MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Manipal College of Health Professions

Manipal Academy of Higher Education, Manipal

Outcome-Based Education (OBE) Framework

Four years Full time Undergraduate Program

Bachelor of Science in

Clinical Nutrition and Dietetics

(B.Sc. CND)

With effect from July 2020

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Head of the Department **Dean**

Deputy Registrar - Academics **Registrar**

1. NATURE AND EXTENT OF THE PROGRAM

"Clinical Nutrition and Dietetics" is concerned with therapeutic uses for nutrition in medical settings as part of a complete health care programme. It deals with the prevention diagnosis and management of nutritional and metabolic changes related to acute and chronic diseases.

The growing evidence of unhealthy life style leading to many metabolic disorder has made this course as the need of the hour. The current analysis about BSc clinical nutrition and dietetics is more concentrated on hands-on clinical exposure and experience.

BSc clinical nutrition and dietetics is a 4year (3+1) fulltime credit based semester system, including one-year compulsory internship in Manipal Academy of Higher Education. "Clinical Nutrition and Dietetics" programme extends knowledge for students to explore how our choices of foods affect the biochemical and physiological functions of cells and organs, and our diets influence on physical, mental and social health so as to provide an evidence based nutritional practice.

The candidate applying for admission to BSc. CND course should have passed 10+2 examination or equivalent / two years of Pre-University / Pre-Degree examination conducted by the Pre-University Board of Education of Government of respective State, and further, the applicant/candidate should have studied: Physics, Chemistry & Biology. At the time of entry/admission to the first semester BSc. CND course the candidate should be of age 17 years or above OR as per rules of the respective universities with regard to the entry age.

The knowledge and experiences obtained from the programs will equip graduates with the tools and skills required to promote the nutrition and well-being of individuals and groups in a variety of settings and confidently fulfil jobs in clinical field, community and public health, teaching and research.

2. PROGRAM EDUCATION OBJECTIVES (PEOs)

The overall objective of the learning outcome-based curriculum framework (LOCF) for BSc. Clinical Nutrition and Dietetics Program are as follows:

PEO No.	Education Objective
PEO 1	Students will be able to use their fundamental knowledge and clinical competence in various scientific aspects of food as and when required to achieve professional excellence.
PEO 2	Students will demonstrate strong and well defined clinical / practical skills in understanding the functions and role of nutrients their requirements and effects of deficiency, excess and importance of nutrients in recommended dietary allowances.
PEO 3	Students will be able to practice the profession with highly professional and ethical attitude, strong communication skills, and to work in an inter-disciplinary team so as to translate the science of nutrition in health and diseases into practical information.
PEO 4	Students will be able to use interpersonal and collaborative skills to identify, assess and formulate problems and execute the solution to assess nutritional status of individuals in various life-cycle stages and determine nutrition-related conditions and diseases by applying knowledge of metabolism and nutrient functions, food sources, and physiologic systems.
PEO 5	Students will be able to imbibe the culture of research, innovation, entrepreneurship and incubation through evidence-based medical nutrition therapy.
PEO 6	Students will be able to participate in lifelong learning process for a highly productive career and will be able to relate the concepts of trends and issues in the discipline of nutrition, and translate this information into education, and training program towards serving the cause of the society.

3. GRADUATE ATTRIBUTES

S No.	Attribute	Description
1	**Professional Knowledge**	Demonstrate **scientific knowledge and understanding** to work as a health care professional
2	**Clinical / Laboratory / practical skills**	Demonstrate **Clinical / practical skills** in order to implement the preventive, assessment and management plans for quality health care services
3.	**Communication**	Ability to communicate effectively and appropriately in writing and orally to patients/clients, care-givers, other health professionals and other members of the community
4.	**Cooperation/Team work**	Ability to work effectively and respectfully with interdisciplinary team members to achieve coordinated, high quality health care
5.	**Professional ethics**	Ability to identify ethical issues and apply the ethical values in the professional life
6.	**Research / Innovation-related Skills**	A sense of inquiry and investigation for raising relevant and contemporary questions, synthesizing and articulating.
7.	**Critical thinking and problem solving**	Ability to think critically and apply once learning to real-life situations
8.	**Reflective thinking**	Ability to employ reflective thinking along with the ability to create the sense of awareness of one self and society
9.	**Information/digital literacy**	Ability to use ICT in a variety of learning situations
10.	**Multi-cultural competence**	Ability to effectively engage in a multicultural society and interact respectfully
11.	**Leadership readiness/qualities**	Ability to respond in an autonomous and confident manner to planned and uncertain situations, and should be able to manage themselves and others effectively
12.	**Lifelong Learning**	Every graduate to be converted into lifelong learner and consistently update himself or herself with current knowledge, skills and technologies. Acquiring Knowledge and creating the understanding in learners that learning will continue throughout life.

