life protection Act, Water and Air Act, Industrial, Biomedical and E waste disposal rules.

Unit-III: **12hrs**

Diseases in Contemporary Society: Definition – need for good health- factors affecting health. Types of diseases – deficiency, infection, pollution diseases-allergies, respiratory, cardiovascular, and cancer Personal hygiene-food – balanced diet. Food habits and cleanliness, food adulterants, avoiding smoking, drugs and alcohol.

Communicable diseases: Mode of transmission –epidemic and endemic diseases. Management of hygiene in public places – Railway stations, Bus stands and other public places. Infectious diseases:

Role of sanitation and poverty case studies on TB, diarrhea, malaria, viral diseases. Non-communicable diseases: Role of Lifestyle and built environment. Diabetes and Hypertension.

Unit-IV: **12 hrs**

Perspectives and Interventions in Public Health: Epidemiological perspective – Disease burden and surveillance; Alternative systems of medicine – Ayurveda, Yoga, Unani, Siddha and Homeopathy (AYUSH); Universal Immunization Programme (UIP); Reproductive health-Youth Unite for Victory on AIDS (YUVA) programme of Government of India. Occupational health hazards-physical-chemical and biological, Occupational diseases-prevention and control.

REFERENCES:-

1. Bridge, J. & Demicco, R. 2008. Earth Surface Processes, Landforms and Sediment deposits. Cambridge University Press.
2. Duff, P. M. D. and Duff, D. (Eds.). 1993. Holmes' Principles of Physical Geology. Taylor & Francis.
3. Gupta, A. K., Anderson, D. M., & Overpeck, J. T. 2003. Abrupt changes in the Asian southwest monsoon during the Holocene and their links to the North Atlantic Ocean. Nature 421: 354-357.
4. Gupta, A. K., Anderson, D. M., Pandey, D. N., & Singhvi, A. K. 2006. Adaptation and human migration, and evidence of agriculture coincident with changes in the Indian summer monsoon during the Holocene. Current Science 90: 1082-1090.
5. Leeder, M., & Arlucea, M.P. 2005. Physical Processes in Earth and Environmental Sciences.Blackwell Publishing.
6. Pelletier, J. D. 2008. Quantitative Modeling of Earth Surface Processes (Vol. 304). Cambridge: Cambridge University Press. Chicago.

B21HC0402	**Food Service Management**	L	T	P	C
Duration: 2 hrs/wk		2	1	0	3

Prerequisites:

Basic knowledge of management

Course Objective:

1. To develop knowledge in the areas of institutionl food service management.
2. To understand the process of planning, organizing and controlling the management of food and other resources in food service institutions.

Course Outcomes: After completing the course the student shall be able to

CO1. Understand concept of management food service industry, welfare and transport industry.
CO2. Acquire knowledge on Layout of kitchens and types of kitchens.
CO3. Learn about Quantity food service, equipments and menu planning
CO4. Get a concept of Resource management, Personnel management, Sanitation and safety

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0404	CO1	3	1	1	1	1	1	1	--			1	1	2
	CO2	3	1	1	2	1	1	2	--			2	2	1
	CO3	2	3	2	2	--	1	2	--			1	1	2
	CO4	1	3	3	3	--	1	2	--			2	1	1

Course Content: **Total Hours: 48 Hrs**

UNIT- I

12Hrs

Management-Definition, function, principles, tools of Management- Tangible tools(organization chart, job specification, work schedule, job analysis, budget), Intangible tools(Personality, experiences, decision making and quality of working life) TQM(concept of qulity assurance

Food service industry: Definition – types of catering Formal, semi formal, non formal- Hotel, Motel, Restaurant, Cafeteria and chain hotels.

Welfare – Hospital, School lunch, Residential establishment and Industrial catering.

Transport – Air, Rail, Sea and Space, Miscellaneous – Contract and outdoor.

UNIT – II:

12Hrs

Physical plant and food purchase

Layout of kitchens, types of kitchens – Planning of Receiving preparation, storage and service area with relevant too spacing. Catering equipments, classification based on mode of operation,

Food purchase- Procedures and Factors involved in the selection of food.

Costing- concept of cost, components Material, employee, overhead,)behaviour of cost(fixed, semi fixed, variables), concept of break- even and cost benefit ratio, cost control- food, labour, overhead, hidden cost, pricing of dishes

UNIT – III:

12Hrs

Quantity food service and equipments

Quantity food service: Definition, objectives, styles of service- waiter service, self – service, vending. Mechanics of waiter service.

Equipment: Classification, factors involved in selection, use and care of major equipments, traditional and modern equipment.

Menu planning: Origin of menu, importance of menu planning. Types of menu- table d'hote menu, a la carte, Dujour, theme, static, cycle. French classical menu, food served in kiosk, use of menu, construction of menus, Menu Design, Factors affecting menu planning. Standardisation of Recipes and portion control.

UNIT – IV

12Hrs

Management- Definition, principles, Functions and tools of management, qualities of a good leader, styles of leadership.

Resource management – Money, Time, Energy, Computer applications in menu planning.

Personnel management- Recruitment, selection and induction. Financial management- Cost control- methods of food cost control, Book- keeping; advantages of the double entry system.

Sanitation and safety – Sanitation of Plant and Kitchen Hygiene, Personal Hygiene, First aid principles and practice, Health and Safety at at work. Use of fire extinguishers.

REFERENCES :-

1. Kaufman, R. Mega planning- Practical tools for Organisational Success, Sage Publications Inc, 2000.
2. Shring Y, P. Effective Food Service Management, Anmol publications Pvt Ltd,New Delhi, 2001. 3. Stephen, B, Williams, S, R, "Bill Jardine, and Richard, J, N, Introduction to Catering,
3. Ingredients for Success, Delmar- Thomson learning, 2001.
4. Yadav, C, P. Management of Hotel and Catering Industry, Anmol publications Pvt
5. Ltd and Institute of sustainable development, Lucknow, New Delhi, 2001
6. Mohini Sethi and Surjeet Malham, "Catering Management – an integrated approach", 2nd edition, Wiley Eastern Limited, New Delhi, Reprint 2007.

Course Code	Duration	Course Title	L	T	P	C
B21HC0403	**16 weeks**	**Food Product Development and Quality control**	2	1	0	3

Prerequisite:

Basic knowledge on Food Product and ways to improvise them

Course objectives:

1. To Demonstrate knowledge of principles of menu planning through creating an appropriate menu for institutional feeding to meet needs of target population

Standardized Recipes

1. Discuss need for Quantity Food Production Techniques, Terminology, and Equipment, to apply the principles of sanitation and safety to foodservice, and recognize the impact on consumers

Course outcomes: After completing the course the student shall be able to

CO1. Demonstrate the ability to plan nutritient enhanced products.

CO2. Understand the development of new food product and organoleptic testing panels.

CO3. To gain knowledge on Sensory Evaluation Tests.

