# MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
Grade 'A$^{++}$' Accredited by NAAC
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CHOICE BASED CREDIT SYSTEM (CBCS)

**(with effect from 2025-2026 Batch onwards)**

# Curriculum for

# M.Sc. Clinical Nutrition

Amended as per AC-51/2025, Dated 29/04/2025

# Amended History

1. Amended as per AC-51/2025, [Resolution No. 3.1,(Annexure-3.4)]; [Resolution No. 3.5 (Annexure-7)]; Dated 29/04/2025.

**Resolution No. 3.1 of Academic Council (AC-51/2025):**

Resolved to approve the CBCS syllabus, including Program Outcomes (POs), Course Outcomes (COs), and PO-CO Mapping for 15 two-year postgraduate programs under MGMSBS for Semesters I and II. These include: M.Sc. Medical Biotechnology, M.Sc. Medical Genetics, M.Sc. Clinical Embryology, **M.Sc. Clinical Nutrition**, M.Sc. Medical Dialysis Technology, M.Sc. Molecular Biology, M.Sc. Medical Radiology & Imaging Technology, M.Sc. Cardiac Care Technology, M.Sc. Operation Theatre and Anaesthesia Technology, M.Sc. Emergency and Trauma Care, M. Optometry, Master in Hospital Administration, Master of Public Health, M.Sc. Health Informatics & M.Sc. Clinical Research to be effective from batch admitted in Academic Year 2025-26 onwards [ANNEXURE-3.1 to 3. 30].

**Annexure-3.4 of AC-51/2025**

# MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI

**(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**
(Deemed to be University u/s 3 of UGC Act 1956)
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## CHOICE BASED CREDIT SYSTEM (CBCS)

## (Academic Year 2025 - 26)

## Curriculum for

## M.Sc. Allied Health Sciences

## M.Sc. Clinical Nutrition

## Semester I & II

## DIRECTOR'S MESSAGE

### Welcome Message from the Director

Dear Postgraduate Students,

Welcome to **MGM School of Biomedical Sciences (MGMSBS), MGMIHS**, a premier institution dedicated to advancing allied and health sciences education. As you embark on this transformative academic journey, you are joining a community that fosters excellence in research, clinical expertise, and innovation**.**

MGMIHS, accredited with **NAAC 'A$^{++}$' Grade (CGPA 3.55, 2022)** and recognized as a **Category I Institution by UGC**, offers an ecosystem that nurtures both academic and professional growth. With **NIRF (151-200 rank band) recognition, NABH-accredited hospitals, NABL-accredited diagnostic labs, and JCI accreditation for MGM New Bombay Hospital**, we uphold global benchmarks in education and healthcare.

At MGMSBS, our **15 postgraduate programs** are meticulously designed to align with the National Commission for Allied and Healthcare Professionals **(NCAHP)** standards**,** National Education Policy **(NEP)** 2020**,** and the National Credit Framework **(NCrF).** We have implemented the **Choice-Based Credit System (CBCS)** to provide academic flexibility while ensuring rigorous training in clinical and technical skills**.** Our state-of-the-art research laboratories, digital classrooms, and the Central Research Laboratory (CRL) foster an environment that encourages innovation and evidence-based learning**.**

Postgraduate education at MGMSBS goes beyond theoretical learning—our curriculum integrates **hands-on clinical training, interdisciplinary collaboration, and exposure to real-world healthcare challenges**. We emphasize **research-driven education**, encouraging students to actively participate in **scientific discoveries, publications, and international collaborations**.

Beyond academics, we believe in **holistic development**, with initiatives such as the **AARAMBH Science and Wellness Club**, which promotes **mental well-being, leadership, and professional networking**.

As you step into this **next phase of academic and professional growth**, we encourage you to explore new ideas, engage in impactful research, and contribute meaningfully to the **healthcare ecosystem**. We are confident that your journey at MGMSBS will shape you into **skilled, compassionate, and visionary professionals**, ready to lead in the ever-evolving healthcare landscape.

We look forward to witnessing your achievements and contributions!

**Dr. Mansee Thakur**
Director, MGM School of Biomedical Sciences
MGM Institute of Health Sciences, Navi Mumbai

## ABOUT MGM SCHOOL OF BIOMEDICAL SCIENCES

### Mission

To improve the quality of life, both at individual and community levels by imparting quality medical education to tomorrow's doctors and medical scientists and by advancing knowledge in all fields of health sciences though meaningful and ethical research.

### Vision

By the year 2020, MGM Institute of Health Sciences aims to be top-ranking Centre of Excellence in Medical Education and Research. Students graduating from the Institute will have the required skills to deliver quality health care to all sections of the society with compassion and benevolence, without prejudice or discrimination, at an affordable cost. As a research Centre, it shall focus on finding better, safer and affordable ways of diagnosing, treating and preventing diseases. In doing so, it will maintain the highest ethical standards.

### About – School of Biomedical Sciences

MGM School of Biomedical Sciences is formed under the aegis of MGM IHS with the vision of offering basic Allied Science and Medical courses for students who aspire to pursue their career in the Allied Health Sciences, teaching as well as research.

School of Biomedical Sciences is dedicated to the providing the highest quality education in basic medical sciences by offering a dynamic study environment with well-equipped labs. The school encompasses 23 courses each with its own distinct, specialized body of knowledge and skill. This includes 8 UG courses and 15 PG courses. The college at its growing years started with mere 100 students has recorded exponential growth and is now a full-fledged educational and research institution with the student strength reaching approximately **800** at present.

Our consistent theme throughout is to encourage students to become engaged, be active learners and to promote medical research so that ultimately they acquire knowledge, skills, and understanding so as to provide well qualified and trained professionals in Allied Health Sciences to improve the quality of life.

As there is increased need to deliver high quality, timely and easily accessible patient care system the collaborative efforts among physicians, nurses and allied health providers become ever more essential for an effective patient care. Thus the role of allied health professionals in ever-evolving medical system is very important in providing high-quality patient care.

Last but by no means least, School of Biomedical Sciences envisions to continuously grow and reform. Reformations are essential to any growing institution as it fulfills our bold aspirations of providing the best for the students, for us to serve long into the future and to get ourselves updated to changing and evolving trends in the health care systems.

# Introduction

Nutrition can have a direct impact on how a person feels and functions daily. A well-balanced diet can improve energy, mood, and cognitive function, which can significantly enhance quality of life, especially in those with chronic conditions. Proper nutrition is essential for preventing and managing acute and chronic conditions like diabetes, heart disease, obesity, hypertension, etc. It helps control risk factors, reduce complications, and enhance overall health outcomes.

Overall, clinical nutrition is fundamental in promoting health, preventing and managing diseases, supporting recovery, and improving patients' quality of life through personalized dietary guidance. It bridges the gap between food and health, making it a key part of medical care.

The M.Sc. in Clinical Nutrition program is designed to provide advanced knowledge in nutrition, dietetics, and clinical care. The curriculum combines foundational courses in biochemistry, physiology, and microbiology with specialized topics like clinical nutrition, therapeutic diets, and nutrition in disease management. A significant feature of the M.Sc. Clinical Nutrition program is its focus on **interdisciplinary learning**. In addition to core courses in clinical nutrition, students engage with subjects such as **public health nutrition**, **community nutrition**, and **sustainable food systems**. This approach prepares students to address nutrition-related issues not only at the individual level but also within the larger context of public health. The program also integrates practical experience through clinical postings, helping students apply theory to real-world scenarios. The program focuses on holistic development, fostering critical thinking, communication skills, and leadership, preparing graduates for diverse roles in healthcare, research, and policy.

The program prepares graduates to become proficient and compassionate nutrition experts who can address both individual and public health challenges. With its blend of core subjects, interdisciplinary learning, practical training the program equips students to lead in the evolving field of clinical nutrition. Graduates are well-prepared to take on roles in hospitals, healthcare organizations, research institutions, and policy development, making significant contributions to improving health through nutrition.

### AIM of the Program

The Master's in Clinical Nutrition program aims to:

1. Provide a thorough understanding of the biochemical, physiological, and metabolic processes of nutrients and their impact on health.
2. Prepare students to assess nutritional status, create individualized nutrition care plans, and use diet to manage various health conditions.
3. Teach students how to critically analyze and apply research findings to make informed nutrition decisions in both acute and chronic health situations.
4. Enable students to work effectively within healthcare teams, collaborating with physicians, nurses, and other professionals to deliver comprehensive patient care.
5. Develop the ability to educate and guide individuals and communities in adopting healthy eating habits and making lifestyle changes to prevent disease.
6. Impart strong ethical practices, cultural sensitivity, and professionalism in clinical nutrition.

7. Support students in contributing to the advancement of the field through research and developing new clinical nutrition strategies.

**Job Opportunities**

After completing an MSc in Clinical Nutrition, there are various job opportunities available in healthcare, research, and other related sectors. Here are some potential career paths:

**1. Clinical Dietitian/Nutritionist**

- **Role**: Work in hospitals, clinics, or private practice to assess patients' nutritional needs, provide dietary counseling, and develop meal plans for patients with medical conditions (e.g., diabetes, heart disease, cancer).
- **Where**: Hospitals, clinics, rehabilitation centres, private practice.

**2. Public Health Nutritionist**

- **Role**: Work with government health organizations, NGOs, or community health programs to promote healthy eating habits and improve public health nutrition. May also be involved in designing and implementing nutrition-related policies.
- **Where**: Government health agencies, non-profit organizations, international organizations like WHO, UNICEF.

**3. Researcher in Nutrition and Dietetics**

- **Role**: Conduct research in the field of nutrition, either in academic institutions, research labs, or as part of clinical trials, to develop new dietary guidelines, supplements, and nutritional therapies.
- **Where**: Universities, research institutions, pharmaceutical companies.

**4. Sports Nutritionist**

- **Role**: Specialize in the dietary needs of athletes and individuals involved in physical training, advising them on optimal nutrition for performance, recovery, and overall health.
- **Where**: Sports teams, fitness centers, personal coaching, or rehabilitation centers.

**5. Nutrition Consultant for Food Industry**

- **Role**: Provide expertise to food companies, helping them develop healthier food products, create nutrition labels, and ensure compliance with regulations.
- **Where**: Food manufacturing companies, health and wellness brands, product development teams.

**6. Corporate Wellness Consultant**

- **Role**: Design nutrition programs for businesses to improve employee health, reduce absenteeism, and enhance productivity through better dietary habits.
- **Where**: Corporations, wellness organizations, employee health programs.

**7. Nutrition Educator/Trainer**

- **Role**: Teach nutrition-related courses, seminars, or workshops in schools, colleges, universities, or as part of public outreach programs.
- **Where**: Educational institutions, health promotion organizations, wellness programs.

**8. Dietary Manager**

- **Role**: Manage the dietary department in hospitals, nursing homes, or schools, overseeing food service operations, nutrition planning, and ensuring the dietary needs of individuals are met.
- **Where**: Hospitals, nursing homes, schools, long-term care facilities.

**9. Food Safety and Quality Control Specialist**

- **Role**: Ensure the safety and quality of food products, and work on guidelines for the proper handling, storage, and preparation of food.
- **Where**: Food manufacturing companies, quality control labs, regulatory agencies.

**10. Entrepreneur in Nutrition and Wellness**

- **Role**: Start own business in nutrition counseling, wellness coaching, or create a nutrition-related product line (e.g., supplements, meal plans).
- **Where**: Private practice, online business, wellness centres.

**11. Medical Nutrition Therapist**

- **Role**: Work with patients with medical conditions that require therapeutic diets, such as kidney disease, cancer, diabetes, and gastrointestinal disorders.
- **Where**: Hospitals, specialized clinics, rehabilitation centres.

**12. Health Blogger/Vlogger or Content Creator**

- **Role**: Create educational content on nutrition and wellness topics, building an online following. Can monetize through ads, partnerships with brands, and selling products or services.
- **Where**: Online platforms (YouTube, Instagram, blogs).

**ELIGIBILITY FOR ADMISSION:**

Eligibility students with the following undergraduate degree are eligible, B.Sc. Home Science/ Nutrition/ Dietetics/ Food Science/ Biochemistry or any Life Sciences, MBBS, BHMS, BAMS, BDS, B.Sc. Nursing. Student should have obtained minimum 50% marks in the undergraduate degree or B grade from any recognized University.