4. QUALIFICATION DESCRIPTORS:

a) Demonstrate (i) a fundamental and systematic knowledge and understanding of an academic field of study as a whole and its applications, and links to related disciplinary areas/subjects of study; including a critical understanding of the established theories, principles and concepts, and of a number of advanced and emerging issues in the field of Clinical Nutrition and Dietetics (ii) Procedural knowledge that creates different types of professionals related to the Clinical Nutrition and Dietetics, including research and development, teaching and in government and public service; (iii) Professional and communication skills in the domain of Clinical Nutrition and Dietetics, including a critical understanding of the latest developments, and an ability to use established techniques in the domain of Clinical Nutrition and Dietetics.

b) Demonstrate comprehensive knowledge about Clinical Nutrition and Dietetics, including current research, scholarly, and/or professional literature, relating to essential and advanced learning areas pertaining to the Clinical Nutrition and Dietetics field of study, and techniques and skills required for identifying problems and issues.

c) Demonstrate skills in i) identifying the issues in health care needs; ii) collection of quantitative and/or qualitative data relevant to client's needs and professional practice; iii) analysis and interpretation of data using methodologies as appropriate for formulating evidence based hypotheses and solutions

d) Use knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems and issues relating to the Clinical Nutrition and Dietetics

e) Communicate appropriately with all stakeholders, and provide relevant information to the members of the healthcare team

f) Address one's own learning needs relating to current and emerging areas of study, making use of research, development and professional materials as appropriate, including those related to new frontiers of knowledge

g) Apply one's disciplinary knowledge and transferable skills to new/unfamiliar contexts and to identify and analyse problems and issues and seek solutions to real-life problems.

5. PROGRAM OUTCOMES (POs):

After successful completion of Bachelor / BSc Clinical Nutrition and Dietetics program students will be able to:

PO No.	Attribute	Competency
PO 1	**Professional knowledge**	Possess and acquire **scientific knowledge** to work as a health care professional
PO 2	**Clinical/ Technical skills**	Demonstrate and possess **clinical skills** to provide quality health care services
PO 3	**Team work**	Demonstrate **team work skills** to support shared goals with the interdisciplinary health care team to improve societal health
PO 4	**Ethical value & professionalism**	Possess and demonstrate **ethical values and professionalism** within the legal framework of the society
PO 5	**Communication**	**Communicate effectively** and appropriately with the interdisciplinary health care team and the society
PO 6	**Evidence based practice**	Demonstrate high quality **evidence based practice** that leads to excellence in professional practice
PO 7	**Life-long learning**	Enhance knowledge and skills with the use of advancing technology for the **continual improvement** of professional practice
PO 8	**Entrepreneurship, leadership and mentorship**	Display **entrepreneurship, leadership and mentorship** skills to practice independently as well as in collaboration with the interdisciplinary health care team

6. COURSE STRUCTURE, COURSE WISE LEARNING OBJECTIVE, AND COURSE OUTCOMES (COs)

SEMESTER - I

Course Code	Course Title	Credits Distribution (L,T,P,CL are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
ANA1103	Anatomy	3	-	-	-	3	30	70	100
PHY1103	Physiology	2	-	-	-	2	30	70	100
CSK1001	Communication skills	2	-		-	2	100	-	100
EIC1001	Environmental science & indian constitution	2	-	-	-	2	100	-	100
CND1101	Clinical correlation of food and nutrition - I	3	1	-	-	4	50	50	100
CND1161	Therapeutic practice in food and nutrition - I	-	-	4	9	5	100	-	100
CND1121	Basic computer application	1	-	2	-	2	100	-	100
	Total	**13**	**1**	**6**	**9**	**20**	**510**	**190**	**700**

NOTE: ESE for ANA1103 & PHY1103 will be conducted for 50 marks and normalized to 70 marks for grading.
ESE for CND1101 will be conducted out of 100 and normalized to 50 marks.

SEMESTER - II

Course Code	Course Title	Credits Distribution (L,T,P,CL are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
BIC1201	Biochemistry	3	-	-	-	3	30	70	100
CND1201	Clinical correlation of food and nutrition - II	3	1	-	-	4	50	50	100
CND1261	Therapeutic practice in food and nutrition - II	-	-	4	9	5	100	-	100
CND1202	Introduction to food science - I	3	1		-	4	50	50	100
CND1262	Analysis in food science - I	-	-	4	6	4	100	-	100
	Total	**9**	**2**	**8**	**15**	**20**	**330**	**170**	**500**

NOTE: ESE for BIC1201 will be conducted for 50 marks and normalized to 70 marks for grading.
ESE for CND1201, CND1202 will be conducted out of 100 and normalized to 50 marks.

SEMESTER - III

Course Code	Course Title	Credits Distribution (L,T,P,CL are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
MCB2103	Microbiology	3	-	-	-	3	30	70	100
CND2101	Medical nutrition therapy - I	3	1	-	-	4	50	50	100
CND2161	Clinical practice in medical nutrition therapy	-	-	4	6	4	100	-	100
CND2102	Introduction to food science - II	2	-	-	-	2	50	50	100
CND2162	Analysis in food science - II	-	-	4	6	4	100	-	100
*** ****	Open elective - I	-	-	-	-	3	-	-	S/NS
Total		**8**	**1**	**8**	**12**	**20**	**330**	**170**	**500**

NOTE: ESE for MCB2103 will be conducted for 50 marks and normalized to 70 marks for grading. ESE for CND2101 and CND2102 will be conducted out of 100 and normalized to 50 marks.