CO4. Gain market acceptance factors Regulations in quality control.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0403	CO1	1	3	2	2	--	1	2	--			2	1	1
	CO2	1	3	3	2	--	--	1	--			2	2	1

	CO3	2	3	2	3	--	--	--	--			1	1	2
	CO4	2	3	2	3	--	--	--	--			1	1	2

Course Content: **Total Hours: 48Hrs**

UNIT-I **12 hours**

New food product- Definition, Food needs and consumer preference: need for new products, factors shaping new product development- social concern, health concern, impact of market place influence and technology. Information required prior to launching a new product. Designing new products -- new food product development process and activities; Planning stages, Prerequisites of a successful product development, the concept of added value

UNIT-II **12 hours**

Food product development tool: Organoleptic testing panels- export profile panels, primary sensory panels and secondary sensory panels; Research guidance panels- purpose, panel organization, utility of results. Product Development and Quality Evaluation -- Standardization of food products (laboratory level, Scaling up, Understand sale and profit margin), Shelf life studies – chemical and microbiological parameters

UNIT-III **12 hours**

Sensory Characteristics of Food and Selection of Panel -- Colour, Texture, Consistency, Taste and odor; Effect of temperature on sensory characteristics of foods; Panels for Sensory Evaluation Types of panels, Training the panel members, Number of panel members for different tests); Types of Sensory Evaluation Tests -- Discriminative / Difference Test, Quality Test, Rating Test, Food Samples for Evaluation, Quality control: Need, role of government and industry in quality control, design of company quality assurance program, objectives of quality assurance activity, raw material quality assurance, in-process quality assurance and finished product quality assurance,

UNIT-IV **12 hours**

Advertisement and Marketing -- product performance testing; market positioning, marketing; developing test market strategies, various tools and methodologies to evaluate consumer attitudes, preferences and market acceptance factors Regulations in quality control: FAO/WHO Codex Alimentarious commission, PFA, AGMARK, BIS, FPO, CPA, fair average quality (FAQ) specifications for food grains, ISO 9000 series; HACCPbackground, principles, benefits and limitations; FSSAI

REFERENCES :-

1. Norman W. Desroisier, James N. Desrosier, The Technology of Food Preservation, fourth edition, CBS Publishers and distributors, Delhi.
2. Mark Clute, Food Industry Quality Control Systems, CRC Press, 2008.
3. Inteaz Alli, Food Quality Assurance: Principles and Practices, CRC Press, 2003.

Course Code	Duration	Course Title	L	T	P	C
B21HC0404	16 weeks	**Bakery Science**	2	1	0	3

Prerequisite:
Basic knowledge of Food Science Principles

Course objectives:

1. To Demonstrate knowledge of food science principles in baking industry to meet needs of target population using Standardized Recipes
2. Discuss need for developing Bakery products using advanced relevant technology

Course outcomes: After completing the course the student shall be able to

CO1. Know types of baked and confectionary products and equipments used in it.

CO2. Understand principles involved in the yeast product preparation and pastries.

CO3. Learn about Principles involved in the preparation of cake, Types and Preparation Methods Butter cream – royal icing, American frosting, preparation Methodsof Pastries

CO4. Gain knowledge on preparation, methods for mixing of cookies, types, faults and remedies in baked biscuits and cookies.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0402	CO1	3	3	2	2	1	2	2	2			2	2	1
	CO2	3	3	2	2	1	3	2	2			1	1	2
	CO3	3	3	1	2	1	2	3	3			2	1	2
	CO4	3	3	1	2	1	3	3	3			2	1	1

Course Content: **Total Hours: 48Hrs**

UNIT- I **12 hours**

Introduction of bakery–definition, principles, types of baked and confectionary products. Major and minor equipment – required to start a small bakery unit. Major and minor ingredient in baking
a) Major ingredients – flour, fat, sugar and leavening agent – types, role in bakery
b) Minor ingredients – milk, water, salt – types, role in bakery

UNIT -II **12 hours**

BREAD: a) Principles involved in the yeast products preparation, methods – straight dough method, salt delayed method, no dough time method, sponge and dough method, ferment and dough method.
b) Processing – flying fermentation, bulk fermentation, knock back, dividing and rounding, intermediate proofing, molding and panning, final proofing, baking, depanning, cooling, slicing, packaging.
c) Faults and remedies in baked bread, types of bread improvers.

UNIT- III **12 hours**

CAKE: a) Principles involved in the preparation of cake, sponge cake – types (fatless sponge, Genoese sponge, plain sponge, gel sponge).

b) Methods – sugar batter method, flour batter method, blending method, boiling method, sugar water method, all-in process method (slow speed, medium speed, fast speed), foaming method.

c) Faults and remedies in baked cakes

ICING –Types and Preparation Methods Butter cream – royal icing - almonds paste (or) marzipau – fondant icing – gum paste (or) pastillage – American frosting – water icing (or) glace icing.

PASTRIES and preparation Methods Pastries – types, short crust pastry – puff pastry – flaky pastry – philo (or) filo pastry – choure pastry – punish pastry – faults and their causes in making pastry

UNIT- IV **12 hours**

BISCUITS AND COOKIES: a) Principles involved in cookies preparation, methods for mixing cookies – single or one stage method, creaming or sugar batter method, blending or rub in method, foaming method, flour batter method.

b) Types – sheeted types, piped types, bar types, dropped types, rolled types

i. Different between biscuits and cookies

ii. Faults and remedies in baked biscuits and cookies

REFERENCES: -

1. Wayne Gisslen, The Professional Baking, Sixth Edition, Publishers John Wiley & Sons (2012).
2. Pat Sinclair, Basic Baking, Publisher Agate (2006).
3. John Kingslee, Professional Text to Bakery and Confectionary, First Edition, New Age International (P) Limited Publishers (2006).
4. Yogambal Ashokkumar Theory of Bakery and Confectionery, Fifth Edition, PHI Learning Private Limited, New Delhi (2009).

Course Code	Duration	Course Title	L	T	P	C
B21HC0405	**16 weeks**	**Food Packageing**	2	1	0	3

Prerequisite:

Basic knowledge of Nutrition

Course objectives:

1. To Demonstrate knowledge of principles of Food packaging
2. Discuss need for Quality Food Packaging Techniques, Terminology, and Equipment, to apply the principles of Packaging to foodservice, and recognize the impact on consumers

Course outcomes: After completing the course the student shall be able to

CO1. Learn the functions of packaging and usage of various packaging materials.

CO2. Understand the usage of Plastic, Papers, Aseptic packaging.

CO3. To know the types of packaging**.**

CO4. Understand the applications of nanotechnology in food packaging and its benefits.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0401	CO1	3	3	3	3	1	1	3	2			2	1	1
	CO2	3	2	1	3	1	3	1	3			2	1	2
	CO3	3	1	1	3	1	3	1	2			2	2	1
	CO4	3	3	3	3	1	3	2	3			1	1	2

Course Content: **Total Hours: 48Hrs**

UNIT-I

12Hrs

Food packaging- Definition, functions and levels of packaging.

Packaging materials: Introduction, purpose, requirements and characteristics of packaging materials. Packaging materials for processed foods: Metal cans- Types and their recommended uses. Glass containers- Characteristics, advantages and surface treatments.