**DURATION OF THE COURSE:** 2 (two) academic years/4 semesters

# M.Sc. CLINICAL NUTRITION
## Program Outcomes (PO)

| Program Code | Program Objective(s) |
|---|---|
| **PO1** | **Advanced Knowledge and Understanding:**<br>• Develop in-depth knowledge of clinical nutrition and dietetics, including the physiological, biochemical, and metabolic processes.<br>• Understand the role of nutrition in disease prevention, management, and treatment, with a focus on medical nutrition therapy.<br>• Stay informed the latest advancements in nutrition science and technology. |
| **PO2** | **Clinical Competency and Patient Care:**<br>• Equip students with the skills to assess nutritional needs, create personalized nutrition plans, and monitor patient progress.<br>• Gain proficiency in counselling patients and families about healthy eating, lifestyle modifications, and therapeutic diets.<br>• Demonstrate the ability to apply nutritional science to clinical settings, including hospitals, rehabilitation centres, and community health organizations. |
| **PO3** | **Research and Evidence-Based Practice:**<br>• Foster the ability to conduct independent research in clinical nutrition, contributing to new insights in the field.<br>• Promote a scientific, evidence-based approach to nutrition interventions and patient care. |
| **PO4** | **Interdisciplinary Collaboration:**<br>• Develop skills for working in collaborative healthcare teams, integrating the expertise of medical doctors, dietitians, and other healthcare professionals.<br>• Communicate effectively with colleagues and patients from diverse backgrounds, ensuring inclusive and culturally competent care. |
| **PO5** | **Ethics and Professionalism:**<br>• Instil high ethical standards in clinical practice, including patient confidentiality, informed consent, and professional integrity.<br>• Embrace professional conduct and responsibility in all aspects of the clinical nutrition profession. |
| **PO6** | **Public Health and Nutrition Advocacy:**<br>• Promote public health nutrition through education, advocacy, and community programs.<br>• Understand and address public health challenges, such as malnutrition, obesity, and chronic diseases, through nutrition interventions.<br>• Engage in nutrition policy-making and advocacy for better health outcomes on a population level. |
| **PO 7** | **Sustainability and Environmental Impact:**<br>• Understand the importance of sustainable food systems and their impact on health and the environment. |
| **PO8** | **Lifelong Learning and Professional Development:**<br>• Encourage continuous learning and professional growth through certifications, workshops, and seminars.<br>• Stay updated with the latest trends and innovations in the nutrition field to adapt to evolving healthcare needs. |

# Course Outcomes
# Semester I

| MCN 101 T | Fundamentals of Nutrition | Mapped POs | Teaching-Learning Methodologies | Assessment Tools |
|---|---|---|---|---|
| CO1 | Discuss the role of nutrients in human health and their contribution to preventing or managing certain disorders. | **PO1, PO2** | Lecture, Group Discussion, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| CO2 | Describe the different forms of nutrients (carbohydrates, proteins, fats, vitamins, minerals, water, and electrolytes) and understand their procurement and requirements for the human body. | **PO1, PO2, PO8** | Lecture, Group Discussion, Assignment, Seminar | Theory exam, Assignment, Poster, Seminar |
| **MCN 102 T & MCN 104 P** | **Nutritional Biochemistry** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Outline the structure and function of the biomolecules found in all living organisms | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO2** | Describe the circulatory system, cardiac cycle, and conditions like hypertension and heart failure. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO3** | Explain respiratory system functions, breathing mechanisms, and related abnormalities. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO4** | Comprehend renal system functions, urine formation, and dialysis principles. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO5** | Understand the structure and function of the nervous system, including the blood-brain barrier. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, |

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| **CO6** | Analyze the digestive system, digestion, absorption, and gastrointestinal hormone functions. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO7** | Study musculoskeletal system functions, muscle contraction, and nerve impulse conduction. | **PO1, PO2, PO3** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO8** | Understand the endocrine system's glands, their regulation, and related disorders. | **PO1, PO2, PO3, PO4, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO9** | Interpret blood composition, blood cell formation, coagulation, and blood groups. | **PO1, PO2, PO3, PO4, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **MCN 103 T & MCN 105 P** | **Human Physiology** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | **Understand body systems:** Gain knowledge of the structure and function of systems like circulatory, respiratory, renal, digestive, musculoskeletal, nervous, and endocrine systems. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO2** | **Analyze physiological processes:** Learn key processes such as membrane transport, cardiac cycle, respiration, urine formation, muscle contraction, and digestion. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO3** | **Study special systems:** Explore the functioning and disorders of the cardiovascular, respiratory, renal, and gastrointestinal systems, including blood pressure, ECG, and respiratory issues. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO4** | **Comprehend endocrine and hematology:** Understand the regulation and disorders of major | **PO1, PO2** | Lecture, Practical, Demonstration, | Internal Assessment, University Exam, Theory exam, |

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| | glands (pituitary, thyroid, adrenal, pancreas) and blood functions like coagulation and anemia. | | Assignment, Seminar | Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO5** | **Integrate with clinical nutrition:** Relate physiological knowledge to clinical nutrition, focusing on the connection between nutrition and health. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO6** | **Enhance clinical application:** Develop critical thinking skills to apply physiological knowledge in clinical nutrition practice and disease management. | **PO1, PO2** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CC 001 T & CC 001 P** | **Research Methodology & Biostatistics (Core Course)** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis interpretation & reporting of Results and use of statistical software. | **PO2** | Lecture, Demonstration, Practical, Assignment, Seminar | Internal Exam, University Exam (Theory Exam, Practical Exam), Assignment |
| **MCN 106 CP** | **MCN Directed Clinical Education - I** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | **Knowledge-Based competencies** will build a robust theoretical foundation, enabling students to understand healthcare practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies. | **PO2, PO4, PO5, PO8** | Case studies, Industrial Visit | Case-study Presentation, Viva-voce, log book |
| **CO2** | **Skill-Based competencies** will emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' | **PO2, PO4, PO5, PO8** | Case studies, Industrial Visit | Case-study Presentation, Viva-voce, log book |

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| | confidence and competence in delivering quality patient care. | | | |
| **CO3** | **Attitudinal competencies** will focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills-key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams. | **PO2, PO4, PO5, PO8** | Case studies, Industrial Visit | Case-study Presentation, Viva-voce, log book |

# Semester II

| MCN 107 T & MCN 111 P | Medical Nutrition Therapy -I | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
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| **CO1** | **Conduct Comprehensive Nutrition Assessments:** Use various clinical assessment tools (e.g., NRS, SGA, MNA) to assess patients' nutritional status, diagnose nutritional problems, and design appropriate interventions. | **PO1, PO2, PO4, PO5** | Lecture, Problem based learning, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO2** | **Provide Therapeutic Nutritional Support:** Implement enteral and parenteral nutrition, manage related complications, and understand the impact of drug-nutrient interactions to deliver effective nutritional support for patients with therapeutic needs. | **PO1, PO2, PO3, PO4** | Lecture, Problem based learning, Quiz, Assignment, Seminar, Group discussion, Case-study, Workshops, Guest lecture | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO3** | **Manage Pediatric Nutrition:** Develop and implement nutrition care plans for hospitalized infants and children, addressing conditions like low birth weight, failure to thrive, gastrointestinal issues, and congenital anomalies. | **PO1, PO2, PO3, PO4** | Lecture, Problem based learning, Quiz, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO4** | **Manage Nutrition in Infectious Diseases:** Address the nutritional needs of patients with febrile conditions and infections such as typhoid, malaria, tuberculosis, and HIV/AIDS, understanding the metabolic changes and dietary requirements during illness. | **PO1, PO2, PO3, PO4** | Lecture, Problem based learning, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO5** | **Address Energy Imbalance and Nutritional Disorders:** Manage conditions such as obesity, underweight, and eating disorders by applying dietary, behavioral, and pharmacological strategies, with a focus on energy balance regulation. | **PO1, PO2, PO3, PO4** | Lecture, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |

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| **CO6** | **Handle Immune System and Food Allergy Management:** Design elimination diets and nutrition strategies for patients with food allergies, intolerances, and immune system disorders such as celiac disease and autoimmune conditions. | **PO1, PO2, PO3, PO4** | Lecture, Practical, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO7** | **Manage Nutrition in Pulmonary and Musculoskeletal Disorders:** Provide nutritional care for patients with pulmonary diseases (e.g., asthma, COPD) and musculoskeletal disorders (e.g., arthritis, osteoporosis), focusing on anti-inflammatory dietary approaches. | **PO1, PO2, PO3, PO4** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO8** | **Implement Gastrointestinal Nutrition Therapy:** Manage gastrointestinal disorders, including diseases of the upper and lower GI tract, malabsorption syndromes, and post-surgical care, improving clinical practice in digestive health. | **PO1, PO2, PO3, PO4** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO9** | **Manage Endocrine Nutrition:** Assess and provide nutrition interventions for patients with endocrine disorders like thyroid diseases, polycystic ovary syndrome (PCOS), Cushing's syndrome, and Addison's disease. | **PO1, PO2, PO3, PO4** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **CO10** | **Understand and Manage Nutrient-Drug Interactions:** Evaluate the clinical significance of nutrient-drug interactions and their effects on nutritional status, ensuring optimal treatment outcomes through appropriate management strategies. | **PO1, PO2, PO3, PO4** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops, Guest lecture | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar, Case Study presentation |
| **MCN 108 T & MCN 112 P** | **Community and Public Health Nutrition** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Define and understand key concepts in community and public health nutrition, including biomedical, ecological, psychological, and holistic approaches, as well as | **PO1, PO3, PO5, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |

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| | epidemiological methods such as case-control and cohort studies. | | | |
| **CO2** | Assess nutritional status at individual and community levels using methods like anthropometry, biochemical, clinical, and dietary assessments. | **PO1, PO3, PO5, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO3** | Apply nutrition standards for growth monitoring in children and assess nutritional status in adults using WHO standards. | **PO1, PO3, PO5, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO4** | Understand and analyze food and nutrition security, including its dimensions and relevant policies in India, such as NFSA and the Public Distribution System. | **PO1, PO3, PO5, PO6, PO7** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO5** | Identify and address nutritional problems such as nutrient deficiencies, obesity, chronic diseases, and malnutrition, with an emphasis on integrated solutions and interventions. | **PO1, PO3, PO5, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops, guest lecture | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO6** | Plan, execute, and evaluate nutrition education programs for communities, utilizing appropriate tools and overcoming implementation challenges. | **PO1, PO3, PO5, PO6, PO7** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops, guest lecture | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **CO7** | Understand health and nutrition administration in India, including welfare programs, government policies, and the role of global health agencies like UNICEF and WHO. | **PO1, PO3, PO5, PO6** | Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Case-study, Workshops | Internal Assessment, University Exam, Theory exam, Practical exam, Viva-voce, log book, Assignment, Seminar |
| **MCN 109 T** | **Food Microbiology** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Understand the basics of food microbiology, including microbial growth and factors affecting it. | **PO1** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO2** | Identify and describe microorganisms (molds, bacteria, yeasts, viruses) in food and their role in spoilage and foodborne diseases. | **PO1** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |

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|---|---|---|---|---|
| **CO3** | Recognize biochemical changes caused by microbes in food. | **PO1** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO4** | Analyze microbial contamination and spoilage in various food types. | **PO1** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO5** | Understand foodborne diseases, pathogens, and their detection methods. | **PO1** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO6** | Learn about microbial toxins and their health impacts. | **PO1** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO7** | Explore methods for controlling microorganisms in food, including preservation and novel processing technologies. | **PO1, PO7** | Lecture, Assignment, Seminar, Group discussion, Industrial Visit | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO8** | Understand food sanitation, including water quality, sewage treatment, and food safety standards like GMP and HACCP. | **PO1, PO7** | Lecture, Assignment, Seminar, Group discussion, Industrial Visit | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO9** | Apply microbiological criteria for food safety and understand the role of control agencies in ensuring food safety. | **PO1, PO7** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **MCN 110 T** | **Nutrition Through Life Cycle** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Understand nutritional requirements across the life cycle, from pregnancy to geriatrics. | **PO1, PO2** | Lecture, Assignment, Seminar, Group discussion, Role-play | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO2** | Assess the impact of physiological and psychosocial changes on nutrition at each life stage. | **PO1, PO2** | Lecture, Assignment, Seminar, Group discussion, Role-play | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO3** | Identify and manage nutrition-related challenges, such as high-risk pregnancies, childhood obesity, and aging-related issues. | **PO1, PO2, PO6** | Lecture, Assignment, Seminar, Group discussion, Role-play | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO4** | Apply growth monitoring techniques and design dietary interventions for different age groups. | **PO1, PO2** | Lecture, Assignment, Seminar, Group discussion, Role-play, Guest lecture, Workshops | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO5** | Address specific nutritional issues like breastfeeding, weaning, and adolescent eating disorders. | **PO1, PO2, PO6** | Lecture, Assignment, Seminar, Group discussion, Role-play, Demonstrations, | Internal Assessment, University Exam, Theory exam, Assignment, Seminar, Poster presentation. |

| | | | | |
|---|---|---|---|---|
| | | | Guest lecture, Workshops | |
| **CO6** | Develop nutrition plans for preventing and managing health problems, including chronic diseases in the elderly. | **PO1, PO2, PO6** | Lecture, Assignment, Seminar, Group discussion, Role-play, Demonstrations, Guest lecture, Workshops | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **MCN 113 CP** | **MCN Directed Clinical Education - II** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | **Knowledge-Based competencies** will build a robust theoretical foundation, enabling students to understand healthcare practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies. | **PO2, PO4, PO5, PO8** | Case studies, Industrial Visit | Case-study Presentation, Viva-voce, log book |
| **CO2** | **Skill-Based competencies** will emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' confidence and competence in delivering quality patient care. | **PO2, PO4, PO5, PO8** | Case studies, Industrial Visit | Case-study Presentation, Viva-voce, log book |
| **CO3** | **Attitudinal competencies** will focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills-key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams. | **PO2, PO4, PO5, PO8** | Case studies, Industrial Visit | Case-study Presentation, Viva-voce, log book |
| **SEC 001 T** | **Nutrition for Emergencies** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Distinguish between natural and manmade disasters, and comprehend their impact on public health and nutrition. | **PO1, PO2, PO3** | Lecture, Assignment, Seminar, Videos | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO2** | Demonstrate knowledge of nutrition management during emergencies, including immediate rescue, first aid, and physiological support | **PO1, PO2** | Lecture, Assignment, Seminar, Videos | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |

| | | | | |
|---|---|---|---|---|
| **CO3** | Organize and implement nutritional assessments and individual screenings in disaster-affected populations. | **PO1, PO2, PO4** | Lecture, Assignment, | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO4** | Develop and manage supplementary and therapeutic feeding interventions tailored to emergency contexts. | **PO6. PO7, PO8** | Lecture, Assignment, Case studies | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO5** | Assess food needs, design effective food supply chains, and ensure equitable distribution to vulnerable groups. | **PO1, PO2, PO3** | Lecture, Assignment, Seminar, Group discussion, Role-play, Demonstrations, Guest lecture | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO6** | Utilize local food resources, manage feeding centers, and ensure proper food storage and transportation. | **PO5, PO6, PO7** | Lecture, Assignment, Seminar, Group discussion, | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO7** | Promote safe water supply, sanitation, and hygiene to prevent disease outbreaks during and after disasters | **PO3, PO4, PO5** | Group discussion, Role-play, Demonstrations | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO8** | Recognize major and specific nutrient deficiencies common in emergencies and apply appropriate dietary and medical treatments. | **PO1, PO2** | Lecture, Assignment, | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO9** | Evaluate the impact of global warming and other factors on food security, particularly in the Indian context | **PO5, PO6, PO7** | Lecture, Assignment, Seminar, Group discussion | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO10** | Advocate for immunization, communicable disease control, and long-term nutritional rehabilitation in post-disaster settings | **PO6, PO7, PO8** | Group discussion, Role-play, Demonstrations | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **SEC 002 T** | **Maternal Infant Young Child Nutrition (NPTEL)** | **Mapped POs** | **Teaching-Learning Methodologies** | **Assessment Tools** |
| **CO1** | Understand the maternal and child health landscape in India | **PO1, PO2, PO3** | Lecture, Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO2** | Differentiate between Type 1 and Type 2 nutrients, and understand the role of key micronutrients like omega-3, folate, and vitamin B12 in maternal and child health. | **PO1, PO2, PO4** | Lecture, Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |

| | | | | |
|---|---|---|---|---|
| **CO3** | Examine the causes and effects of nutrient deficiencies, assess the impact of junk food, and suggest nutrient-rich dietary alternatives | **PO3, PO4, PO5** | Group discussion, Role-play, Demonstrations | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO4** | Outline essential nutrition actions for pregnant women and young children, and recommend appropriate dietary interventions during this window | **PO3, PO4, PO5** | Group discussion, Role-play, Demonstrations | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO5** | Demonstrate breastfeeding techniques including cross cradle hold and address common lactation challenges through visual aids and counseling points. | **PO1, PO2, PO4** | Lecture, Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO6** | Explain the golden hour of breastfeeding, benefits over substitutes, and legal protections for breastfeeding in India. | **PO6, PO7, PO8** | Lecture, Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO7** | Apply techniques like Football, Cradle, Sidelying, and Laid-Back Holds, and assess feeding practices using standardized forms. | **PO6, PO7, PO8** | Lecture, Group Discussion Demonstrations | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO8** | Ensure proper newborn care and promote Kangaroo Mother Care (KMC) | **PO3, PO4** | Lecture, Group Discussion Demonstrations | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO9** | Create age-appropriate, nutritious recipes from 6 to 24 months, emphasize hygiene in food handling, and troubleshoot feeding challenges. | **PO1, PO2, PO4** | Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO10** | Design targeted diet plans for women across reproductive stages and for adolescent girls, including vegetarian and non-vegetarian options. | **PO6, PO7, PO8** | Lecture, Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |
| **CO11** | Interpret WHO growth charts, use Z-score and percentile methods, and conduct accurate anthropometric assessments. | **PO4, PO5, PO6** | Lecture, Group Discussion, Assignment | Internal Assessment, University Exam, Theory exam, Assignment, Seminar |

## OUTLINE OF COURSE CURRICULUM

### M.Sc. Clinical Nutrition

### Semester I

| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| **Discipiline Specific Core Theory** | | | | | | | | | | | | | | |
| MCN 101 T | Fundamentals of Nutrition | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MCN 102 T | Nutritional Biochemistry | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MCN 103 T | Human Physiology | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| CC 001 T | Research Methodology & Biostatistics (Core Course) | 3 | - | - | - | 3 | 45 | - | - | - | 45 | - | 50 | 50 |
| **Discipiline Specific Core Practical** | | | | | | | | | | | | | | |
| MCN 104 P | Nutritional Biochemistry | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MCN 105 P | Human Physiology | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MCN 106 CP | MCN Directed Clinical Education - I | - | - | - | 15 | 5 | - | - | - | 225 | 225 | - | 50 | 50 |
| CC 001 P | Research Methodology & Biostatistics (Core Course) | - | - | 4 | - | 2 | - | - | 60 | - | 60 | - | 50 | 50 |
| **Total** | | 12 | 0 | 8 | 15 | 21 | 180 | 0 | 120 | 225 | 525 | 80 | 470 | 550 |

## OUTLINE OF COURSE CURRICULUM

### M.Sc. Clinical Nutrition

### Semester II

| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| **Discipiline Specific Core Theory** | | | | | | | | | | | | | | |
| MCN 107 T | Medical Nutrition Therapy - I | 4 | - | - | - | 4 | 60 | - | - | - | 60 | 20 | 80 | 100 |
| MCN 108 T | Community & Public Health Nutrition | 2 | - | - | - | 2 | 30 | - | - | - | 30 | 20 | 80 | 100 |
| MCN 109 T | Food Microbiology | 2 | - | - | - | 2 | 30 | - | - | - | 30 | 20 | 80 | 100 |
| MCN 110 T | Nutrition through Lifecycle | 2 | - | - | - | 2 | 30 | - | - | - | 30 | 20 | 80 | 100 |
| **Discipiline Specific Core Practical** | | | | | | | | | | | | | | |
| MCN 111 P | Medical Nutrition Therapy - I | - | - | 4 | - | 2 | - | - | 60 | - | 60 | 10 | 40 | 50 |
| MCN 112 P | Community & Public Health Nutrition | - | - | 4 | - | 2 | - | - | 60 | - | 60 | 10 | 40 | 50 |
| MCN 113 CP | MCN Directed Clinical Education - II | - | - | - | 15 | 5 | - | - | - | 225 | 225 | - | 50 | 50 |
| **Skill Enhancement Course** | | | | | | | | | | | | | | |
| SEC 001 T | Nutrition in Emergencies | 3 | - | - | - | 3 | 45 | - | - | - | 45 | - | 100 | 100 |
| SEC 002 T | Maternal Infant Young Child Nutrition (NPTEL) | | | | | | | | | | | | | |
| **Total** | | 13 | 0 | 8 | 15 | 22 | 195 | 0 | 120 | 225 | 540 | 100 | 550 | 650 |

# FIRST YEAR

## M.Sc. Clinical Nutrition

## SEMESTER-I

| Code No. | Core Subjects |
|---|---|
| **Discipline Specific Core Theory** | |
| MCN 101 T | Fundamentals of Nutrition |
| MCN 102 T | Nutritional Biochemistry |
| MCN 103 T | Human Physiology |
| CC 001 T | Research Methodology & Biostatistics (Core Course) |
| **Discipline Specific Core Practical** | |
| MCN 104 P | Nutritional Biochemistry |
| MCN 105 P | Human Physiology |
| MCN 106 CP | MCN Directed Clinical Education-I |
| CC 001 P | Research Methodology & Biostatistics (Core Course) |

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|---|---|
| **Name the Programme** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester - I** |
| **Name of the Course** | **Fundamentals of Nutrition** |
| **Course Code** | **MCN 101 T** |

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|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>● The basic concept of nutrition.<br>● The importance of nutrients for the growth and maintenance of human body. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>● Discuss the role of nutrients in human health and their contribution to preventing or managing certain disorders.<br>● Describe the different forms of nutrients (carbohydrates, proteins, fats, vitamins, minerals, water, and electrolytes) and understand their procurement and requirements for the human body. |

| Sr. No. | Topics | | No. of Hrs. |
|---|---|---|---|
| 1 | **Basic Concepts** | Introduction, Food pyramid, Balanced diet, RDA. | **1** |
| 2 | **Body Composition** | Significance of body composition and changes through the life cycle, Methods for assessing body composition (both classical and recent) and their applications. | **2** |
| 3 | **Energy** | Estimating energy requirements of individuals, Factors affecting energy requirements, methods for measuring energy expenditure Determination of energy value of food, Components of energy expenditure- BMR PAL, RMR, PAR, Thermic control of food intake, role of hormones in energy requirements for different age groups and energy balance. | **4** |
| 4 | **Carbohydrates** | Introduction, classification, physiological function, Process of digestion & absorption, Metabolic utilization of CHO, Nutritional significance of carbohydrates, requirement and deficiencies.<br>Modification of carbohydrate intake for specific disorders - lactose intolerance, diabetes mellitus.<br>Dietary fibre - Introduction, types, components of dietary fibre, requirements, role of dietary fibre in human nutrition.<br>Artificial sweeteners, glycemic index of food and its uses, glycemic load. | **6** |
| 5 | **Proteins** | Classification, functions, requirement and Deficiencies, Digestion, absorption and metabolic utilization of protein, Nitrogen Balance, quality of protein and protein deficiency.<br>Amino acid – Types, functions, requirements and deficiency.<br>Peptides of physiological significance | **5** |
| 6 | **Lipids** | Fatty acid – types, function, food sources and deficiency, requirements and deficiencies.<br>Digestion, absorption & metabolic utilization of fats.<br>Role of lipo-protein, cholesterol and triglycerides in health and disease. | **5** |

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|---|---|---|---|
| | | Omega fats: classification & role, daily requirements, food sources, fortification of omega fats. | |
| **7** | **Water & Electrolytes** | **Water:** Distribution of water in the human body, role of water, preformed water, metabolic water, water balance intake and output determination, factors affecting water balance, role of hormones in water balance, fluid balance in stress.<br>**Electrolytes:** Electrolytes content of fluid compartments, Function of electrolytes. Absorption, transport, balance. Factors influencing electrolyte balance. Maintenance of hydrogen ion concentration | **6** |
| **8** | **Vitamins** | Introduction, Physiological functions, Food sources, Requirement, Deficiency & toxicity manifestations and Interaction with other nutrients<br>a) **Water soluble Vitamins** (B Complex and Vitamin C)<br>b) **Fat soluble Vitamins** (Vitamin A, D, E, K) | **8** |
| **9** | **Minerals** | Introduction, Physiological role, food sources, Bioavailability and requirements, Deficiency and toxicity, Interaction with other nutrients<br>a) **Macro Minerals** (Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chloride)<br>b) **Micro minerals** (Iron, Copper, Zinc, Iodine, Fluoride, and Manganese, chromium, selenium) | **8** |
| **Total** | | | **45 hrs** |

**References:**


1. Shubhangini A. Joshi, (1992)' "Nutrition and Dietetics" Tata Mc Grow- Hill publishing Company Ltd, New Delhi.
2. Srilakshmi. B – "Nutrition Science", V Edn, New Age International (P) Ltd, Publishers, Chennai
3. Passmone R. and Eastwood M.A, (1986), "Human Nutrition and Dietetics", English language book Society/Churchill Livingstone, Eighth edition, Hong Kong.
4. Neiman N. Catherine, (1990), "Nutrition", Wm.C. Brown Publishers. USA.