SEMESTER - IV

Course Code	Course Title	Credits Distribution (L,T,P,CL are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
BST3201	Biostatistics & research methodology	3	-	-	-	3	30	70	100
CND2201	Medical nutrition therapy - II	3	1	-	-	4	50	50	100
CND2261	Clinical practice in medical nutrition therapy - II	-	-	4	12	6	50	50	100
CND2202	Quality control	3	1	-	-	4	50	50	100
CND****	Program elective - I	-	-	-	-	3	50	50	100
Total		**9**	**2**	**4**	**12**	**20**	**230**	**270**	**500**

NOTE: ESE for BST3201 will be conducted for 100 marks and normalized to 70 marks for grading. ESE for CND2201 and CND2202 will be conducted out of 100 and normalized to 50 marks.

SEMESTER – V

Course Code	Course Title	Credits Distribution (L,T,P,CL are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
CND3101	Nutrition in critical care	3	1	-	-	4	50	50	100
CND3102	Clinical nutrition through life cycle - I	3	1	-	-	4	50	50	100
CND3161	Therapeutic practice in critical care nutrition & life cycle - I	-	-	4	12	6	100	-	100
CND3103	Food sanitation and hygiene	3	-	-	-	3	50	50	100
*** ****	Open elective - II	-	-	-	-	3	100	-	S/NS
	Total	**9**	**2**	**4**	**12**	**20**	**250**	**150**	**400**
NOTE: ESE for subjects CND3101, CND3102, CND3103 will be conducted out of 100 and normalized to 50 marks.									

SEMESTER - VI

Course Code	Course Title	Credits Distribution (L,T,P,CL are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
CND3201	Clinical nutrition through life cycle - II	3	-	-	-	3	50	50	100
CND3221	Food preservation	3	-	2	-	4	50	50	100
CND3261	Therapeutic practice in nutrition through life cycle - II	-	-	2	6	3	50	50	100
CND3203	Community nutrition	3		-	-	3	50	50	100
CND3262	Clinical practice in community nutrition	-	-	4	6	4	100	-	100
CND ****	Program elective - II	-	-	-	-	3	50	50	100
	Total	**9**	**-**	**8**	**12**	**20**	**350**	**250**	**600**
NOTE: ESE for subjects CND3201, CND3221 and CND3203 will be conducted out of 100 and normalized to 50 marks.									

Open Electives
Open elective is credited, choice-based and is graded as satisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department

Program Electives
Program elective is credited and choice-based. The students make a choice from pool of electives offered by the department. The ESE is conducted for 50 marks.

Semester	Course Code	Course Title	Credit (s) Distribution (L,T,P,CL are hours/ week)				
			L	T	P	CL	CR
IV Semester	CND3241	Nutrition for special children	3	-	-	-	3
	CND3242	Dietetics and counselling	3	-	-	-	3
VI Semester	CND3243	Nutritional consideration during disasters	3	-	-	-	3
	CND3244	Eating behaviour	3	-	-	-	3

SEMESTER - VII and VIII

Rotatory Internship (1 year, 48 hours/week)

Semester VII	**Internship -** I	Duration 6 months 48 hours in a week / 8 hours in a day
Semester VIII	**Internship -** II	Duration 6 months 48 hours in a week / 8 hours in a day

OVERALL CREDIT DISTRIBUTION

Semester	Credit distribution					Marks Distribution		
	L	T	P	CL	CR	IAC	ESE	Total
SEMESTER - I	13	1	6	9	20	510	190	700
SEMESTER - II	9	2	8	15	20	330	170	500
SEMESTER - III	8	1	8	12	20	330	170	500
SEMESTER - IV	9	2	4	12	20	230	270	500
SEMESTER - V	9	2	4	12	20	250	150	400
SEMESTER -VI	9	-	8	12	20	350	250	600
SEMESTER - VII	-	-	-	48	NA	-	-	-
SEMESTER - VIII				48	NA	-	-	-
Grand Total	**57**	**8**	**38**	**168**	**120**	**2000**	**1200**	**3200**

Internal assessment component (IAC) weightage distribution

Theory		**Practical**	
Components	**%**	**Components**	%
Mid semester exam	60	Mid semester exam	60
Class seminar	20	Record submission	20
Assignments/Quiz	20	Competency in bench mark	20

Rotatory Internship	
Components	**%**
Case study proposal	10
Progress report	20
Work done	25
Internship report	20
Case presentation	25
Total	**100**

SEMESTER - I

COURSE CODE		COURSE TITLE
ANA1103	:	Anatomy
PHY1103	:	Physiology
CSK1001	:	Communication skills
EIC1001	:	Environmental science & indian constitution
CND1101	:	Clinical correlation of food and nutrition - I
CND1161	:	Therapeutic practice in food and nutrition - I
CND1121	:	Basic computer application