UNIT-II

12Hrs

Plastics: General properties, pack requirements, applications, types of packaging plastics- PET, HDPE, PVC, LDPE, PP and PS; plastic films- types and applications; advantages of usage of plastic in food packaging; shrink and stretch films- properties, advantages and disadvantages.

Papers: Types, uses in packaging; corrugated board and solid fiber board- introduction.

Aseptic packaging: Introduction and heating systems involved

UNIT-III

12Hrs

Modified atmosphere packaging (MAP): Definition, gases used in MAP, types and active packaging. Microwave enable packages: Meaning and advantages.

Retortable packages: Types and advantages. Packaging of cereals: Storage of wheat, rice, breakfast cereals and pasta. Packaging of dairy products: Packaging materials used in dairy industries.

Packaging of fruits and vegetables: Packaging of fresh produce and packaging of minimally processed fruits and vegetables. Packaging of meat: Packaging of fresh meat, poultry and eggs

UNIT-IV

12Hrs

Application of nanotechnology in food packaging and its benefits. Future of food packaging: Smart packaging and activated packaging; RFID tags in packaging, intelligent packaging, self heating and

self chilling packages. Labeling: Definition, purpose, types, materials used, regulations, recent trends, thermo chromic labeling.

REFERENCES

1. NIIR Board of consultants and engineers, Food packaging technology, Hand book, NIIR, Delhi.
2. Neelam Khetarpaul and Darshan Punia, Food Packaging, Daya publishing house, New Delhi. 2012.
3. Vijaya Khader, Text book of food science and technology, Indian council of agricultural research, New Delhi, 2001.

Course Code	Duration	Practicals	L	T	P	C
B21HC0405	16 weeks	**Bakery Science Practical**	0	0	2	2

Prerequisite:
Basic knowledge of Food Science Principles

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0405	CO1	1	2	3	3	1	1	1	1	1	1	3	1	1
	CO2	2	1	3	3	1	3	2	2	2	1	2	1	1
	CO3	2	2	3	1	1	2	2	2	1	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	1	1	3	1	1

Course Content: **Total Hours: 3Hrs/ wk**
Experiments:

1. Preparation of pizza base and assessment of its quality
2. Preparation of bread and assessment of its quality
3. Preparation of buns and assessment of quality
4. Preparation of butter cake and assessment of its quality.
5. Preparation of sponge cake with icing and assessment of its quality.
6. Preparation of biscuit and assessment of quality.

Course Code	Duration	Practicals	L	T	P	C
B21HC0406	16 weeks	**Food Product Development Practical**	0	0	2	2

Prerequisite:
Basic knowledge on Food Product and ways to improvise them

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0406	CO1	1	1	2	3	2	1	1	2	1	1	2	2	2

	CO2	2	2	3	2	2	3	2	1	1	--	3	3	2
	CO3	2	2	1	3	1	2	2	2	1	1	3	3	3
	CO4	2	1	2	2	3	2	1	3	1	1	3	2	3

Course Content: **Total Hours: 3Hrs/ wk**

Experiments:

1. Market survey to identify the concepts of new products based on special dietary requirements, functionality, convenience and improvisation of existing traditional Indian foods.
2. Development of new product and Standardization of formulation process.
3. Proximate Analysis of New Product
4. Training of sensory panel to perform sensitivity tests for four basic tastes
5. sensory evaluation of new Product
6. Packaging, labeling and shelf-life studies
7. Cost analysis and Final Project Report

B21HC0407	**Food Service Management**	L	T	P	C
Duration: 2 hrs/wk	**Practicals**	**0**	**0**	**2**	**2**

Prerequisites:

Basic knowledge of management

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0407	CO1	1	1	2	3	1	1	1	2	1	1	3	2	2
	CO2	2	2	3	2	2	3	2	1	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	1	1	3	3	3
	CO4	2	1	2	2	3	2	1	3	--	1	3	2	3

Course Content: **Total Hours: 3Hrs/Wk**

Experiments: -

1. Visit to a food service institution (Commercial and Charitable) and Preparation of a report on that
2. Survey on types of equipments used in food production and service area
3. Plan a menu for hospital food service for patients (Waiter service)
4. Plan a menu for Industrial canteen (Table de Hote Menu)
5. Plan a menu for Five star hotel (A -la -carte Menu)
6. Plan a menu for College hostel (A week's cyclic menu)
7. Plan a menu for Preparation of Market list, cost and selling price calculation of a given lunch
8. Practice and demonstrate any four types of serviettes folding

9. Plan a menu for Table setting and formal service for
10. Plan a menu for Indian Lunch/ dinner of North India cuisine & South India cuisine.

SEMESTER V

Course Code	Duration	Course Title	L	T	P	C
B21HC0501	**16 weeks**	**Nutrition for Sports and Exercise**	2	0	0	2

Prerequisites:

Prior knowledge of Nutrition, Sports types

Course Objectives:

To learn the relationship between Physical fitness & Nutrition

To study the nutritional requirement of Athletes & Fitness enthusiasts

Course Outcomes: After completing the course the student shall be able to

CO1. Learn different Physical activity, Body composition and their relation to Nutrition

CO2. Gain Knowledge on Utilisation of Carbohydrates & Protein in different phase of Sports Specific preparatory phase, Competition phase, Transition phase, Injury and rehabilitation phase - Pre-competition - Post competition condition.

CO3. Acquire ideas on Role of Lipids & Electrolytes in Sports Performance

CO4. Learn about ergogenic aids, Fluid replacement, requirements of female athletes, sports related complications

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0501	CO1	3	2	3	3	1	1	2	3			1	1	2
	CO2	2	3	2	3	1	1	2	3			2	2	1
	CO3	3	3	2	2	1	1	2	3			1	1	2
	CO4	2	3	1	3	1	1	2	3			1	2	2

Course Content: **Total Hours: 48Hrs**

Unit I

12hrs

Definition of physical fitness, Benefits of Fitness, Body's response to physical activity- Weight training, cardiorespiratory conditioning, muscle conditioning, Physical activity pyramid. Balanced fitness program. Energy cost of various physical activities including sports and exercise. Human Body Composition: Significance of studying body composition. Two

compartment and multiple compartment models. Methods of Assessment: Nutritional Anthropometry, BOD POD, Bioelectric impedance, DEXA, Whole body K counter. Factors affecting body composition: Age, Body weight, physical activity. Energy intake and energy expenditure - thermogenesis - SDA of foods - Pre competition Nutrition - Post competition nutrition

Unit II **12hrs**

Carbohydrates types - Simple sugars - complex carbohydrates - Glycemic index - Glycemic load - food sources - Muscle glycogen & performance - Consumption of carb (what, when & how much?) – carb loading - Carbohydrates in sports: - during training, during different phases of Preparation, General preparatory phase, Specific preparatory phase, Competition phase, Transition phase, Injury and rehabilitation phase - Pre competition Nutrition - Post competition nutrition. Protein - Amino acids, essential, non-essential - Types and quality of protein - Protein intake and performance - Daily protein requirement - Type of exercise and Protein requirements in sport - different type of sports and their protein requirement - Protein sparing - Protein intake (what, when and how much) - Protein in sports :- during training, during different phases of Preparation, General preparatory phase, Specific preparatory phase, Competition phase, Transition phase , Injury and rehabilitation phase - Pre competition Nutrition - Post competition nutrition