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|---|---|
| **Name of the Programme** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester - I** |
| **Name of the Course** | **Nutritional Biochemistry** |
| **Course Code** | **MCN 102 T** |

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|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>● Understand the mechanisms adopted by the human body for regulation of metabolic pathways.<br>● Develop an insight into interrelationships between various metabolic pathways. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>● Outline the structure and function of the biomolecules found in all living organisms.<br>● Describe the circulatory system, cardiac cycle, and conditions like hypertension and heart failure.<br>● Explain respiratory system functions, breathing mechanisms, and related abnormalities.<br>● Comprehend renal system functions, urine formation, and dialysis principles.<br>● Understand the structure and function of the nervous system, including the blood-brain barrier.<br>● Analyze the digestive system, digestion, absorption, and gastrointestinal hormone functions.<br>● Study musculoskeletal system functions, muscle contraction, and nerve impulse conduction.<br>● Understand the endocrine system's glands, their regulation, and related disorders.<br>● Interpret blood composition, blood cell formation, coagulation, and blood groups. |

| **Sr. No.** | **Topics** | | **No. of Hrs.** |
|---|---|---|---|
| 1 | **Enzymes** | Definition, classification of enzymes, Factors affecting enzyme activity, regulation of enzyme activity and inhibition.<br>Enzymes in clinical diagnosis. | **2** |
| 2 | **Water & Electrolyte metabolism** | Acid base homeostasis, blood buffer system, metabolism and disorders, and metabolism in starvation | **5** |
| 3 | **Carbohydrate metabolism** | Composition and classification (self-study) - General metabolism – Glycolysis, TCA cycle, Glycogenesis, Glycogenolysis, uric acid pathway, Gluconeogenesis and HMP Shunt, Glycogen storage diseases – clinical importance, regulation and hormonal influences of carbohydrate metabolism. | **8** |
| 4 | **Protein Metabolism** | Composition and classification (self-study)<br>Amino acid pool, nitrogen balance, catabolism of amino acids.<br>Urea – formation and its clinical significance.<br>Creatine and creatinine – synthesis and regulation.<br>Plasma proteins, biologically active peptides. | **8** |

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|---|---|---|---|
| 5 | **Lipid Metabolism** | Composition and classification (self-study), Metabolism of Lipids, Oxidation of fatty acids, Unsaturated fatty acids, Metabolism of Ketone bodies, Biosynthesis of fatty acids, Biosynthesis of Cholesterol and regulation, Biosynthesis of Bile acids Biosynthesis of phospholipids –cephalin and lecithin, Plasma lipoproteins - Composition, Classification, Functions, Synthesis, Metabolism and Significance. | **8** |
| 6 | **Biological Oxidation** | Introduction, Electron transport chain and oxidative phosphorylation.<br>Free radicals, ROS and oxidative damage<br>Detoxification in the body, metabolism of xenobiotics. | **2** |
| 7 | **Nucleic Acid metabolism** | Introduction**,** Metabolism of purines and pyrimidines.<br>Role of purine, pyrimidine, and nucleotide in metabolism.<br>Metabolism of DNA (DNA Replication, repair, recombination), Metabolism of RNA (transcription, translation)<br>Concept of Operons, Disorders of nucleic acid metabolism. | **2** |
| 8 | **Function Tests** | **Liver** – liver function tests, diagnostic tests, detoxification, excretory test (two tests each)<br>**Renal function Test -** Biological functions of kidneys – manifestation of clinical symptoms, classification – glomerular filtration tests, renal plasma flow test, tubular function tests and other miscellaneous tests<br>**Gastric Function Test**<br>Test for malabsorption – Fat – Qualitative and quantitative analysis; Carbohydrate – D- xylose; Lactose breath test – lactose intolerance; Hydrogen test – H.Pylori; Schilling's Test – B12; Protein – Serum protein, albumin.<br>**Cerebrospinal fluid -** Composition, appearance, biochemical changes – clinical importance<br>**Oncogenic markers** – classification and clinical uses<br>**Diabetic Profile** | **10** |
| **Total** | | | **45 hrs** |

# MCN 104 P – Nutritional Biochemistry

| Sr. No. | Topic | No. of Hrs. |
|---|---|---|
| 1 | Test for Monosaccharides | **2** |
| 2 | Test of disaccharide and polysaccharide | **2** |
| 3 | Colour Reactions of Proteins | **4** |
| 4 | Precipitation Reactions of proteins | **2** |
| 5 | Estimation of Blood Glucose, glycosylated Haemoglobin | **4** |
| 6 | LCD on Glucose Tolerance Test | **4** |
| 7 | LCD on Lipid Profile | **2** |
| 8 | Demonstration on Total Protein & A/G Ratio | **2** |
| 9 | Estimation of Serum Uric Acid | **2** |
| 10 | Demonstration on AST, ALT & ALP | **2** |
| 11 | LCD of Thyroid Function Test | **2** |
| 12 | LCD – Normal Constituents of Urine | **2** |
| **Total** | | **30 hrs** |

***LCD – Lecture Cum Demonstration**

**References:**


1. Dasgupta, S. K., Biochemistry Vol. I; N & Iii, Mc Milan Co. of India Ltd
2. Das, Debajyoti, Biochemistry 2nd Ed., 1980, Academic Publishers, India.
3. Harper, H. A. etal, A Review of Physiological Chemistry, Los Altos, Lange Medical Publications, 1985.
4. Lehninger, A. L., Principles Of Biochemistry
5. Chaterjee. Textbook of Medical Biochemistry
6. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.

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|---|---|
| **Name of the Program** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester I** |
| **Name of the Course** | **Human Physiology** |
| **Course Code** | **MCN 103 T** |

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|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>• The basic physiology of various system in human body.<br>• The functions of various organs and their regulation. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>• Understand body systems: Gain knowledge of the structure and function of systems like circulatory, respiratory, renal, digestive, musculoskeletal, nervous, and endocrine systems.<br>• Analyze physiological processes: Learn key processes such as membrane transport, cardiac cycle, respiration, urine formation, muscle contraction, and digestion.<br>• Study special systems: Explore the functioning and disorders of the cardiovascular, respiratory, renal, and gastrointestinal systems, including blood pressure, ECG, and respiratory issues.<br>• Comprehend endocrine and hematology: Understand the regulation and disorders of major glands (pituitary, thyroid, adrenal, and pancreas) and blood functions like coagulation and anemia.<br>• Integrate with clinical nutrition: Relate physiological knowledge to clinical nutrition, focusing on the connection between nutrition and health.<br>• Enhance clinical application: Develop critical thinking skills to apply physiological knowledge in clinical nutrition practice and disease management. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| **1.** | **Cell Membrane**<br>Structure, composition and Transport of metabolites across the across the membrane | **2** |
| **2** | **Circulatory system**<br>Basic structure and function of CVS, Structure and function of heart, Cardiac Impulse and cardiac cycle, Concept of haemorrhage, heart failure, shock, hypertension, Concept of Blood Pressure, Normal values, Regulation, Cardiac Output, Normal ECG | **4** |
| **3.** | **Respiratory system**<br>Basic structure and function of RS, Mechanism of breathing, Transport of oxygen and carbon dioxide, Regulation of respiration, Respiratory abnormalities – Hypoxia, apnea, hypo and hyperventilation | **4** |
| **4.** | **Renal system**<br>Basic structure and function of Renal System, Mechanism of urine formation GFR & Tubular functions, Maintenance of Osmolarity& Volume of ECF, Micturition & RFT (Renal handling of individual substances-inulin, urea, para –amino hippuric acid, dialysis & functions) | **6** |
| **5.** | **Nervous system** | **3** |

| | | |
|---|---|---|
| | Structure & functions of brain and spinal cord Blood brain barrier | |
| **6.** | **Digestive system**<br>Basic structure and function of GIT, Digestion & Absorption of food in various parts of GIT, Mechanism of secretion of digestive juices, movements of GI tract, digestion and absorption, gastrointestinal hormones – sources and action | **8** |
| **7.** | **Musculoskeletal system**<br>Basic structure and function of skeletal muscle, Conduction of nerve impulses, role of neurotransmitters; afferent & efferent nerves, regeneration of nerve fibres, Neuromuscular Transmission and muscle contraction, Energetics of muscle contraction | **6** |
| **8.** | **Endocrine system**<br>1. Introduction to Endocrine system<br>2. Function, Regulation & Disorders of<br>● Pituitary gland<br>● Thyroid gland<br>● Parathyroid gland<br>● Adrenal gland<br>● Endocrine Pancreas gland | **6** |
| **9.** | **Haematology**<br>1. Composition & Functions of Blood<br>2. Normal Hemogram<br>3. Formation of blood cells-RBC, WBC, Platelets<br>4. Anemia<br>5. Blood coagulation<br>**6.** Blood groups | **6** |
| **Total** | | **45 hrs** |

# MCN 105 P –Human Physiology

| Sr. No. | Topic | No. of Hrs. |
|---|---|---|
| 1. | Microscopy | **2** |
| 2. | Estimation of Haemoglobin | **2** |
| 3. | Estimation of WBC | **2** |
| 4. | Estimation of RBC | **2** |
| 5. | Estimation of DLC | **4** |
| 6. | Estimation of blood group | **2** |
| 7. | Bleeding Time & Clotting Time | **2** |
| 8. | General Examination, History taking | **2** |
| 9. | Clinical Examination of Pulse | **4** |
| 10. | Blood Pressure | **2** |
| 11. | Demonstration of Clinical Examination of CVS | **2** |
| 12. | Demonstration of Clinical Examination of RS | **2** |
| 13. | Demonstration of Clinical Examination of Alimentary System | **2** |
| **Total** | | **30 hrs** |

**References:**

1. Sembulingam. K, Essentials of Medical physiology, 2010, Jaypee Medical Publishers, New Delhi
2. E. Rabsky, B.Khodorov, G.Kositskv, A. Zubkov, Human physiology, Vol II, MIR Publishers, 1989.
3. Dorothy S. Luciano, Arthur J. Vander, James H. Sherman, Human function and its structure international student edition, Me Graw Hill pub.
4. P.D Strukie, Basic physiology, Springer - Verlag pub, 1981.
5. Winter & Shourd, Review of human physiology 1982, W.B. Saunderscompany publication, 2nd edition.
6. Anil Baran & Singha Mahapatra, 1999, Essentials of medical physiology, Current book international.
7. G.K. Pal & Parvati Pal, 2010, Textbook of Practical Physiology (New), India

| | |
|---|---|
| **Name of the Program** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester - I** |
| **Name of the Course** | **Research Methodology & Biostatistics (Core Course)** |
| **Course Code** | **CC 001 T** |

| | |
|---|---|
| **Learning Outcomes** | • Describe fundamental research designs and statistical models commonly used in medical and biomedical sciences.<br>• Apply appropriate statistical techniques to analyze and interpret medical research data.<br>• Evaluate the validity and reliability of research findings using statistical inference methods.<br>• Differentiate between various research methodologies and their applications in biomedical sciences.<br>• Interpret statistical results and effectively communicate research outcomes in a healthcare context.<br>• Design a basic research study, including selecting an appropriate research methodology and statistical approach. |
| **Course Outcomes** | • Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis interpretation & reporting of Results and use of statistical software. |

| Sr. No. | Topic | No. of Hrs. |
|---|---|---|
| **A** | **Research Methodology:** | **23** |
| 1 | **Scientific Methods of Research:** Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research, Research Methods versus Methodology | 4 |
| 2 | **Research Designs:** Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case – Control Studies, Cross-sectional studies, Intervention studies, Panel Studies. | 5 |
| 3 | **Sampling Designs:** Census and Sample Survey, Need and importance for Sampling, Implications of a Sample Design, Different Types of Sample Designs (Probability sampling and non-probability sampling), Systematic sampling, Stratified sampling, Cluster sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling. | 5 |
| 4 | **Measurement in research:** Measurement Scales, Sources of Error in Measurement | 3 |
| 5 | **Methods of Data Collection:** Types of data, Collection of Primary Data, Observation Method, Interview Method | 4 |
| 6 | Research Ethics and plagiarism | 2 |
| **B** | **Biostatistics** | **22** |
| | **Data Presentation:** Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, | 3 |

| | | |
|---|---|---|
| 7 | Histograms, Frequency polygons, scatter plots, line graphs | |
| 8 | **Measures of Central Tendency and Dispersion:** Mean, Median, Mode, Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits). | 3 |
| 9 | **Testing of Hypotheses:** Definition, Basic Concepts, Procedure for Hypothesis Testing, Power of Test, Normal distribution, Parametric Tests including Z-test, t-test, and ANOVA | 4 |
| 10 | **Chi-square Test**: Chi-square as a Non parametric Test, Applications. | 2 |
| 11 | **Measures of Relationship:** Correlation and Simple Regression Analysis | 3 |
| 12 | **Non parametric Test:** Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test, Kruskal Walli's test, Friedman's test, and Spearman Correlation test. | 3 |
| 13 | **Vital Health Statistics:** rate, crude rate, age specific rate, Measurement of fertility, rate, Measures of mortality. | 4 |
| **Total** | | **45 hrs** |