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Anatomy**
Course Code	**ANA1103**
Academic Year	First Year
Semester	I
Number of Credits	3
Course Prerequisite	Basic knowledge of biology
Course Synopsis	Human anatomy is the study of gross features and relations of various structures of the human body by dissection.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain the General Anatomy in the human body (C2)
CO2	Explain the Systemic Anatomy of the human body (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours (Theory)**
Unit 1:		
General Anatomy	• Define the Anatomical position and Anatomical terms (C1) • Explain the epithelium – types and functions (C2) • Explain the connective tissue – fibers and cells (C2) • Explain the cartilage – types, structure and function (C2) • Explain the bone – types, structure and blood supply (C2) • Explain the muscle – classification, structure and function (C2) • Explain the neurons- types and structure, typical spinal nerve (C2) • Explain the blood vessels – arteries, veins, lymph vessels, lymph nodes, structure of lymph node (C2) • Explain the joints: Classification, examples , structure of a typical synovial joint (C2) • Explain the classification of synovial joints (C2)	7
Unit 2:		
Respiratory system	• List the parts of respiratory tract (C1) • Explain the boundaries of the Nasal cavity (C2)	5

Content	Competencies	Number of Hours (Theory)
	• Explain the Lateral wall of nasal cavity - features, blood supply, nerve supply and lymphatic drainage (C2) • Explain the nasal septum: Formation, blood supply, nerve supply, lymphatic drainage and applied anatomy (C1, C2) • List and Explain the paranasal air sinuses and their function (C1, C2) • Explain the pharynx - extent, parts- nasopharynx , oropharynx and laryngopharynx - internal features (C2) • Explain the cavity of larynx, blood supply, nerve supply (C1, C2) • Explain the vocal cords and their movements, and Rima glottidis (C2) • List the intrinsic muscles of the larynx, their nerve supply and actions (C1) • List the Cartilaginous framework and ligaments (C1) • Explain the trachea: Extent, Structure and nerve supply (C2) • Explain the diaphragm - attachments, nerve supply and actions (C2) • Explain the thoracic cage: thoracic wall, intercostal spaces and their contents (C1, C2) • Explain the Lungs- gross anatomy, roots of the lungs, surface marking of pleura and lungs (C1, C2) • Explain the pleura- parts, pleural cavity, pleural recesses, pulmonary ligament (C2)	
Unit 3:		
Cardiovascular system	• Explain the heart - position, external features, right atrium internal features (C1, C2) • Explain the right ventricle internal features, Blood supply to the heart (C1, C2) • Explain the left atrium and left ventricle, nerve supply of heart (C2) • Explain the pericardium - Parts, blood supply, nerve supply and function (C2) • Explain the mediastinum - boundaries and contents (C2) • List and explain the arteries - Arch of aorta and descending thoracic aorta (extent course and branches) (C1, C2) • Explain the veins -Azygos system of vein (formation, course and termination) (C1, C2) • Define the thoracic duct: formation, course and termination (C2) • Explain the arteries - pulmonary trunk, ascending aorta (extent course and branches) (C2) • Explain the veins - branchiocephalic veins, superior	4

Content	Competencies	Number of Hours (Theory)
	vena cava (formation, course and termination) (C2) • Explain the major arteries and veins of head and neck (name and positions) (C2) • Explain the major arteries and veins of abdomen and pelvis (name and positions) (C2) • Explain the abdominal aorta, inferior vena cava, portal vein (C1, C2)	
Unit 4:		
Digestive system	• List the parts of digestive system (C1) • Explain the tongue – gross anatomy, blood supply and nerve supply (C2) • Explain the salivary glands- Names and location (C2) • Explain the oesophagus- extent, parts, constrictions, blood supply, nerve supply and lymphatic drainage (C2) • Explain the stomach- position, relations, blood supply, nerve supply and lymphatic drainage (C1, C2) • Explain the duodenum- parts, important relations, blood supply and nerve supply (C2) • Explain the pancreas – position, parts, important relations, blood supply and nerve supply (C2) • Explain the small intestine – parts- duodenum, jejunum and ileum- blood supply and nerve supply (C1, C2) • Explain the large intestine – parts, position of each of the parts, extent, blood supply and nerve supply (C2) • List the differences between jejunum and ileum (C1) • List the differences between small intestine and large intestine (C1) • Explain the rectum and anal canal-position, blood supply, nerve supply and lymphatic drainage (C2) • Explain the liver- position, anatomical and physiological lobes, surfaces, relations, porta hepatis, blood supply and nerve supply (C1, C2) • Explain the extrahepatic biliary apparatus – gall bladder and bile duct (C2)	6
Unit 5:		
Urinary system	• List the parts of urinary system (C1) • Explain the kidneys: position, external features, capsules, relations, macroscopic structure, blood supply and nerve supply (C1, C2) • Explain the ureter- length, constrictions and blood supply (C2) • Explain the urinary bladder- position, external features, blood supply and nerve supply (C2)	2