Unit III

12 hrs

Fat - types, Saturated and Unsaturated fats, Trans fatty acids - Essential Fats - Fat Intake (what, when and how much) - Cholesterol - Fats in sports :- during training, during different phases of Preparation, General preparatory phase, Specific preparatory phase, Competition phase, Transition phase , Injury and rehabilitation phase. Hydration - Pre competition Hydration, The Week before, the day before, on the day. Homeostasis: Fluid & Electrolyte Fluid loss - Sweat - Thermoregulation Core & Shell temperature - Effect of Climate & Environment - Dehydration & Performance - Assessing Fluid loss - Proper Pre-Hydration, Rehydration / fluid replacement (what, when & how much) - Electrolytes - Role of electrolytes in Muscular contraction- Electrolyte loss & exercise - Maintaining / Restoring electrolyte Balance - Sports &Energy drinks - Osmolality &osmolarity - Hypotonic, Isotonic, Hypertonic

Unit IV

12 hrs

Micronutrients- vitamins and minerals, Antioxidants, electrolytes - Definition of vitamins, Minerals - Fat soluble, Water soluble vitamins - Role of Vitamins - RDA - Deficiency - Vitamins and Performance - Minerals - Iron, calcium - RDA - Minerals role in Performance - deficiency - Iron deficiency - role of electrolytes in Sport & performance - Antioxidants - free radicals & exercise – Ergogenic aids: Definition of Ergogenic aids - Popular and famous Ergogenic aids Nutritional supplementation for performance enhancement Actions & side effects of steroids – Nutrition for female athlete - female athlete triad - eating disorders – athletic amenorrhea, Sports anemia, Weight imbalance - nutrition for preventing weight gain - nutrition for preventing muscle loss - nutrition for weight gain.

REFERENCES

1. Gordan.M. Wardlaw, Perspectives in Nutrition, fourth edition, Mc. Graw Hill companies. 1999.
2. Antia. F.P. and Philip Abraham, Clinical dietetics and Nutrition, fourth edition, Oxford University Press. 2002.
3. L. Kathleen Mahan, Sylvia Escott-stump, Krause's Food, Nutrition and Diet therapy, ninth edition, W.B. Saunders company., 1996.
4. Don Benordot, Advanced sports nutrition, second edition, Human Kinetics, 2012.
5. William D. McArdle, FrankL.Katch, Victor L. Katch: Exercise Physiology, Seventh edition-Nutrition, Energy and Human Performance 2010.
6. Heather Hedrick Fink, Lisa A. Burgoon, Alan E. Mikesky: Practical Applications in Sports Nutrition, 2nd edition 2009
7. Edward, H and Terjuny R.: Exercise Nutrition and Energy Metabolism, McMillan Pub.Co,1988.
8. Shils.M.E, Olson and Shike: Modern Nutrition in Health and Disease.

Course Code	Duration	Course Title	L	T	P	C
B21HC0502	16 weeks	**Food Processing**	2	1	0	3

Prerequisite:

Basic knowledge on Food chemistry & microbiology

Course objectives:

1. To gather knowledge in preveniting food contamination, food storage & transportation
2. To gain knowledge about turning food materials into attractive, commercial products, avoid food adulteration

Course outcomes: After completing the course the student shall be able to

CO1. Know about Scope and importance of food processing. Cereal Processing, Potato processing, Fish processing

CO2. understand Decortication processing of legumes, effect of processing of legumes on their nutrient composition and quantity and quality

CO3. Learn about Processing of oil seeds, packing and storage of fats and oils, change during storage of oils, Oil speciality products, processing oil seeds for food use

CO4. develop knowledge on processing of fruits and vegetables juice concentrates and powders, Processing of milk, Poultry and egg powder

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0502	CO1	3	2	2	1	--	1	--	--			1	2	2

	CO2	2	2	2	2	--	--	--	--			2	2	1
	CO3	3	1	1	2	--	1	1	--			1	1	2
	CO4	2	3	3	1	--	1	--	--			1	2	2

Course Content: **Total Hours: 48Hrs**

UNIT-I **12 hours**

Scope and importance of food processing. Cereal – processing of raw and parboiled rice and rice products- Puffing and flaking. Wheat and corn processing, Products of wheat and corn, Potato processing – potato chip, flakes and powder. Fish processing –canning, freezing, drying, salting, smoking and curing, uses of by-products

UNIT-II **12 hours**

Decortication processing of legumes, effect of processing of legumes on their nutrient composition and quantity and quality, quick cooking legumes, instant legume powders, legume protein concentrates, legume processing and storage of legumes.Meat processing - curing and smoking

UNIT III **12 hours**

Processing of oil seeds, packing and storage of fats and oils, change during storage of oils. Oil speciality products-margarine, mayonnaise, salad dressing and fat substitutes, Nutritional food mixes from oilseeds – processing oil seeds for food use, protein enriched foods

UNIT IV **12 hours**

Storage and handling of fresh fruits and vegetables, processing of fruits and vegetables juice concentrates and powders, by- products from fruits and vegetables waste. Canning process of fruits and vegetables. Cultivation of mushroom and its processed products.

Processing of milk, manufacture of butter, paneer and cheese., Poultry and egg powder – processing and storage.

REFERENCES:-

1. Norman N. P. and Joseph H.H, Food science, CBS Publishing New Delhi, 1997.
2. Stadelman W.J., Olson V.M, Shemwell G.A and Parch S., Egg and poultry meat processing, Elliwood Ltd, 1998.
3. Subbulakshmi G., Shobha A. Udipi, Food processing and preservation, New age international Publisher, New Delhi, 2008.
4. Sivasankar B., Food Processing and Preservation, PHI Learning private limited, New Delhi, 2015.
5. Sumati R. Mudambi, M.V. Rajagopal., Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi, 2015.

Course Code	Duration	Course Title	L	T	P	C

B21HC0503	16 weeks	Basics of Bioinformatics	2	1	0	3

Pre-requisites:
basic knowledge of computers and mathematics.

Course Objective:
1. To understand the importance of computer science in Nutrition sciences.
2. To understand the tools, databases and softwares used in Nutrition data understanding and interpretation.

Course Outcomes: After completing the course the student shall be able to

CO1. Understand fundamental knowledge, features of computers and their application in Nutrition data processing, computer memory

CO2. Acquire knowledge on Computer hardware, software, Nutritional Indian database & its application

CO3. Learn about An overview of MS WORD, MS EXCEL and MS POWERPOINT. Elements of BASIC programming. Simple illustrations

CO4. Application aspects of bioinformatics, search engines and softwares used in Diet calculations and its application, Use of e- audiovisual aids and its application in nutrirtion education.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0503	CO1	3	3	2	1	1	1	2	3			1	2	2
	CO2	2	3	3	2	1	1	2	2			1	1	2
	CO3	3	2	3	1	1	2	3	2			1	1	1
	CO4	2	3	2	1	1	1	2	2			2		1

Course Content: **Total Hours: 48Hrs**

UNIT – I **12 hours**

General features of a Computer. Generation of computers. Personal Computer, workstation, Mainframe Computer and super Computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia.