## CC 001 P–Research Methodology & Biostatistics

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| **A** | **Research Methodology** | |
| 1 | Research Article Presentation (Seminar) | **5** |
| **B** | **Biostatistics** | |
| 2 | Data Presentation | **4** |
| 3 | Measures of Central Tendency and Dispersion | **6** |
| 4 | Testing of Hypotheses | **16** |
| 5 | Chi-square Test | **4** |
| 6 | Measures of Relationship | **6** |
| 7 | Analysis of Variance | **5** |
| 8 | Non parametricor Distribution-free Tests | **8** |
| 9 | Computer Application Using Statistical Software including SPSS | **6** |
| **Total** | | **60 hrs** |

**Reference Books:**


1. Daniel WW. Biostatistics: A foundation for analysis in the health sciences. 10th ed. Wiley; 2013.
2. Gupta SC, Kapoor VK. Fundamentals of mathematical statistics. Sultan Chand & Sons; 2020 Sep.
3. Kothari CR, Garg G. Research methodology: Methods and techniques.2019.
4. Mahajan BK. Methods in biostatistics for medical students and research workers. 7th ed. Jaypee Brothers Medical Publishers; 2010.
5. Murthy MN. Sampling theory and methods. Statistical Publishing Society; 1967.
6. Singh YK. Fundamental of research methodology and statistics. New Age International; 2006.

Resolution No. 3.5 of Academic Council (AC-51/2025):

Resolved to approve the submitted list of recommended books for M.Sc. Clinical Nutrition and the course on Biostatistics and Research Methodology [ANNEXURE-7].

Annexure-7 of AC-51/2025

Biostatistics & Research Methodology Books List

| Subject | Book Name | Author |
|---|---|---|
| **Biostatistics & Research Methodology** | Biostatistics: A Foundation for Analysis in the Health Sciences (10th ed.) | Daniel WW. |
| | Biostatistical Analysis (5th ed.) | Zar JH. |
| | Research Methodology: Methods and Techniques | Kothari CR, Garg G. |
| | Methods in Biostatistics for Medical Students and Research Workers (7th ed.) | Mahajan BK. |
| | Sampling Theory and Methods | Murthy MN. |
| | Fundamentals of Research Methodology and Statistics | Singh YK. |
| | Fundamentals of Biostatistics (8th ed.) | Rosner B. |
| | An Introduction to Medical Statistics (4th ed.) | Bland M. |

# Course code- MCN 106 CP: MCN Directed Clinical Education – I (Total - 225 hrs.)

| | |
|---|---|
| **Course Outcomes** | • Knowledge-Based competencies will build a robust theoretical foundation, enabling students to understand healthcare practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies.<br>• Skill-Based competencies will emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' confidence and competence in delivering quality patient care.<br>• Attitudinal competencies will focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills-key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams. |

## Objectives

- To enable the students to Acquaint with the working protocol of the hospital's Dietetics Department.
- Assess the nutritional status of different patients.

## Work Instructions

- Each student is instructed to Nutritional Assessment of admitted patients.
- Report 3 case studies in order to familiarize with assessment methods and their interpretation for various disorders.
- Submit Hospital Posting and Case report booklet.

# FIRST YEAR

## M.Sc. CLINICAL NUTRITION

## SEMESTER-II

| Code No. | Core Subjects |
|---|---|
| **Discipline Specific Core Theory** | |
| MCN 107 T | Medical Nutrition Therapy - I |
| MCN 108 T | Community & Public Health Nutrition |
| MCN 109 T | Food Microbiology |
| MCN 110 T | Nutrition Through Lifecycle |
| **Discipline Specific Core Practical** | |
| MCN 111 P | Medical Nutrition Therapy I |
| MCN 112 P | Community & Public Health Nutrition |
| MCN 113 CP | MCN Directed Clinical Education - II |
| **Skill Enhancement Course** | |
| SEC 001 T | Nutrition in Emergencies |
| SEC 002 T | Maternal Infant Young Child Nutrition (NPTEL) |

| | |
|---|---|
| **Name of the Program** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester - II** |
| **Name of the Course** | **Medical Nutrition Therapy I** |
| **Course Code** | **MCN 107 T** |

| | |
|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>• Understanding of basic concepts of medical nutrition therapy.<br>• Develop an insight about the Etiology, signs and symptoms, nutritional management of diseases and disorders. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>• **Conduct Comprehensive Nutrition Assessments:** Use various clinical assessment tools (e.g., NRS, SGA, MNA) to assess patients' nutritional status, diagnose nutritional problems, and design appropriate interventions.<br>• **Provide Therapeutic Nutritional Support**: Implement enteral and parenteral nutrition, manage related complications, and understand the impact of drug-nutrient interactions to deliver effective nutritional support for patients with therapeutic needs.<br>• **Manage Pediatric Nutrition:** Develop and implement nutrition care plans for hospitalized infants and children, addressing conditions like low birth weight, failure to thrive, gastrointestinal issues, and congenital anomalies.<br>• **Manage Nutrition in Infectious Diseases:** Address the nutritional needs of patients with febrile conditions and infections such as typhoid, malaria, tuberculosis, and HIV/AIDS, understanding the metabolic changes and dietary requirements during illness.<br>• **Address Energy Imbalance and Nutritional Disorders:** Manage conditions such as obesity, underweight, and eating disorders by applying dietary, behavioral, and pharmacological strategies, with a focus on energy balance regulation.<br>• **Handle Immune System and Food Allergy Management:** Design elimination diets and nutrition strategies for patients with food allergies, intolerances, and immune system disorders such as celiac disease and autoimmune conditions.<br>• **Manage Nutrition in Pulmonary and Musculoskeletal Disorders:** Provide nutritional care for patients with pulmonary diseases (e.g., asthma, COPD) and musculoskeletal disorders (e.g., arthritis, osteoporosis), focusing on anti-inflammatory dietary approaches.<br>• **Implement Gastrointestinal Nutrition Therapy:** Manage gastrointestinal disorders, including diseases of the upper and lower GI tract, malabsorption syndromes, and post-surgical care, improving clinical practice in digestive health.<br>• **Manage Endocrine Nutrition:** Assess and provide nutrition interventions for patients with endocrine disorders like thyroid diseases, polycystic ovary syndrome (PCOS), Cushing's syndrome, and Addison's disease.<br>• **Understand and Manage Nutrient-Drug Interactions:** Evaluate the clinical significance of nutrient-drug interactions and their effects on nutritional status, ensuring optimal treatment outcomes through appropriate management strategies. |

| Sr. No. | Topics | | No. of Hrs. |
|---|---|---|---|
| 1 | **Introduction to Medical Nutrition Therapy** | **Nutrition Education & Dietetic Counselling:** Principles and objectives, role of dietitian in Interdisciplinary Medical Team & Outreach Activities. Clinical Information Resources – Medical History and Patient Profile. Routine hospital diets and modifications for different diseases or disorders, use of exchange lists in nutrient calculation and menu planning. **Nutrition Care Process:** Introduction, Nutrition Assessment- Nutritional Screening & Assessment Tools (NRS, SGA, MNA, Case Specific tools), Nutrition diagnosis, Nutrition intervention and Nutrition monitoring, Evaluation and Documentation. | **8** |
| 2 | **Nutritional support** | **Nutrition Support Techniques:** **Type of Dietary Adaptations for therapeutic needs** **Enteral nutrition** - Indications, enteral access - Routes of enteral feeding, enteral formula composition, methods of administration, monitoring, advantages of enteral feeding and management of complications; medication and enteral nutrition interactions. **Parenteral nutrition** - Indications for use of TPN, parenteral access, parenteral nutrition solutions, administration, monitoring and complications. | **8** |
| 3 | **Nutrition in Paediatrics -** | Basic needs and plans of nutritional care of the hospitalized infant- Assessment of Pediatric patients, Special infant needs - low birth weight, failure to thrive-Gastrointestinal problems of infancy & childhood- general functional disturbances, infantile diarrhea, celiac malabsorption syndrome, cleft palate and cleft lip, dental caries and nutrition support techniques | **8** |
| 4 | **Nutritional management of Infections and Febrile Conditions** | **Febrile Conditions:** Defence mechanism in body, metabolic changes during infection, type, Etiology, signs and symptoms, diagnosis and treatment and Nutritional management of different type of fever: Short duration (typhoid, malaria, Dengue), Long duration (Tuberculosis) and HIV/AIDS. | **4** |
| 5 | **Dietary management in Nutritional Imbalance** | **Energy Imbalance:** Neuronal & Hormonal Regulation of food intake and pathogenesis of obesity and malnutrition and starvation. Energy imbalance, Obesity: Etiology, Theories, Physiology of obese state, Obesity Management – Pharmacological, Dietary & Lifestyle management, Surgical Management. Evaluation of Common diets – Atkin's diet, intermittent fasting & Ketogenic diet (Self-study). Underweight: Etiology & Dietary Management. **Eating Disorders:** Nutrition Management in Anorexia Nervosa, Bulimia | **6** |
| 6 | **Nutritional management in Immune System Diseases** | Adverse food reactions: food allergy and food intolerance, Definition, Diagnosis - History, Food record, overview of Biochemical and Immune testing, Dietary Approach -Elimination diets management, Food Allergy in infancy - Milk sensitive enteropathy; Colic, | **4** |

| | | | |
|---|---|---|---|
| | | Intolerance to breast milk, celiac disease (gluten sensitive enteropathy), Preventions of adverse food reactions. | |
| 7 | **Nutritional Management in Pulmonary & Musculo Skeletal System** | **Diseases of the Pulmonary System:** Asthma, COPD, Bronchopulmonary Dysplasia, Cystic Fibrosis<br>**Diseases of the Musculo-Skeletal System:** Pathophysiology & Inflammation, Rheumatic Diseases, Arthritis, Gout, Osteoporosis, Sjogren's Syndrome, Systemic Lupus Erythematous, Anti-inflammatory Diet | **4** |
| 8 | **Nutritional Management in GI disorders** | **Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders:**<br>Diagnostic tests for the G.I. diseases, Signs and symptoms Nutritional care and diet therapy in diseases of oesophagus; Oesophagitis, Hiatus hernia, Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers.<br>Nutrition management in Gastric Surgery<br>**Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders:**<br>Common Symptoms of Intestinal dysfunction – Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhea.<br>Diseases of the large intestine: - Diverticular disease, irritable bowel syndrome, inflammatory bowel disease.<br>Malabsorption Syndrome/Diseases of Small intestine - Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy.<br>Intestinal surgery: Short bowel syndrome, Ileostomy, Colostomy, Rectal surgery | **8** |
| 9 | **Nutritional Management of Endocrinal Disorders** | Medical Nutrition Therapy for Thyroid and other endocrinal Disorders: Thyroid Physiology; Assessment of Thyroid Disorders; Hypothyroidism, Polycystic Ovary Syndrome; Hyperthyroidism; Other Endocrine System Disorders- Cushing's Syndrome, Addison's Disease, Adrenal Insufficiency | **6** |
| 10 | **Nutrient & Drug Interaction** | Basic concept of nutrient drug interaction- effect of nutrition on drug, drugs effect on nutritional status, drug and drug interaction, clinical significance of drug nutrient interaction | **4** |
| **Total** | | | **60 hrs** |