Content	Competencies	Number of Hours (Theory)
	• Explain the urethra- female urethra, male urethra- parts (C2)	
Unit 6:		
Male reproductive system	• List the parts of male reproductive system (C1) • List the spermatic cord- constituents and coverings (C1) • Explain the testes- position, coverings, gross structure, blood supply, nerve supply and lymphatic drainage (C2) • Explain the vas deferens- commencement, course and termination (C2) • Explain the prostate – position, external features, lobes and structure (C2) • Explain the seminal vesicles and ejaculatory ducts (C2)	2
Unit 7:		
Female reproductive system	• Name the parts of female reproductive system (C1) • Explain the uterus-position, parts, external features, relations, blood supply and lymphatic drainage (C2) • Explain the uterine tube- parts, blood supply and nerve supply (C2) • Explain the ovary – position and structure (C2)	2
Unit 8:		
Endocrine glands	• Name the endocrine glands (C1) • Explain the pituitary gland (Hypophysis cerebri)- position, parts, blood supply (C2) • Explain the suprarenal glands- position, relations, parts, blood supply and lymphatic drainage (C2) • Explain the thyroid gland- position, parts, blood supply and lymphatic drainage (C2) • Name the parathyroid glands-their position and blood supply (C1)	2
Unit 9:		
Central Nervous system	• Name the parts of the CNS (C1) • List the features and explain the spinal cord- position, external features, internal structure, brief note on important ascending and descending tracts (C1, C2) • Explain the major motor and sensory pathways (C2) • Explain the pyramidal tract in detail (C2) • Name the parts of brain (C2) • List the external and internal features of medulla oblongata (C1) • List the cranial nerves attached to medulla oblongata (C1) • List the external and internal features pons (C1) • Explain the cranial nerves attached to pons and	12

Content	Competencies	Number of Hours (Theory)
	ponto-medullary junction (C2) • Explain the cerebellum- functional lobes of the cerebellum and its functions (C2) • Explain the midbrain- external features and internal structure – in brief (C1) • Explain the cranial nerves attached to midbrain (C2) • Explain the cerebral hemispheres – lobes, important sulci and functional areas (C2) • List the fiber system of the brain and explain the corpus callosum and internal capsule (C1, C2) • Explain the diencephalon- Thalamus and hypothalamus-position and functions (C2) • Explain the basal nuclei: Corpus striatum – parts and functions (C2) • Explain the blood supply to the central nervous system (C2) • Explain the ventricles: 4th and 3rd ventricles (features, position and communications) (C2) • Explain the lateral ventricles- parts, features, position and communications (C2) • Define the CSF production and circulation (C1)	
Unit 10:		
Special senses	• Recall the gross anatomy of the eye (C1) • Recall the gross anatomy of external, middle and internal ear (C1) • Recall the skin and its features (C1)	3

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	45	135
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**45**	**135**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Sessional Exam I & II
	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Sessional Examination 1	x	x				
Sessional Examination 2	x	x				
End Semester Exam	x	x				
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Manipal Manual of Anatomy by Dr. Sampath Madhyastha					
Additional References	1. Human Anatomy by Dr. B. D. Chaurasia (Vol 1,2,3,4) 2. Chaurasia's handbook of human anatomy 3. Netter's Atlas					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Physiology I**
Course Code	**PHY1103**
Academic Year	First Year
Semester	I
Number of Credits	2
Course Prerequisite	Basic knowledge of biology
Course Synopsis	This module provides a comprehensive knowledge about normal functions of the organ systems of the body to understand the physiological basis of health and disease required for health professional (paramedical) courses.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Know the basic facts and concepts of Physiology (C1)
CO2	Explain the normal functions of various systems of the body.(C2)
CO3	Describe the relative contribution of various systems in maintaining the homeostasis.(C2)
CO4	Explain the physiological basis of disease processes (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1. BASIC CONCEPTS AND NERVE PHYSIOLOGY		
Transport across cell membrane	• Name the various transport mechanisms across cell membrane(C1) • Describe passive transport mechanisms such as simple diffusion, facilitated diffusion and osmosis (C2) • Describe primary and secondary active transport mechanisms(C2)	4
Body fluid compartments	• Mention the total body water as percentage of body weight and its distribution. (C1) • Give the ionic composition of body fluids(C1)	
Physiology of neuron	• Describe the morphology of a neuron (C2) • Mention the structure and functions of myelinated	

Content	Competencies	Number of Hours
	and unmyelinated nerve fibers (C2)	
Membrane potential	• Describe resting membrane potential(C2) • Draw and label the action potential (C2) • Describe the ionic basis of the action potential (C2)	
Unit 2: MUSCLE PHYSIOLOGY		
Skeletal muscle	• Describe the characteristic features of skeletal, cardiac and smooth muscles(C2) • Describe the structure of skeletal muscles(C2) • Mention the types of skeletal muscles(C1) • Explain neuromuscular transmission in skeletal muscle(C2) • Explain excitation contraction coupling in skeletal muscle(C2) • Describe rigor mortis (C2)	4
Smooth muscle	• Mention the types of smooth muscle(C1)	
Unit 3: BLOOD		
Composition and functions of blood	• Describe the composition of blood(C2) • List the functions of blood(C1)	6
Plasma proteins	• Name the different types of plasma proteins (C1) • List the functions of plasma proteins(C1)	
Red blood cells	• Mention the morphology and functions of red blood cells (C1) • Mention the normal count of RBC and its variations (C1) • Describe the stages and factors influencing erythropoiesis(C2) • Mention the normal value of hemoglobin concentration and its variations(C1) • Mention the functions of hemoglobin (C1) • Define anemia(C1)	
White blood cells	• Classify White Blood Cells (WBC) (C2) • List the functions of WBCs(C1) • Mention the normal count of various types of WBCs (C1)	
Hemostasis	• Mention the normal range of platelets and its variations(C1) • List the functions of platelets(C1) • Define hemostasis(C1) • Describe the various stages involved in haemostasis (C2) • List the clotting factors(C1) • Describe the intrinsic and extrinsic pathways of coagulation (C2) • Describe hemophilia(C2) • Classify anticoagulants and give examples for each(C2)	