Computer organization. Central processing unit. Computer memory primary memory and secondary memory. Secondary storage devices – magnetic and optical media. Input and output units. OMR, OCR, MICR, scanner, mouse. Modem.

UNIT-II **12 hours**

Computer hardware and software. Machine language and high-level language. Application software. Computer program. Operating system. Computer virus, antivirus and Computer security. Elements of MS DOS and Windows OS. Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

UNIT – II **12 hours**

Word processing and electronic spread sheet. An overview of MS WORD, MS EXCEL and MS POWERPOINT. Elements of BASIC programming. Simple illustrations. Network of computers. Types of networks. LAN, Intranet and Internet. Internet applications. World Wide Web. E-mail, browsing and searching. Search engines. Multimedia applications.

UNIT-IV **12 hours**

Introduction and history of bioinformatics. Database browsers and search engines, Pathway Databases, Entry formats. Application aspects of bioinformatics, search engines and softwares used in Diet calculations and its application, Use of e- audiovisual aids and its application in nutrirtion education.

REFERENCES: -

1. Alexis Leon and Mathews Leon (1999): Fundamentals of information technology, Leon Techworld Pub.
2. Jain, S.K. (1999): Information Technology "O" level made simple, BPB Pub.
3. Jain, V.K. (2000): "O" Level Personal Computer Software, BPB Pub.
4. Rajaraman, V. (1999): Fundamentals of Computers, Prentice Hall India.
5. Hamacher, Computer Organisation, Mc Graw.
6. Sinha, Computer Fundamentals, BPB Pub.

Course Code	Duration	Course Title	L	T	P	C
B21HC0504	**16 weeks**	**Quality Food Service and physical facilities**	2	1	0	3

Prerequisite:

Basic knowledge on Food service and nutrition

Course objectives:

1. To Demonstrate knowledge of principles of menu planning through creating an appropriate menu for institutional feeding to meet needs of target population

Standardized Recipes

3. Discuss need for Quantity Food Production Techniques, Terminology, and Equipment, to apply the principles of sanitation and safety to foodservice, and recognize the impact on consumers

Course outcomes: After completing the course the student shall be able to

CO1. demonstrate the ability to plan nutritious, appealing food combinations and menu patterns that meet the needs of the defined clientele within economic and physical limitations of a food service facility.

CO2. understand the use of Space organization and storage of foods in limited sourse of equipments available

CO3. Learn about food distribution systems and the role of marketing and merchandising in the business of food service**.** learn the biological, physical, and chemical changes which occur when food is cooked and stored

CO4. develop knowledge of Menu planning, standardization of recipes and different food service system

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0504	CO1	3	3	1	3	1	2	3	1			1	2	1
	CO2	3	3	1	3	1	2	3	1			1	1	2
	CO3	3	3	1	3	1	2	3	1			1	2	2
	CO4	3	3	1	3	1	2	3	1			1	1	1

Course Content: **Total Hours: 48 Hrs**

UNIT-I **12 Hrs**

Quality food service: Meaning and evolution.

Classification of food service institutions according to

a. Function: Profit oriented, service oriented and public health facility oriented.

b. Processing method: Conventional system, commissary system and fast-food service systems.

c. Service of food: Self service, tray service and waiter-waitress service.

UNIT-II **12 Hrs**

Space organization: Kitchen- Size and type; developing kitchen plan; work simplification- work area, worker's area of reach, work space, equipment materials and supplies and movement at work; features to be considered in designing kitchen; kitchen lay out.

Storage space: Location, planning, lay out, safety and security. Service area: Location, planning, dimensions and decor.

Equipments: Classification, selection, design, installation, operation, care and maintenance of commonly used equipments

UNIT-III **12 Hrs**

Food purchasing: Food buyer- Knowledge, quality and functions of a food buyer; methods of buying food.

Receiving and storage of food: Delivery methods, delivery procedure; Receiving; Storage- organization of storages, general procedure for storage; Store keeping- store records, order form and goods received book.

UNIT-IV **12 Hrs**

Menu planning: Menu- Definition, functions, need for and factors to be considered in menu planning, procedure for writing menu, types and construction of menu, menu display.

Standardization of recipe: Definition, methods of standardization, standard recipe format and uses.

Standard portion sizes: Definition, portioning equipments and portion control.

Food production: Meaning, types of food production system, process of food production (Briefly), large quantity cooking techniques, use of leftover food and holding techniques.

Food service: Meaning, styles- waiter service, self service and vending.

REFERENCES:-

1. Mohini Sethi and Surjeet Malhan, Catering management- An integrated approach, Third edition, New Age International publishers. 2015.

2. Mohini Sethi, Institutional food management, Second edition, New Age International publishers.2016.

3. Kinton, R and Cesarani, V., The Theory of Catering ELBS, VII Edition, 1992.
4. Lillicap, D.R and Cousins, J.A. Food and Beverage Service, ELBS, IV Edition, 1994.
5. Fellow, P., Food Processing Technology – Principles and Practices, 2nd Edition, CRC Press Woodland Publishers, England, 2000.
6. Sommers, C.H. and Xveteng Fan, Food Irradiation Research and Technology, Blackwell Publishing, 2006.

Course Code	Duration	Course Title	L	T	P	C
B21HC0505	16 weeks	**Clinical Nutrition-II**	2	1	0	3

Prerequisites:

Theoretical knowledge of general Principles of Meal planning, RDA, EAR

Course Objective:

1. To understand the basics of clinical nutrition.
2. To know the diet therapy for diabetes mellitus, renal, metabolic and genetic disorders, cancer and HIV

Course Outcome: After completing the course the student shall be able to

CO1: Understand about dietary modifications on for patients suffering from diabetes mellitus and renal disorders.

CO2: Achieve knowledge about specific food allergies and how to overcome them. Also know about dietary modifications for genetic and metabolic disorders.

CO3: Learn about dietary modifications on cancer and HIV/AIDS patients. Also know about nutrient drug interations.

CO4: Know about Nutritional problems in infants - Preterm baby- nutritional requirement, feeding problems, management.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
B21HC0505	CO1	1	3	2	2	--	--	1	--			2	2	2
	CO2	1	3	3	2	--	--	1	--			1	2	1
	CO3	2	2	2	2	--	1	1	--			2		1
	CO4	1	2	2	1	--	--	1	--			1	2	2

Course Content: **Total Hours: 3Hrs/ wk**

UNIT – I **12 hours**

Diet in Diabetes Mellitus: Definition, prevalence, types (IDDM, NIDDM, GDM, MRDM), etiology, symptoms, Factors Influencing, Risk Factors – Clinical Characteristics, Metabolic changes in Diabetes, Diagnosis of Diabetes Mellitus (1) Blood Glucose Levels, a) Glycosuria , b) Ketonuria

(2)Oral Glucose Tolerance Test (3) Glycosylated Hemoglobin, (4)SBGM, Complications of Diabetes-Hypoglycemia, DKA, Fasting Hyperglycemia

Long term Complications-Macro vascular and Micro vascular, Diseases, Management - Principles of Nutritional Therapy-i) Care of Insulin Dependent Diabetes Mellitus, (ii) Insulin Therapy
Care of Non-Insulin Dependent Diabetes, food exchange, glycaemic index of food, glycaemic load, carbohydrate counting, OHA, insulin- types and uses.
Diet in Renal Disorders: Renal Function in Disease, Etiology, Clinical Symptoms and Course of Disease, Treatment – Dietary Management, Feeding Pattern for (i) Glomerulonephritis, (ii) Nephrotic Syndrome, (iii) Chronic Kidney disease, (iv) Kidney Dialysis and (v) Transplantation (brief)
Renal Calculi: type, nutritional requirement, complications and management.