# MCN 111 P: Medical Nutrition Therapy I

| Sr. No. | Topic | No. of Hrs. |
|---|---|---|
| 1 | Standardization of Common Foods | **4** |
| 2 | Understanding and Using Food Exchange lists and Food Composition Table | **2** |
| 3 | Market Survey of Commercial Feeding Products – Adult & Children | **2** |
| 4 | Planning of Enteral Feeds | **4** |
| 5 | Plan & Prepare Weaning foods | **4** |
| 6 | Diet plan for febrile conditions<br>1. Typhoid<br>2. Tuberculosis | **6** |
| 7 | Diet Plan for Obesity & Underweight | **6** |
| 8 | Anti-inflammatory diet plan | **6** |
| 9 | Diet Plan for COPD | **4** |
| 10 | Diet plan for peptic ulcer | **4** |
| 11 | Diet plan for IBS | **6** |
| 12 | Diet plan GI Surgery | **4** |
| 13 | Diet Plan for Thyroid Disorders | **4** |
| 14 | Diet Plan for PCOD | **4** |
| **Total** | | **60 hrs** |

**References:**


1. Mahan, L.K. and Escott-Stump, S. (2021): Krause's Food Nutrition and Diet Therapy, 15th Edition, W.B. Saunders Ltd.
2. Anita Jatan., Daphnee DK., et.al (2022): Apollo Clinical Nutrition Handbook, 1st Edition. Jaypee Brothers Publication.
3. Annalynn Skipper, Dietitian's Handbook of Enteral and Parenteral Nutrition, 2012, I edition, An ASPEN Publication
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.
5. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
6. Antia F. P.: Clinical Dietetics and Nutrition, 3rd ed., Oxford University, Press, Delhi, Reprinted in 1989.
7. Laura E. Matarese, Michele M. Gottschlich, Contemporary nutrition support practice: a clinical guide, 2006, I edition, Saunders Elsevier's Science, Missouri

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|---|---|
| **Name of the Program** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester - II** |
| **Name of the Course** | **Community and Public Health Nutrition** |
| **Course Code** | **MCN 108 T** |

| | |
|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>• Basics of community nutrition<br>• Understanding of nutrition related problems and nutrition interventions. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>• Define and understand key concepts in community and public health nutrition, including biomedical, ecological, psychological, and holistic approaches, as well as epidemiological methods such as case-control and cohort studies.<br>• Assess nutritional status at individual and community levels using methods like anthropometry, biochemical, clinical, and dietary assessments.<br>• Apply nutrition standards for growth monitoring in children and assess nutritional status in adults using WHO standards.<br>• Understand and analyze food and nutrition security, including its dimensions and relevant policies in India, such as NFSA and the Public Distribution System.<br>• Identify and address nutritional problems such as nutrient deficiencies, obesity, chronic diseases, and malnutrition, with an emphasis on integrated solutions and interventions.<br>• Plan, execute, and evaluate nutrition education programs for communities, utilizing appropriate tools and overcoming implementation challenges.<br>• Understand health and nutrition administration in India, including welfare programs, government policies, and the role of global health agencies like UNICEF and WHO. |

| Sr. No. | Topics | | No. of Hrs. |
|---|---|---|---|
| 1 | **Introduction to community and Public Health** | Definition, Scope and Concept (biomedical, ecological, psychological and holistic) of community & Public health nutrition.<br>**Epidemiology** – Definition, methods of epidemiological studies – retrospective study, prospective study, case control study, cohort study, randomized control trials, non-randomized control trials<br>Role of nutritionist in community. | **3** |
| 2 | **Nutritional Assessment** | Nutritional status assessment: Goal and objectives<br>Methods of Nutritional status assessment at individual and community level<br>Direct methods:<br>● Anthropometry<br>● Biochemical assessment<br>● Clinical assessment<br>● Dietary assessment<br>Indirect methods: | **6** |

| | | | |
|---|---|---|---|
| | | • Age Specific Mortality Rates<br>• Cause Specific Mortality Rates<br>• Cause Specific Nutritionally – Relevant<br>• Morbidity Rate Ecological Factors | |
| 3 | **Nutrition standards** | Determinants and Indicators of Nutritional Status<br>WHO standards for children for growth monitoring, IAP Standards, Anthro plus software<br>WHO standards for adults for assessment of nutritional status | **2** |
| 4 | **Food and Nutrition Security** | Food and Nutrition Security: Concept of food security and nutritional security. Food security in India, Dimensions of food security, Availability, Food Production, Distribution,<br>Access, Losses, Consumption Factors affecting food availability and intake;<br>Food Security and Adequacy of Diets;<br>Determinants of food and nutrition Security,<br>Policies and measures taken by the Government of India to achieve food security. Public distribution system, Nutrition Food security act (NFSA), GFSI, GHI | **6** |
| 5 | **Nutritional Problems in India** | Etiology, prevalence, clinical manifestations, preventive and therapeutic measures for:<br>a. Macro and micro nutrient deficiencies<br>b. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis.<br>c. Overweight, obesity and chronic degenerative diseases<br>Synergism between malnutrition and infection.<br>Strategies to Overcome Malnutrition:<br>Integrated Approach to Solve the Problems of Malnutrition: Nutrition Education, Nutrition Intervention Programmes, Agriculture Planning, Role of Food Technology, Environmental Sanitation and Health<br>Occupational health hazards – Physical, Chemical and Biological hazards - prevalence, prevention and control; Hazards in Industries-hospital, textiles, foundry, agriculture and radiation: Controlling measures and legal provisions. | **6** |
| 6 | **Nutrition Education** | Meaning, Nature and Importance of Nutrition Education to the Community; Principles of Planning, Executing and Evaluating Nutrition Education Programmes; Educational Aids; Problems of Nutrition Education Programmes | **3** |
| 6 | **Health & Nutrition Administration in India** | **Welfare Programmes** – Maternal and child health (specific reference to immunization programme); Nutrition programmes; public nutrition approach to tackle nutritional problems; Policies and programmes of the government and NGO sector of vulnerable groups, Millennium Development Goals and indicators pertaining to nutrition like goals 1,4,5,6.<br>**Health status in India** (based on current statistics)- Definition, principles and objectives of community health administration and policy; Prevalence of lifestyle diseases in India; Nutritional health policy, Health care delivery system at central, state and district level (specific reference to PHC). | **4** |

| | | | |
|---|---|---|---|
| | | **Health Agencies** –UNICEF, FAO, UNDP, ILO, UN, UNESCO, WHO, USAID, CARE, World bank Functions and beneficiaries. | |
| **Total** | | | **30 hrs** |

# MCN 112 P: Community & Public Health Nutrition

| Sr. No. | Topics | | No. of Hrs. |
|---|---|---|---|
| **For each unit field visits should be undertaken and report to be prepared by the students** | | | |
| 1 | **Nutritional status assessment** | Anthropometric Measurement of community - Height, weight, circumference of Head and Chest, Mid-upper arm circumference of children; Comparison with norms and interpretation of the nutritional assessment data and its significance - Weight for age, height for age, weight for height<br>Body Mass Index (BMI), Waist - Hip Ratio (WHR) for adults | **16** |
| 2. | **Growth monitoring** | Visits to Anganwadi, Assessment of height weight, MUAC etc. of children, use of growth charts and its application for assessment of nutritional status using WHO standards for children for growth monitoring, IAP Standards<br>Use of different software<br>Observation of ICDS activities (Supplementary feeding programs) | **10** |
| 3 | **Dietary Assessment** | Estimation of food and nutrient intake - Household food consumption – using coefficient of consumer unit, 24 hours dietary recall, weighment method, food diaries, food frequency questionnaire - for households | **12** |
| 4 | **Planning Nutritious Recipes** | Development of Low-cost nutritious recipes, sensory evaluation of selected recipes for nutrient deficiencies. | **10** |
| 5 | **Nutrition Education intervention** | Nutrition cum Health Education for rural population- through development of selected Nutrition Education tools. | **12** |
| **Total** | | | **60 hrs** |

**References:**


1) Parks's Textbook of Preventive and Social medicine, 26th Latest Edition 2021 Kpark, Bhanot Publisher
2) Srilakshmi B and V Suganthi. Community Nutrition. New Age International Private Limited; 1st edition (7 July 2022); NEW AGE International, 7/30A, Near LIC Flats, Daryaganj, ND110002
3) Suryatapa Das. Textbook of community. Nutrition Academic publishers (1 January, 2022)
4) Elizabeth Eilender. Public Health and Community Nutrition. Momentum Pr (28 September 2016s
5) M. Margaret Barth, Ronny A. Bell, Karen Grimmer. Public Health Nutrition: Rural, Urban, and Global Community-Based Practice, Springer Publishing Co Inc; 1st edition (30 June 2020)

| Name of the Program | M.Sc. Clinical Nutrition |
|---|---|
| Semester | Semester - II |
| Name of the Course | Food Microbiology |
| Course Code | MCN 109 T |

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|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>• Morphology and life cycle of different microorganisms.<br>• Information regarding food borne diseases.<br>• Identification of causative organisms and their treatment measures. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>• Understand the basics of food microbiology, including microbial growth and factors affecting it.<br>• Identify and describe microorganisms (molds, bacteria, yeasts, viruses) in food and their role in spoilage and foodborne diseases.<br>• Recognize biochemical changes caused by microbes in food.<br>• Analyze microbial contamination and spoilage in various food types.<br>• Understand foodborne diseases, pathogens, and their detection methods.<br>• Learn about microbial toxins and their health impacts.<br>• Explore methods for controlling microorganisms in food, including preservation and novel processing technologies.<br>• Understand food sanitation, including water quality, sewage treatment, and food safety standards like GMP and HACCP.<br>• Apply microbiological criteria for food safety and understand the role of control agencies in ensuring food safety. |

| Sr. No. | Topics | | No. of Hrs. |
|---|---|---|---|
| 1 | **Basics and Morphology** | **History and scope of food microbiology-** Historical development in food preservation, food spoilage and food poisoning, role of microbes in food.<br>**Microbial growth pattern**– Growth curve of microbial cultures, its application to food preservation.<br>**Factors affecting microbial growth** – pH, moisture content, Eh, nutrient content, antimicrobial constituents, biological structures, extrinsic factors. | **4** |
| 2 | **Microorganisms in food** | **Types of microorganism associated with food:**<br><br>**Mold** – general characteristics, morphological features, reproduction, physiological requirements, common Molds associated with foods.<br>**Bacteria** – Morphological, physiological characteristics, important food spoilage and pathogenic bacteria, associated with foods.<br>**Yeast** – General Characteristics, reproduction, cultural characteristics, physiological characteristics.<br>**Viruses** – Structure and replication with particular reference to food born viruses. | **6** |

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|---|---|---|---|
| | | **Biochemical changes caused by micro-organisms** – Degradation of carbohydrates, fermentation, degradation of lipids, degradation of proteins and amino acids, putrefaction.<br>**Hygiene** – basic principles, Antisepsis, Antibiotic, Bactericidal agents. | |
| 3 | **Microbial Contamination** | **Microbial contamination and spoilage of foods –** Vegetables, cereals, pulses, oilseeds, milk and meat during handling, processing and storage<br>**Microbiology of water -** Microbiological quality of water. Analysis of water.<br>**Spoilage of processed foods –** Canned products, causes of spoilage, appearance of spoiled cans, types of spoilage of canned foods by yeast, moulds and bacteria. | **6** |
| 4 | **Food Borne Diseases** | **Food borne disease** – Staphylococcal gastroenteritis, Botulism, Listeriosis, Salmonellasis, Shigillosis, Hepatitis A, B<br>**Toxicants of microbial origins -** Aflatoxins, ochratoxins, patulin, botulism, enterotoxins.<br>**Detection of food borne pathogens -**Physical, chemical and immunological methods of detecting microbes in foods with special reference to Staphyllococcus, Clostridium, Lysteria, Yersenia, Salmonella, Escherichia, Vibrio | **6** |
| 5 | **Control of Microorganisms** | Access, physical removal, heat, low temperature, low pH, organic acids, modified atmosphere, antimicrobial preservatives, irradiation and novel processing technologies | **4** |
| 6 | **Microbiology in Food Sanitation** | Bacteriology of water; sewage and waste treatment and disposal; good manufacturing Practices; HACCP; Microbiological criteria for foods; Control Agencies | **4** |
| **Total** | | | **30 hrs** |

## References:


1. Frazier, W. C. and Westhoff, D. C. (1988): 4th edition, Food Microbiology, MaGraw Hill Inc.
2. Jay James. N. (1986) : 3rd edition, modern Food Microbiology, Van Nestrand Reinhold Company Inc
3. Peleezar, M.I. and Reid, K. D. (1978): Microbiology, McGraw Hill Company, New York.
4. Benson Harold, J. (1990) : Microbiological Application, Publishers, U.S.A.
5. Colling, C.E. and Lyne, P.M. (1976) : Microbiological Methods Butterworth. London.
6. George J. Banwart (2004), 2nd edition CBS Publishers & Distributors
7. Pelezar, M.J. and Chan, E.C.S. (Jr.), 2000: Microbiology, Tata McGraw Hill Pub. Co., New Delhi
8. G.K.Pal & Parvati Pal Textbook of Practical Physiology (New),2010 , India
9. Stanier R.Y., Adelberg E.A. and Ingraham J.L. (1987) General Microbiology, 5th Edition. Macmillan Press Ltd.