Content	Competencies	Number of Hours
Blood types/groups	• Describe the ABO and Rh systems of blood grouping(C2) • Explain the importance of blood grouping(C2) • Mention the hazards of blood transfusion(C1) • Explain the cause and clinical features of hemolytic disease of the newborn (erythroblastosis fetalis) (C2)	
Lymph	• List the functions of lymph(C1)	
Unit 4: CARDIOVASCULAR SYSTEM		
Organization of cardiovascular system	• Describe the structure of heart (C2) • Describe the innervation of heart and blood vessels(C2) • Describe the properties of cardiac muscle(C2)	9
Cardiac cycle	• Define cardiac cycle (C1) • State the normal duration of cardiac cycle (C1) • Explain the various events occurring during a cardiac cycle with the help of graphs(C2)	
Heart sounds	• Enumerate the differences between first and second heart sounds(C2)	
Electrocardiogram (ECG)	• Define electrocardiogram (ECG) (C1) • Draw a labeled diagram of a normal ECG recorded from limb lead II (C1) • Describe the waves and intervals of ECG (C2) • Mention the uses of ECG(C1)	
Heart rate	• Mention the normal value and variations of heart rate(C1) • Describe the regulation of heart rate(C2)	
Cardiac output	• Define cardiac output (C1) • State the normal value of cardiac output (C1) • Mention the variations of cardiac output(C1) • Describe the regulation of cardiac output(C2) • Mention the effect of muscular exercise on cardiac output (C1)	
Blood pressure (BP)	• Define blood pressure (BP) (C1) • Mention the normal value of BP (C1) • Mention the factors influencing BP(C1) • Mention the variations of blood pressure(C1) • Describe the short term regulation of arterial blood pressure(C2)	
Unit 5: RESPIRATORY SYSTEM		
Introduction to respiration	• Describe the functional anatomy of the respiratory system (C2)	6
Mechanics of respiration	• Mention the muscles of respiration(C1) • Describe the mechanism of inspiration and expiration(C2)	

Content	Competencies	Number of Hours
	• Describe the intra-pulmonary and intra-pleural pressure changes during the various phases of respiration(C2)	
Lung volumes and capacities	• Draw a labelled spirogram(C2) • Define various lung volumes and capacities (C1) • Mention the normal values of lung volumes and capacities (C1)	
Ventilation	• Define pulmonary ventilation (C1) • Mention the normal value of pulmonary ventilation (C1) • Define alveolar ventilation(C1) • Mention the normal value of alveolar ventilation(C1) • Define anatomical dead space (C1) • Mention the normal value of anatomical dead space (C1)	
Gas exchange	• Describe the structure of respiratory membrane (C2) • Mention the factors affecting diffusion of gases across it (C1)	
Transport of gases	• Mention the forms in which oxygen is transported in the blood(C1) • Describe the oxygen-hemoglobin dissociation curve(C2) • Mention the factors shifting the oxygen-hemoglobin dissociation curve to the right and to the left(C1) • Mention the forms in which carbon dioxide is transported in the blood(C1) • Describe the mechanism of carbon dioxide transport(C2)	
Regulation of respiration	• Explain the neural regulation of respiration(C2) • Explain the chemical regulation of respiration(C2)	
Applied aspects	• Define hypoxia(C1) • Mention the types of hypoxia with example (C1) • Define cyanosis(C1) • Mention the cause of cyanosis (C1) • Mention the types of hypoxia in which cyanosis occurs (C2) • Define apnea, dyspnea and asphyxia(C1)	
Unit 6: SPECIAL SENSES		
Vision	• Describe the structure of human eye with the help of a diagram (C2) • Mention the functions of aqueous humor (C1) • Name the photoreceptors (C1) • Mention the differences between the rods and cones (C1) • Draw the visual pathway (C2) • Explain the defects in field of vision due to lesions of	4

Content	Competencies	Number of Hours
	visual pathway at different locations (C2) • Describe the mechanism of accommodation(C2) • Describe light reflex with the help of a diagram (C2) • Define visual acuity and mention the tests (C2) • Describe the cause and correction for refractory errors of the eye(C2)	
Hearing and vestibular apparatus	• Describe the structure and functions of external, middle and inner ear (C2) • Describe the mechanism of hearing (C2) • Mention the parts and functions of vestibular apparatus (C1)	
Taste and smell	• Name the receptors for taste and smell (C1) • Mention the disorders of taste and smell (C1)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**		**Student Learning Time (SLT)**			
Lecture	33		99			
Total	**33**		**99**			
Assessment Methods:						
Formative:	**Summative:**					
Unit Test	Sessional Exam I & II					
	End Semester Exam					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Sessional Examination 1	x	x	x	x		
Sessional Examination 2	x	x	x	x		
End Semester Exam	x	x	x	x		
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Basics of Medical Physiology,4th edition, D.Venkatesh, H.H.Sudhakar 2. Manipal Manual of Medical Physiology,1st edition, C. N. ChandraShekar					
Additional References						