UNIT – II **12 hours**

Food sensitivity (food allergy): types of reaction, Foods involved in sensitivity, differences between food allergy and food intolerances, Lactose intolerance, gluten intolerances- symptoms, diagnosis, dietary management (elimination diet),
Diet in genetic disorders (Inborn error of metabolism): Phenylketoneurea, galactosemia, fructosuria
Diet in Metabolic disorders- Gout-etiology, Symptoms, treatment

UNIT – III **12 hours**
Diet in cancer: Pathophysiology, Causes, Types, Treatment-Nutrition and Medical management, Role of Antioxidants, Nutritional problems in cancer treatment, **Nutrition in Immune system dysfunction HIV/AIDS:** definition, stages, Nutritional requirements, dietary management
Nutrients – drug interaction: effect of drugs on Food intake, digestion, absorption, transportation and excretion

UNIT – IV **12 hours**
Diet for cardio vascular disease: Dyslipademia- Introduction, Etiology, Multiple Risk Factors, Treatment, Diet and Feeding Pattern, Food to be avoided and included ,Atherosclerosis – Introduction, Etiology, Multiple Risk Factors, Treatment, Diet and Feeding Pattern, Food to be avoided and included, Hypertension – Classification, Risk Factors, Symptoms, Dietary Management; Acute and chronic Cardiovascular Disease – MI – Dietary Management

REFERENCES :-

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi
2. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
3. Robinson,C.H;Lawler,M.R.Chenoweth,W.L;and Garwick,A.E(1986):Normal and Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co
4. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.

5. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi
6. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis

Course Code	Duration	Practicals	L	T	P	C
B21HC0506	16 weeks	Assesment of Food Quality Practical	0	0	2	2

Prerequisite:

Basic knowledge on Food Product and ways to improvise them

Course objectives:

1. To Demonstrate knowledge of principles Proximate analysis, gluten content, pectin content
2. To learn Morphology and structural features of various bacteria and fungi commonly associated with Foods

Course outcomes: After completing the course the student shall be able to

CO1. demonstrate the ability to estimate titrable acidity, pectin content of foods and lactose.

CO2. understand the use of pecific gravity of milk using lactometer.

CO3. Learn about Proximate analysis of foods, Tests for identification of adulterants present in commonly used foods.

CO4. Gain Further knowledge on Isolation of microorganisms by Pure Culture Technique and Microbial count by Standard Plate Count Method

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0506	CO1	1	1	3	3	1	1	--	--	--	1	3	1	1
	CO2	2	1	3	3	1	3	2	--	--	--	3	1	1
	CO3	2	1	3	3	1	2	2	3	--	--	3	1	1
	CO4	2	1	3	3	2	2	1	3	--	--	3	1	1

Course Content: **Total Hours: 3Hrs/ wk**

Experiments:

1. Estimation of titrable acidity, pectin content of foods and lactose.
2. Estimation of specific gravity of milk using lactometer.
3. Determination of gluten content.
4. Determination of sugar concentration of food products using refractometer.
5. Isolation of microorganisms by Pure Culture Technique and Microbial count by Standard Plate Count Method.
6. Morphology and structural features of various bacteria and fungi commonly associated with Foods.
   1. Tests for identification of adulterants present in commonly used foods.

Course Code	Duration	Practicals	L	T	P	C
B21HC0507	16 weeks	Clinical Nutrition-II Practical	0	0	2	2

Prerequisites:
Elementary knowledge on RDA, EAR, basic dietary principles of different disease conditions.

Course Objective:

1.To understand the basics of clinical nutrition.

2.To know the diet therapy for infection, fever, gastro-intestinal disorders, cardiovascular disorders, liver disease, burn & weight management.

Course Outcome: After completing the course the student shall be able to

CO1: Learn about definition, objectives, basic concepts of diet therapy, factors to be considered in planning therapeutic diets for Diabetes

CO2: Achieve knowledge about dietary modifications on specific disese condition like Renal disorders in different age group

CO3: Achieve knowledge about dietary modifications on Gluten Sensitivity, Lactose intolerance

CO4: Know about the nutritional requiremtns and dietary modifications for constipation in old age

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0507	CO1	1	1	3	3	1	1	--	--	--	1	3	1	2
	CO2	3	1	2	3	1	2	2	--	--	--	3	2	3
	CO3	2	1	3	2	1	2	1	2	--	--	3	2	2
	CO4	2	1	2	3	1	3	2	3	--	--	3	1	2

Course Content: **Total Hours: 3Hrs/ wk**

Experiments:

1. Planning, preparation and calculation of day's diet for non-insulin dependent Diabetes mellitus,
2. Planning of snacks. deserts and beverages for diabetes.
3. Planning, preparations and calculation of diet in nephrotic syndrome and Chronic renal failure
4. Planning, preparations and calculation of diet in Cancer
5. Planning, preparations and calculation of day's diet for anaemic Pregnant mother
6. Planning, preparations and calculation of day's diet for constipation in geriatrics
7. Planning, preparations and calculation of day's diet for an adult with gluten sensitivity
8. Planning, preparations and calculation of day's diet for an adult with Lactose intolerance

Course Code	Duration	Practicals	L	T	P	C
B21HC0508	16 weeks	Nutrition for Sports & Exercise Practical	0	0	2	2

Prerequisites:

Prior knowledge of Nutrition, Sports types

Course Objectives:

1. To learn the relationship between Physical fitness & Nutrition.
2. To study the nutritional requirement of Athletes & Fitness enthusiasts

Course Outcomes: After completing the course the student shall be able to

CO1. Learn different Physical activity, Body composition and their relation to Nutrition

CO2. Gain Knowledge on Utilisation of Carbohydrates & Protein in different phase of Sports Specific preparatory phase, Competition phase, Transition phase, Injury and rehabilitation phase - Pre-competition - Post competition condition.