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|---|---|
| **Name of the Program** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester - II** |
| **Name of the Course** | **Nutrition Through Lifecycle** |
| **Course Code** | **MCN 110 T** |

| | |
|---|---|
| **Learning Outcomes** | **To apprehend the candidate with:**<br>• Understanding of the development of the human being at different stages<br>• Study the importance of nutritional requirements throughout the life cycle |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>• Understand nutritional requirements across the life cycle, from pregnancy to geriatrics.<br>• Assess the impact of physiological and psychosocial changes on nutrition at each life stage.<br>• Identify and manage nutrition-related challenges, such as high-risk pregnancies, childhood obesity, and aging-related issues.<br>• Apply growth monitoring techniques and design dietary interventions for different age groups.<br>• Address specific nutritional issues like breastfeeding, weaning, and adolescent eating disorders.<br>• Develop nutrition plans for preventing and managing health problems, including chronic diseases in the elderly. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Nutrition in Pregnancy:** Physiology of pregnancy, maternal physiological adjustments, maternal weight gain, subjective and objective symptoms of pregnancy, Stages of human fetal growth, mechanism and regulation of fetal growth, Nutrient requirements during prenatal, perinatal, and postnatal periods, High-risk pregnancy-teenage pregnancy, pre-eclampsia and eclampsia, hyperemesis, alcoholism, Complications of Caffeine abuse and smoking, Diet counselling for teenage and adult pregnancy. | **4** |
| 2 | **Nutrition in Lactation:** Physiology of lactation, Hormonal regulation and reflex action, the effectiveness of milk production, supply and demand for nursing and frequency of nursing; breastfeeding benefits, and duration of exclusive breastfeeding, Contraindications to breastfeeding; the association between breastfeeding and immune system, oral motor, and gastrointestinal system development; lactogenic foods; nutritional needs for lactation. Infant Formulas, cow's milk, and human milk composition and comparison. | **4** |
| 3 | **Nutrition in Infancy**: Growth & maturation, Reference standards for growth and growth monitoring; Infant feeding - nutritional requirement of full-term infants; breastfeeding Vs bottle feeding; weaning practices; feeding problems of normal infants, Sequence of development of feeding behaviour.<br>Low birth weight and preterm infants - characteristics, growth, development, feeding practices, feeding problems, Strategies for reducing the incidence and severity of allergy in high-risk infants. | **4** |
| 4 | **Nutrition in preschool age:** Physical growth and development related to neuromuscular development, eating behavior, nutritional requirements of preschool children; factors influencing food choices, standard for growth monitoring. | **6** |

| | | |
|---|---|---|
| | **Nutrition in school children:** Physical growth, height and skeletal maturation, weight and anthropometric measurement, Standards for growth monitoring, factors to be considered while planning a menu; feeding problems of underweight and hyperactive children, dental caries; packed lunch and its effect on nutritional status. Nutritional related health issues in childhood. | |
| 5 | **Nutrition during adolescence**: Growth and development – physical growth & psychosocial development, physiological malnutrition, BMR, and body composition changes; Age at menarche, factors affecting menarche, psychological problems and challenges in adolescence, body image, weight control, skipping meals, anorexia nervosa, obesity, snacking, fast foods, sense of identity- addiction to cigarettes, alcohol, and drugs. Nutritional problems in adolescence – iron deficiency anemia, obesity, and undernutrition - etiology, prevention, and control, pubescent growth assessment. | **6** |
| 6 | **Nutrition during Adulthood:** Physiological changes of adulthood – male- climacteric change, female – menopausal changes, Osteoporosis and Osteopenia; Factors influencing nutritional requirements of the adult. | **2** |
| 7 | **Geriatric Nutrition**: Ageing process - physiological, metabolic, body composition changes and impact on health and nutritional status, Nutritional and health status of the elderly, Factors influencing food and nutrient intake, health status including lifestyle pattern, medication, psychosocial aspects, etc., Chronic degenerative diseases and nutritional problems of the elderly - their etiopathogenesis, management, prevention, and control. | **4** |
| **TOTAL** | | **30 hrs** |

**References:**


1. Worthington. S and Sue Rodwell Williams, Nutrition Throughout the Life Cycle, 1996, Third Edition, The McGraw Hill, New Jersy
2. Gail Goldberg, Elizabeth Dowler, Prakash Shetty, Nutrition Through the Life Cycle, 2007, RSC publishing, London.
3. Judith Sharlin, Sari Edelstein, Essentials of Life Cycle Nutrition, 2010, I edition, Jones & Bartlett Publishers, London.
4. Jim Mann & A. Stewart, Essentials of human nutrition, 2002, II edition, Truswell, Oxford university press, New Delhi
5. Myron Winick, Nutrition and exercise, 1996, I edition, John Wiley & Sons publishing company, Singapore.
6. Ira Wolinsky, Nutrition in Exercise and Sport, 1997, III Edition, CRC press, United Kingdom.
7. Raymond, J.L. *et al.* (2023) Krause and Mahan's food and the Nutrition Care Process. St. Louis, MO: Elsevier.

# Course code- MCN 113 CP: MCN Directed Clinical Education – II (Total – 225 hrs.)

| | |
|---|---|
| **Course Outcomes** | • Knowledge-Based competencies will build a robust theoretical foundation, enabling students to understand healthcare practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies.<br>• Skill-Based competencies will emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' confidence and competence in delivering quality patient care.<br>• Attitudinal competencies will focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills-key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams. |

## Objectives

To enable the students to

- Implement various techniques of dietary assessment.
- Understand clinical and pathological conditions of various diseases/ disorders along with specific dietary modification.
- Observe and study the food service management practices.
- Conduct Nutritional Assessment in field/ community setting.

## Work Instructions

Each student is instructed to

- Counselling of patients during hospital stay and discharge.
- Report 3 case studies in order to familiarize on various disorders and treatments
- Submit the Hospital Posting, Community Posting and Case report

# SKILL ENHANCEMENT COURSE

| | |
|---|---|
| **Name of the Programme** | **M.Sc. Clinical Nutrition** |
| **Semester** | **Semester II** |
| **Name of the Course** | **Nutrition for Emergencies** |
| **Course Code** | **SEC 001 T** |

| | |
|---|---|
| **Teaching Objective** | **To apprehend the candidate with:**<br>● Various natural emergencies and disasters<br>● Impact on nutrition and health status and special nutritional arising out of these situations. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>● Distinguish between natural and manmade disasters, and comprehend their impact on public health and nutrition.<br>● Demonstrate knowledge of nutrition management during emergencies, including immediate rescue, first aid, and physiological support.<br>● Organize and implement nutritional assessments and individual screenings in disaster-affected populations.<br>● Assess food needs, design effective food supply chains, and ensure equitable distribution to vulnerable groups.<br>● Develop and manage supplementary and therapeutic feeding interventions tailored to emergency contexts.<br>● Utilize local food resources, manage feeding centers, and ensure proper food storage and transportation.<br>● Promote safe water supply, sanitation, and hygiene to prevent disease outbreaks during and after disasters.<br>● Recognize major and specific nutrient deficiencies common in emergencies and apply appropriate dietary and medical treatments.<br>● Evaluate the impact of global warming and other factors on food security, particularly in the Indian context.<br>● Advocate for immunization, communicable disease control, and long-term nutritional rehabilitation in post-disaster settings. |

| Unit | Topics | | No. of Hrs. |
|---|---|---|---|
| **1** | **Types of Disaster** | Introduction, definition, classification – Natural disasters and manmade disasters, risk and disaster management with software applications. | 7 |
| **2** | **Disaster Management** | Nutrition management during disaster, immediate rescue and first aid including physiological aid, Organization and Nutritional surveillance and Individual screening, Supply of food, Assessment of food needs in emergency situations, Food distribution strategy – define and reaching the vulnerable group, Mass and supplementary feeding, Therapeutic feeding. | 10 |

| | | | |
|---|---|---|---|
| **3** | **Nutritional relief and rehabilitation** | Assessment of food nutritional relief, local foods in rehabilitation, organizations for mass feeding food distribution, transportation and storage, feeding centres, Sanitation and hygiene.<br>Nutritional support system in relief and rehabilitation, surveillance of nutritional status in emergency relief situations such as flood, cyclone, earthquake, drought, war, etc. | 10 |
| **4** | **The After Effects** | Control of communicable diseases – surveillance and treatment. Causes of malnutrition in emergency situations.<br>Major and specific deficiencies in disaster and treatment. | 10 |
| **5** | **Challenges to food security** | Global warming – Challenges to food security in India.<br>Safe water supply, Sanitation and hygiene, role of immunization and sanitation. | 8 |
| **Total** | | | **45 hrs** |

**References:**


1. Beradley, A Woodruff and Arabella Duffield (July 2000) Assessment of Nutritional status in emergency affected populations. Adolescents special supplement, UNACC.SCN sun committee on nutrition.
2. WHO website for emergencies
3. UNHCR (1999) UNHCR Hand books of emergencies 2nd edition Geneva UNHCR.
4. Young H, Means C (1998) Acceptability and use of cereal – based foods in refugee camps. Oxfain Working paper, Oxfam publishing Oxygen, U.K.
5. Refuge Nutrition Information System (RNIS) Newsletters UNACC/SCN subcommittee on Nutrition.
6. Goyet, Fish V, Seaman, J and Geijact (1978). The management of Nutritional emergencies in large populations WHO, Geneva.

| Name of the Programme | M.Sc. Clinical Nutrition |
|---|---|
| Semester | Semester II |
| Name of the Course | Maternal Infant Young Child Nutrition (NPTEL) |
| Course Code | SEC 002 T |

| | |
|---|---|
| **Teaching Objective** | **To apprehend the candidate with:**<br>● Physiological changes in pregnancy and lactation.<br>● Growth and developmental changes from conception till adolescence. |
| **Course Outcomes** | **After the course accomplishment the student will be able to:**<br>• Understand the maternal and child health landscape in India<br>• Differentiate between Type 1 and Type 2 nutrients, and understand the role of key micronutrients like omega-3, folate, and vitamin B12 in maternal and child health.<br>• Examine the causes and effects of nutrient deficiencies, assess the impact of junk food, and suggest nutrient-rich dietary alternatives.<br>• Outline essential nutrition actions for pregnant women and young children, and recommend appropriate dietary interventions during this window.<br>• Explain the golden hour of breastfeeding, benefits over substitutes, and legal protections for breastfeeding in India.<br>• Demonstrate breastfeeding techniques including cross cradle hold and address common lactation challenges through visual aids and counseling points.<br>• Apply techniques like Football, Cradle, Sidelying, and Laid-Back Holds, and assess feeding practices using standardized forms.<br>• Ensure proper newborn care and promote Kangaroo Mother Care (KMC) Create age-appropriate, nutritious recipes from 6 to 24 months, emphasize hygiene in food handling, and troubleshoot feeding challenges.<br>• Design targeted diet plans for women across reproductive stages and for adolescent girls, including vegetarian and non-vegetarian options.<br>• Interpret WHO growth charts, use Z-score and percentile methods, and conduct accurate anthropometric assessments. |