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Communication skills**
Course Code	**CSK1001**
Academic Year	First Year
Semester	I
Number of Credits	02
Course Prerequisite	Nil
Course Synopsis	1. Equips the students with primary oral and written communication skills in English. 2. Orients students to focus on diverse interactive situations and enhances the interpersonal skills required in a professional environment.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Identify the components of communication skills and apply them in a professional setting (C3)
CO2	Outline effective oral communication skills in diverse context (C2)
CO3	Summarize different ways to write creatively, coherently and effectively on a given topic (C2)
CO4	Develop active listening skills involving feedback in diverse interactive situation. (C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1					x		x	
CO2					x		x	
CO3		x					x	
CO4			x				x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Communication Skills	1. Define Communication (C1) 2. Outline the process and barriers in Communication (C2) 3. Explain the types of communication (C2) (Oral, Verbal, non-verbal, dyadic) 4. How to improve spoken skills (C1)(Telephone, face –to- face) 5. How to improve communication (C1) 6. Apply the concepts of communication skills in a professional setting (C3) 7. Identify the difference between formal and informal communication (C3)	6

Content	Competencies	Number of Hours
Unit 2:		
Reading Skills	1. Explain the types of reading (C2) (Oral, Silent, Extensive, Scanning, Skimming) 2. Outline the reading techniques (C2) (3Q3R) 3. What is the difference between scanning and skimming(C1) 4. Define source of information (C1) 5. Explain feedback on LSWR in individual presentation (C2) 6. Summarise the role played by prepositions in understanding what to read (C2)	4
Unit 3:		
Listening Skills	1. Explain the types of listening (C2) 2. Summarize the context and purpose of listening (C2) 3. Explain various types of listening obstacles (C2) 4. How to improve hearing and focused listening (C1) 5. What is facilitating understanding, static & process description-gambits (C1)	8
Unit 4:		
Writing skills	1. What is the difference between spoken and written form (C1) 2. How words are formed into phrases & clauses (C1) 3. Outline writing paragraphs, cohesion, coherence (C2) 4. Explain summary, precise and essay writing (C2) 5. How to write a formal and informal letters (C1) 6. How to write a resume /CV(C1) 7. Explain the role of visual aids and meetings in writing (C2) 8. Explain the importance of abbreviations and punctuations in writing(C2)	8

Learning Strategies, Contact Hours and Student Learning Time (SLT):

Learning Strategies	Contact Hours	Student Learning Time (SLT)
Lecture	26	78
Seminar	-	
Case Based Learning (CBL)	-	
Clinic	-	
Practical	-	
Revision	-	
Assessment	-	
Total	**26**	**78**

Assessment Methods:					
Formative:	**Summative:**				
Assignments	Mid Semester Exam				
Mapping of Assessment with COs:					
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**
Assignments		x	x	x	
Mid Semester Examination		x	x	x	x
Feedback Process:	Mid-Semester Feedback				
	End-Semester Feedback				
Main Reference:	1. Jain, A K & et al., (2008-5th Edition). *Professional Communication Skills*, 2008, New Delhi, S Chand and Company				
	2. Raman, M., & Singh, P. (2012). *Business communication*. New Delhi: Oxford University Press				
Additional References	3. Raman, M & Sharma, S (2014). *Technical communication: Principles and Practice.* New Delhi: Oxford University				

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Environmental science**
Course Code	**EIC1001**
Academic Year	First Year
Semester	I
Number of Credits	1
Course Prerequisite	Nil
Course Synopsis	1. Aim to give students a general understanding of environmental science and introduce them to some of the main principles 2. It covers the study of subjects for example understanding of earth procedures, evaluating alternative energy frameworks, mitigation and pollution control, natural resource management, effects of global climate change and so on

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain the role of Environmental Science, its multidisciplinary nature in conservation of global environment (C2)
CO2	Describe the natural resources, utility and the role of ecosystems in maintaining planetary cycles (C2)
CO3	Outline the types, sources, prevention and control measures of pollution (C2)
CO4	List the laws, acts and policies related to environmental protection in India (C1)
CO5	Explain the types, mitigation and management techniques of disaster (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x			x				
CO3	x					x		
CO4			x				x	
CO5			x			x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Environmental Studies and multi-disciplinary nature	1. Explain the meaning, objectives and major environmental issues (C2) 2. What is sustainable development? (C1) 3. Explain the global environmental concerns (C2)	2
Unit 2:		
Biodiversity, Ecosystem, Energy and	1. Classify the natural resources (C2) 2. List the renewable and non- renewable resources (C1)	4