CO3. Acquire ideas on Role of Lipids & Electrolytes in Sports Performance

CO4. Learn about ergogenic aids, Fluid replacement, requirements of female athletes, sports related complications

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0508	CO1	1	1	3	3	1	1	--	2	--	1	3	2	2
	CO2	2	1	3	3	1	3	2	--	--	--	3	3	2
	CO3	2	2	3	3	1	3	2	2	--	--	3	3	3
	CO4	2	1	2	3	2	2	1	3	--	--	3	2	3

Course Content: **Total Hours: 3Hrs/ wk**

Experiments:

1. An online survey on types of Exercise including Aerobics, spinning, tai chi, Yoga, Power yoga, Pilates, weight training, strength training, circuit training, etc.
2. Determination of Physiological age of a person.
3. Visit to a fitness center and conducting study of equipments commonly used in fitness industry, their advantages and limitations.
4. Plan and prepare and calculate a day's diet, pre-game and post-game for a female athlete.
5. Plan energy bar/ sports drink for a sports person to be consumed during the game.
6. To study body composition of obese and person with Normal BMI
7. Anthropometric measurement of one male & female individual: Weight, Height, Fat%, WHR

SEMESTER VI

Course Code	Duration	Course Title	L	T	P	C

B21HC0601	16 weeks	Nutrition counseling	2	1	0	3

Prerequisites:
Basic knowledge of therapeutic & clinical nutrition

Course Objective:
1. To learn basic concept of Diet counselling skills

2. To demonstrate effective counselling skill to individual/ group of clientelle

Course Outcomes: After completing the course the student shall be able to
CO1. Learn about Basics of nutrition counseling, models for behavioural change, trans theoretical model of behaviour change, Motivational interview with clients
CO2. Know about verbal, nonverbal communication skills, counseling skills for resistance behaviour, ABCDE approach
CO3. Gain knowledge of Nutrition Care plan, basics, define goals design goals design plan of action, Assessment
CO4. Learn about Components of counseling process**,** Strategies to promote change-food management tools, behaviour change strategy, cognitive restructuring, education during counseling**,** Making behaviour change

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO1	P02	PO3	PO4	PO5	PO6	P7	PO8	PO9	PO10	PSO1	PSO2	PSO3
B21HC0601	CO1	3	1	1	3	1	2	2	1			2	1	2
	CO2	3	1	1	3	1	2	2	1			2		1
	CO3	3	1	1	3	1	2	2	1			2	2	1
	CO4	3	2	3	3	1	1	2	3			2	1	1

Course Content: **Total Hours: 48Hrs**

Unit- I **12 Hours**

Basic Concepts of Counseling -Definition of Nutrition counseling, models for behavioural change, trans theoretical model of behaviour change.
Motivational interview: principles, motivational intervention model Fundamentals of food behaviour, assessment of readiness to change, client counsellor
Relationship.

Unit -II **12 Hours**

Communication skills-Objectives, verbal, nonverbal communication skills
Skills – listening, response, action process, sharing response, observing, paraphrasing & reflecting
Behaviour change: counseling skills for resistance behaviour
Cultural competence in counseling – ABCDE approach

Unit -III **12 Hours**

Nutritional Care Plan (NCP) - Introduction, goal setting: basics, define goals design, plan of action Dietary assessment-Food intake data collection, data analysis, interpretation, Energy Determination-Determination of REE, physical activity factor (PA), determination of Total Energy Expenditure (TEE). Physical assessment, healthy weight standrads, weight for height tables, BMI and waist

Circumference Documentation-SOAP format.

UNIT-IV **12 Hours**

Components of counseling process-Strategies to promote change-food management tools, behaviour change strategy, cognitive restructuring, education during counseling**,** Making behaviour change last-social network, stress management, relapse prevention,counseling evaluation,

understanding psychology of clients and adopting appropriate intervention: Not ready to change, unsure about change, ready to change, skill development for OARS (open end questions, affirmations, reflective listening, summary statements, Client rights**)**
Evaluation - Measuring the success of performance of client and evaluating the counseling process.

REFERENCES:

1. Bauer Kathleen D, Sokolik Carol, Loiu Doreen, Nutrition Counseling and Education Skill Development, Wadsworth Thomson Learning 2002.
2. Bauer Kathleen D, Sokolik Carol, Basic nutrition counseling skill development, Wadsworth Thomson Learning, 2002
3. Gail Morrison & Lisa Hark, Medical Nutrition & Disease, Blackwell Science Inc
4. Herrin M, Nutrition Counseling in the Treatment of Eating Disorders, New York, NY, Brunner-Routledge, 2003
5. King Kathy, Klawitter Bridget, Nutrition Therapy: Advanced Counseling Skills, Lippincott Williams & Wilkin, 2007.
6. Snetsellar, Linda G, Nutrition Counseling skills for the nutrition care process, 4th Edition Jones & Bartlett Publishers, 2009.
7. Rollnick S, Miller WR, Butler CC, Guilford press, 2008, Motivational Interviewing in Health Care: Helping Patients Change Behaviour (Applications of Motivational Interviewing).

Course Code	Duration	Course Title	L	T	P	C
B21HC0602	**16 weeks**	**Entrepreneurship Development**	2	0	0	2

Prerequisites:

Prior knowledge of Nutrition counselling, management, diet therapy

Course Objective:

1. To understand various dimesnsions of entrepreneurship and using them in field of nutrition

2. To enable student to acquire knowledge to become self dependent

Course Outcomes: After completing the course the student shall be able to

CO1. Define Entreprenurship, Skills required in an entrepreneur, Get an idea of SWOT analysis

CO2. Know about Business plan for small enterprises: Importance of business plan, purpose, contents and benefits of business plan; business plan creation process.

CO3. Conceptualise Meaning, process of conducting market survey, points to be considered for effective market research; steps to register a company; regulatory requirements.

CO4. Learn about Concept of marketing, market assessment, market regulation, market targeting, marketing mix, promotional strategies and tips for successful marketing, Finance management.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0602	CO1	3	2	2	3	1	2	3	3			1	1	1
	CO2	2	3	3	3	1	3	2	2			1	1	2
	CO3	3	2	3	3	1	2	2	3			2	1	1
	CO4	2	3	3	3	1	2	2	3			2	1	1

Course Content: **Total Hours: 48Hrs**

UNIT-I **12 hours**

Entrepreneur: Definition, qualities and essential skills of an entrepreneur, communication and presentation skill; innovativeness; idea generation and SWOT analysis. Steps to start a small enterprise, learning journey of a successful entrepreneur.

UNIT-II **12 hours**

Business plan for small enterprises: Importance of business plan, purpose, contents and benefits of business plan; business plan creation process, preparation of sample business plan. Business ethics and etiquettes

UNIT-III **12 hours**

Market survey: Meaning, process of conducting market survey, points to be considered for effective market research; steps to register a company; regulatory requirements

UNIT-IV **12 hours**

Management process and policies: Importance of policy creation, corporate governance, management process, management functions- production and operation management, marketing management, financial management and human resource management. Pricing policy and methods of pricing.

Marketing management- Concept of marketing, market assessment, market regulation, market targeting, marketing mix, promotional strategies and tips for successful marketing.

Financial needs: Types of financial needs- fixed and working capital; methods of raising capital, working capital management, working capital cycle.

REFERENCES:

1. Entrepreneurship development- Your gateway to the journey of entrepreneurship, ICT Academy of Tamil Nadu, Chennai. 2015.
2. S.S. Khanka, Entrepreneurial development, S. Chand Publications, 2007.
3. Vasant Desai, Entrepreneurial development, Vol-1, Himalaya Publishing House, 2009.