| Unit | Topics | | No. of Hrs. |
|---|---|---|---|
| 1 | **Introduction** | NFHS 4-5 data, Evidences from the field, MIYCF framework, Capacity building, case reports. | 3 |
| 2 | **Science of nutrition** | Type 1 and Type 2 nutrients, nutrients essential in children, Importance and recipes of - protein, Omega-3 and Omega-6, Choline, Folate, Vitamin B12. | 3 |
| 3 | **Types of malnutrition and hidden hunger** | Hidden hunger and types of Malnutrition. Importance and recipes of – Calcium, Vitamin D, Magnesium, Potassium.<br>Junk food and reasons for consumption of Junk Food. | 4 |
| 4 | **Importance of first 1,000 days** | First 1000 days, Essential Nutrition actions for pregnant women and children, Importance and recipes of –Vitamin C and Sulphur. | 4 |
| 5 | **Science of Breastfeeding** | Introduction, Golden hour, Importance of breastfeeding, comparison of breastmilk with other substitutes, Breast crawl during normal delivery and caesarean delivery. Indian law to protect breastfeeding. | 4 |

| | | | |
|---|---|---|---|
| **6** | **Cross cradle hold and 45 points of breastfeeding counselling** | Mother's preparation and baby's positioning, Holding the breast and latching the baby to the breast, counselling points, Cross Cradle Hold and Latching. Solutions to problems faced while feeding the baby in cross cradle hold. Visual aids for positioning and latching techniques. | 4 |
| **7** | **Other breastfeeding holds** | Football Hold, Cradle Hold, Sidelying Hold, and Laid-Back Hold. Breastfeeding assessment form, | 4 |
| **8** | **Manual expression, storage and feeding of the expressed breast milk** | Manual expression and storage of breastmilk, How to feed expressed breastmilk, Poor weight gain due to breastfeeding factors and other factors, Solutions to increase Breast Milk Supply, Breastfeeding during covid, Nipple /Breast conditions, complications of nipple shields. | 4 |
| **9** | **Newborn care and Kangaroo mother care** | How to bathe the baby, KMC- KMC bag making | 2 |
| **10** | **Complementary feeding** | Guidelines for complementary feeding, personal hygiene needed for handling baby food, vegetarian and non- vegetarian recipes for 6$^{th}$ month, 7$^{th}$ month, 8 to 11month old, 12 to 18 months, 19to 24-month babies, powder recipes for babies. Issues faced during complementary feeding, nutrient count of day-to-day foods. | 7 |
| **11** | **Maternal Nutrition** | Nutritious vegetarian and non-vegetarian recipes for,<br>-pre-pregnancy, pregnancy, lactating mothers, Adolescent Nutrition | 3 |
| **12** | **Assessment of anthropometric measurement and growth charts - Percentile & Z Score** | The who Multicentric Growth Reference Study (1997- 2003) Percentile growth charts, Standard Normal Deviation WHO Z Score charts, WHO percentile growth charts, anthropometric measurements. | 3 |
| **Total** | | | **45 hrs** |

**References:**


2. Dalal, R., Iyer, S., Abraham, M. and Yaddanapudi, L., 2020. Supporting healthy growth in infants in low-resource settings in Mumbai, India. Field Exchange 63, p.43.
3. Infant and Young Child Nutrition in Tropics, Indian Academy of Paediatric (IAP) Textbook of Tropical Paediatrics – 2020
4. World Health Organization. (2020). Frequently asked questions: breastfeeding and COVID-19: for health care workers, 12 May 2020. World Health Organization. https://apps.who.int/iris/handle/10665/332719. License: CC BY-NC-SA 3.0 IGO
5. Raylene Phillips, The Sacred Hour: Uninterrupted Skin-to-Skin Contact Immediately After Birth, Newborn and Infant Nursing Reviews, Volume 13, Issue 2, 2013, Pages 67-72, ISSN 1527-3369, https://doi.org/10.1053/j.nainr.2013.04.001. (https://www.sciencedirect.com/science/article/pii/S1527336913000299)


**Note:** Attaint the NPTEL Course with title and course code as "**Maternal Infant Young Child Nutrition (Course Code: noc25-bt29) (NPTEL)".**

# Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

## Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

| Question | | Marks distribution | Marks allotted per section | Marks |
|---|---|---|---|---|
| Sec: A | MCQ | 10 x 1 M = 10 | 10 | 10 |
| Sec: B | SAQ | 3/4x 5 M = 15 | 15 | 35 |
| Sec: B | LAQ | 2/3 x 10 M = 10 | 20 | |
| Sec: C | SAQ | 3/4x 5 M = 15 | 15 | 35 |
| Sec: C | LAQ | 2/3x 10 M = 10 | 20 | |
| **Total** | | | | **80 Marks** |

**Marks Scheme for the University Examination (50 Marks)**

Final theory marks will be 50 marks University Theory exam pattern Research Methodology & Biostatistics (Core course)

| Question | Question No. | Question Type | Marks Distribution | Marks |
|---|---|---|---|---|
| Sec: A | 1. | LAQ (2 out of 3) | 2 X 10 Marks = 20 | 20 |
| Sec: B | 2. | SAQ (6 out of 8) | 6 X 05 Marks = 30 | 30 |
| **Total** | | | | **50 Marks** |

**Marks Scheme for the University Examination (100 Marks)**

Final theory marks will be 100 marks University Theory exam pattern Elective Course

| Question | Question No. | Question Type | Marks Distribution | Marks |
|---|---|---|---|---|
| Sec: A | 1. | LAQ (10 out of 12) | 10 X 10 Marks = 100 | 100 |
| **Total** | | | | **100 Marks** |

**Practical exam pattern: Total 40 marks with following breakup:**

| Exercise | Description | Marks |
|---|---|---|
| Q No 1 | Practical exercise - 1 | 1 x15=15 M |
| Q No 2 | Station exercise | 2x5M=10 M |
| Q No 3 | VIVA | 10 M |
| Q No 4 | Journal | 5M |
| **Total** | | **40 Marks** |

**Practical exam pattern Research Methodology & Biostatistics (Core course)**

## Total 50-mark distribution:

| Exercise | Description | Marks |
|---|---|---|
| Q No 1 | **Practical/Problem-Solving:** These questions can assess statistical analysis, research design, hypothesis testing, or interpretation of data etc. | 2 × 10 marks each) = **20 marks** |
| Q No 2 | Identification of study designs, Critical appraisal of research papers, Application of biostatistical tools, Sampling techniques etc. | (4 × 5 marks each) = **20 marks** |
| Q No 3 | **Viva Voce (Oral Examination)** Assessing conceptual clarity, application of research methodology, and statistical reasoning. | **10 marks** |
| **Total** | | **50 Marks** |

**Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.**

**Breakup of theory IA calculation for 20 marks:**

| Description | Marks |
|---|---|
| Internal exam (at department) | 15 marks |
| Seminar | 5 marks |
| **Total** | **20 Marks** |

**Breakup of practical IA calculation:**

| Description | Marks |
|---|---|
| Internal exam (at department) | 10 marks |
| Viva | 5 marks |
| Journal | 5 marks |
| **Total** | **20 Marks** |

**Note** –20 marks to be converted to 10 marks weightage for submission to the university.

# Model Checklist for Evaluation of the Clinical Directed Posting (PG)

Name of the student: _____Date:_____
Program:_____
Semester: _____ Name of the Internal faculty/Observer:_____
Name of the External Faculty/Observer:_____

| Core Competencies | Marks allotted | Marks obtained |
|---|---|---|
| Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations. | | |
| **Clinical Teaching** | | |
| a. Demonstrate beginning competency in technical skills. | 10 | |
| **Independent Work by Student guided by faculty** | | |
| a. Develop effective communication skills (verbally and through charting) with patients, team members, and family | 2.5 | |
| b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members. | 2.5 | |
| **Hands on practical work by students** | | |
| a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner | 05 | |
| **Independent work by student** | | |
| a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance. | 05 | |
| **Log book** | 10 | |
| **Viva** | 10 | |
| **Attendance** | 05 | |
| **Total** | **50 Marks** | |

Sign of Internal Examiner: _____
Sign of External Examiner: _____

**Resolution No. 3.5 of Academic Council (AC-51/2025):**
Resolved to approve the submitted list of recommended books for **M.Sc. Clinical Nutrition** and the course on **Biostatistics and Research Methodology** [ANNEXURE-7].

**Annexure-7 of AC-51/2025**

# M.Sc. Clinical Nutrition & Biostatistics & Research Methodology Books List

| Subject | Book Name | Author |
|---|---|---|
| **Fundamentals of Nutrition** | - *Nutrition Science*<br>ISBNs: 9788195175574<br>Publishing Year: 2022 | B. Srilakshmi |
| | - *Nutrition and Dietetics*<br>ISBNs: 9789339220150<br>Publishing Year: 2017 | Shubhangini A. Joshi |
| **Medical Nutrition Therapy I** | - *Apollo Clinical Nutrition Handbook*<br>ISBNs: 9789354650895<br>Publishing Year: 2022 | Anita Jatan, Daphnee DK, et al. |
| **Community and Public Health Nutrition** | - *Community Nutrition*<br>ISBNs: 9788122479669<br>Publishing Year: 2022 | B. Srilakshmi and V. Suganthi |
| | - *Textbook of Community Nutrition*<br>ISBNs: 9789383420698<br>Publishing Year: 2016 | Suryatapa Das |
| **Food Microbiology** | - *Food Microbiology*<br>ISBNs: 9789387465886<br>Publishing Year: 2022 | W.C. Frazier and D.C. Westhoff |
| | - *Modern Food Microbiology*<br>ISBNs: 9788123904757<br>Publishing Year: 2005 | Jay James N. |
| **Nutrition Through Life Cycle** | - *Nutrition Throughout the Life Cycle*<br>ISBNs: 9780072927320<br>Publishing Year: 1999 | Worthington S. and Sue Rodwell Williams |
| | - *Nutrition Through the Life Cycle*<br>ISBNs: 9781606508718<br>Publishing Year: 2016 | Gail Goldberg, Elizabeth Dowler, Prakash Shetty |
| **Nutrigenomics** | - *Nutritional Genomics: Discovering the Path to Personalized Nutrition*<br>ISBNs: 9780471683193<br>Publishing Year: 2006 | Jim Kaput |
| | - *Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition*<br>ISBNs: 9781439876800<br>Publishing Year: 2013 | Lynnette R. Ferguson |
| | - *Dietary Modulation of Cell Signaling Pathways*<br>ISBNs: 9780429128479<br>Publishing Year: 2008 | Zigang Dong and Young Joon Surh |

| | | |
|---|---|---|
| **Nutraceuticals and Drug Interaction** | - *Handbook of Drug-Nutrient Interactions*<br>ISBNs: 9781603273633<br>Publishing Year: 2009 | Joseph I. Boullata and Vincent T. Armenti |
| | - *Nutraceuticals in Health and Disease Prevention*<br>ISBNs: 9780367397340<br>Publishing Year: 2019 | Lester Packer and Klaus Kraemer |
| | - *Handbook of Nutraceuticals and Functional Foods*<br>ISBNs: 9781498703734<br>Publishing Year: 2019 | Robert.E.C, Wildman |
| **Medical Nutrition Therapy II** | *Modern Nutrition in Health and Disease*<br>ISBNs: 9781605474618<br>Publishing Year: 2013 | Shils et al. |
| | *Nutrition and Diagnosis Related Care*<br>ISBNs: 9781451195323<br>Publishing Year: 2015 | Escott-Stump |
| **Health & Fitness** | *Nutrition and Sport: Advances in Sport and Exercise Science*<br>ISBNs: 9780443103414<br>Publishing Year: 2007 | Don MacLaren |
| | *Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition*<br>ISBNs: 9780849307553<br>Publishing Year: 2000 | Judy A. Driskell, Ira Wolinsky |
| **Dietetic Techniques and Patient Counselling** | *Modern Methods of Guidance and Counselling*<br>ISBNs: 9788176253079<br>Publishing Year: 2005 | Sharma, Tara Chand. |
| | *Textbook of Human Nutrition*<br>ISBNs: 9788120417908<br>Publishing Year: 2019 | Bamji, S.M., Rao, N.P., Reddy, V. |

| Subject | Book Name | Author |
|---|---|---|
| **Biostatistics & Research Methodology** | Biostatistics: A Foundation for Analysis in the Health Sciences (10th ed.) | Daniel WW. |
| | Biostatistical Analysis (5th ed.) | Zar JH. |
| | Research Methodology: Methods and Techniques | Kothari CR, Garg G. |
| | Methods in Biostatistics for Medical Students and Research Workers (7th ed.) | Mahajan BK. |
| | Sampling Theory and Methods | Murthy MN. |
| | Fundamentals of Research Methodology and Statistics | Singh YK. |
| | Fundamentals of Biostatistics (8th ed.) | Rosner B. |
| | An Introduction to Medical Statistics (4th ed.) | Bland M. |

# MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act,1956)

**Grade 'A$^{++}$' Accredited by NAAC**

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