Course Code	Duration	Course Title	L	T	P	C
B21HC0603	**16 weeks**	**Project work**	0	0	10	10

Prerequisites:

Advance knowledge of different courses of Nutrition and Dietitics

Course Objective:

1. To apply knowledge gained during three years of study into real life scenarios.
2. To prepare the student for his/her higher studies

Course Outcomes: After completing the course the student shall be able to

CO1. Carry out an independent research project work in any stream of his / her choice from the field of Nutrition

CO2. Know about application and Use of Nutrition related to Human requirements

CO3. discover unknown facts and principles of Food & Nutrition

CO4. Formulate and device new concepts and hypothesis related to field of Nutrition & dietetics

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/ COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0603	CO1	3	1	1	1	--	--	--	--			1	1	2
	CO2	2	3	2	2	1	--	1	--			2	1	1
	CO3	3	3	2	2	--	--	--	--			2	1	1
	CO4	3	1	1	2	--	--	--	--			2	2	1

Course Content: **Total Hours: 16 wk**

1. An independent research project work undertaken by student under the guidance of a teacher, can either be a survey or Laboratory oriented research. The research should be submitted at the end of session in the form of a dissertation. The project work can be undertaken at university department, affiliated research institutions, quality control laboratories, food industries or other institutions with prior approval.
2. The student should appear before examiners board and the dissertation shall be evaluated by means of presentation and viva - voce

Course Code	Duration	Course Title	L	T	P	C
B21HC0604	**16 weeks**	**Internship**	0	0	5	5

Prerequisites: Prior knowledge of Nutrition counselling, management, diet therapy

Course Objective:

1. To apply knowledge gained during three years of study into real life scenarios.
2. To prepare the student for effective Practice in clinic/ hospital/ industry setting

Course Outcomes: After completing the course the student shall be able to

CO1: Develop counseling competencies in professional practice, nutrition care and management in Dietetic Education and Practice
CO2: Familiarize, identify, understand and practice components of counseling in the practice of dietetics
CO3: Apply nutrition care process to make appropriate nutrition interventions
CO4: Demonstrate counseling techniques to facilitate nutrition behavior change for individuals and groups.

Mapping of Course Outcomes with Programme Outcomes

Course Code	POs/COs	PO 1	P0 2	PO 3	PO 4	PO 5	PO 6	P 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
B21HC0604	CO1	1					3	2	2			2	1	1
	CO2						2		2			2		1
	CO3	1					3	2	2			2	1	1
	CO4						2		2			2		1

Course Content: **Total Hours: 16 wk**

1.Internship Training in superspeciality hospital/ foods service institution for 8-12 weeks depending on availability & convenience
2. Report Preparation - Students are required to perform internship in Multispeciality hospitals and they have to submit a
report on the internship training during examination. Evaluation of internship shall be made on the basis of report and viva-voce examination.

CAREER DEVELOPMENT AND PLACEMENT

Having a degree will open doors to the world of opportunities for you. But Employers are looking for much more than just a degree. They want graduates who stand out from the crowd and exhibit real life skills that can be applied to their organizations. Examples of such popular skills employers look for include:

1. Willingness to learn
2. Self motivation
3. Team work
4. Communication skills and application of these skills to real scenarios
5. Requirement of gathering, design and analysis, development and testing skills
6. Analytical and Technical skills
7. Computer skills
8. Internet searching skills
9. Information consolidation and presentation skills
10. Role play
11. Group discussion, and so on

REVA University therefore, has given utmost importance to develop these skills through variety of training programs and such other activities that induce the said skills among all students. A full-fledged Career Counseling and Placement division, namely Career Development Center (CDC) headed by well experienced senior Professor and Dean and supported by dynamic trainers, counselors and placement officers and other efficient supportive team does handle all aspects of Internships and placements for the students of REVA University. The prime objective of the CDC is to liaison between REVA graduating students and industries by providing a common platform where the prospective employer companies can identify suitable candidates for placement in their respective organization. The CDC organizes pre-placement training by professionals and also arranges expert talks to our students. It facilitates students to career guidance and improve their employability. In addition, CDC forms teams to perform mock interviews. It makes you to enjoy working with such teams and learn many things apart from working together in a team. It also makes you to participate in various student clubs which helps in developing team culture, variety of job skills and overall personality.

The need of the hour in the field of Biotechnology, Biochemistry, Genetics isnot only the knowledge in the subject, but also the skill to do the job proficiently, team spirit and a flavour of innovation. This kept in focus, the CDC has designed the training process, which will commence from second semester along with the curriculum. Special coaching in personality development, career building, English proficiency, reasoning, puzzles, and communication skills to every student of REVA University is given with utmost care. The process involves continuous training and monitoring the students to develop their soft skills including interpersonal

skills that will fetch them a job of repute in the area of his / her interest and march forward to make better career. The School of Applied sciences also has emphasised subject based skill training through lab practice, internship, project work, industry interaction and many such skilling techniques. The students during their day-to-day studies are made to practice these skill techniques as these are inbuilt in the course curriculum. Concerned teachers also continuously guide and monitor the progress of students.

The University has also established University-Industry Interaction and Skill Development Centre headed by a Senior Professor & Director to facilitate skill related training to REVA students and other unemployed students around REVA campus. The center conducts variety of skill development programs to students to suite to their career opportunities. Through this skill development centre, the students shall compulsorily

complete at least two skills/certifications based programs before the completion of their degree. The University has collaborations with Industries, Corporate training organizations, research institutions and Government agencies like NSDC (National Skill Development Corporation) to conduct certification programs. REVA University has been recognised as a Centre of Skill Development and Training by NSDC (National Skill Development Corporation) under Pradhan Mantri Kaushal Vikas Yojana.

The University has also signed MOU's with Multi-National Companies, research institutions, and universities abroad to facilitate greater opportunities of employability, students' exchange programs for higher learning and for conducting certification programs.

LIST OF FACULTY MEMBERS

Sl No.	Name of the Teacher	Designation	Contact No.	E-mail
1	Dr. Jayashree S	Professor	8610123372	Jayashree.s@reva.edu.in
2	Dr. Veeraraghavan V	Professor		veera.raghavan@reva.edu.in
3	Dr. Karthi N	Associate Professor	9884210099	karthi.n@reva.edu.in
4	Dr. Sikandar Mulla	Assistant Professor	7483072566	sikandar.mulla@reva.edu.in
5	Dr. Ramesh Kumar K	Assistant Professor	8004425060	rameshkumar.k@reva.edu.in
6	Dr. Sharadamma N	Assistant Proffesor	9739438693	sharadamma.n@reva.edu.in
8	Mrs. Deepa HN	Assistant Professor	9739355443	deepa.hn@reva.edu.in
9	Mrs. Pooja Karkera	Assistant Professor	9741224361	poojar.karkera@reva.edu.in

Rukmini Educational
Charitable Trust

Rukmini Knowledge Park
Kattigenahalli, Yelahanka, Bengaluru – 560064
Phone No: +91-080-46966966, Fax: 080-28478539
www.reva.edu.in