Content	Competencies	Number of Hours
natural resources	3. Outline the consumption of renewable and non-renewable resources 4. Explain the conservation methods of renewable and non-renewable resources 5. Outline the availability of water resources, forest, land and mineral resources. 6. Summarize the different types of energy (C2) (Conventional sources & Non-Conventional sources of energy, solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas, Fossil Fuels, Hydrogen as an alternative energy) 7. Define Ecosystem (C1) 8. Explain the meaning, structure and functions of ecosystem (C2) 9. Explain the biotic and abiotic components of ecosystem (C2) 10. Describe the trophic levels in ecosystem (C2) 11. What is an energy flow in an ecosystem (C1) 12. Explain Biodiversity and its conservation (C2) (in situ & ex situ, IUCN red list)	
Unit 3:		
Environmental Pollution	1. Explain the various types of Environmental Pollution (C2) (water, air, land, noise, solid waste, Biomedical waste, nuclear pollution, marine pollution)	2
Unit 4:		
Environmental laws and legislations	1. Outline the environmental laws and legislations (C2) (Related to general, air, water, biodiversity and forests) 2. Explain the roles and responsibilities of state and central Pollution control Boards (C2) 3. What is Environmental impact assessment (EIA) (C1)	2
Unit 5:		
Disaster management	1. Define disaster (C1) 2. What is disaster management? (C1) 3. Classify the types of disaster (C2) 4. What is disaster risk formula (C1) 5. Explain the phases in Disaster management phases (C2) (Disaster management cycle, Emergency response and recovery, Hazardous waste spills and dangers posed)	3

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	13	39
Seminar	-	
Small group discussion (SGD)	-	

Self-directed learning (SDL)	-	
Problem Based Learning (PBL)	-	
Case Based Learning (CBL)	-	
Clinic	-	
Practical	-	
Revision	-	
Assessment	-	
Total	**13**	**39**

Assessment Methods:	
Formative:	**Summative:**
Assignments	Mid Semester Exam

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Assignments			x	x	x
Mid Semester / Sessional Examination	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Benny Joseph, Environmental Studies, Tata McGraw-Hill Publishing Company Ltd., New Delhi (2008).
	2. Aloka Debi, "Environmental Science and Engineering", Universities Press (India) Pvt. Ltd. (2012).
Additional References	1. Mohan kanda, Disaster Management in India evolution of institutional arrangements & operational strategies. (2017)
	2. Student guide: Environment Reader for Universities, based on UGC syllabus published by Centre for Science and Environment, (2017).
	3. G.Swarajya Lakshmi, Environmental science: A Practical Manual, (2010).

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Indian constitution**
Course Code	**EIC1001**
Academic Year	First Year
Semester	I
Number of Credits	01
Course Prerequisite	Nil
Course Synopsis	1. To provide understanding of knowledge of the Indian constitution. 2. To familiarize students with the fundamental rights and duties. 3. To understand the importance of constitutional laws. 4. To understand the correlation between Indian constitution, democracy and society.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the salient features, importance and need of the Constitution (C2)
CO2	Infer the need of fundamental rights in a democratic system for a holistic development of a society (C2)
CO3	Outline the directions given to the state by the constitution and fundamental duties of a citizen towards the state. (C2)
CO4	Explain the working nature of State and Centre, roles and responsibilities of President and Governors, amendments emergency powers enjoyed by the government (C2)
CO5	Explain various laws listed under IPC and CrPC and understand importance of voting in a democracy and RTI (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x						x	
CO2				x	x			
CO3			x				x	
CO4						x		x
CO5				x			x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Introduction to Indian Constitution	1. Outline the evolution of the Legal System (C1) (pre-colonial and colonial times, Common Law, Civil Law and Socialist Legal System)	3

Content	Competencies	Number of Hours
	2. Explain the constitutional history and constitutional assembly (C2) 3. Explain the various organs of the Government (C2) (Executive, Legislature and Judiciary, and Panchayat institutions) 4. Summarise the functions of high court and supreme court of India (C2)	
Unit 2:		
Fundamental Rights	1. Explain the individual rights and fundamental rights (C2) 2. Outline the history of the demand for fundamental rights (C2) 3. Classify the fundamental rights (C2) 4. Explain how fundamental rights are a guarantee against state action (C2) 5. Summarise Article 14 to Article 30 (C2) 6. Explain supreme court as the guardian of Fundamental Rights (C2)	4
Unit 3:		
Fundamental Duties and Directive Principles of State Policy	1. Explain fundamental duties and its enforcement (C2) 2. Summarise the utility and the scope of DPSP(C2) 3. Outline the socialistic pattern of society (C2) 4. Explain the conflict between fundamental rights and DPSP (C2)	3
Unit 4:		
Role of President and Governors/ Cabinet	1. What is the procedure followed while electing a President (C1) 2. Explain the power and duties of the President (C2) 3. Outline the power and duties of the Governors (C2) 4. Explain the role and functions of the council of Ministers (C2)	2
Unit 5:		
Role of citizens, Constitutional laws (IPC and CrPC), RTI	1. Explain the role of citizens in a democracy (C2) 2. Explain constitutional laws (C2) 3. Explain the Indian Penal Code and Code of Criminal Procedure (C2) 4. Summarise right to Information (C2)	3

Learning Strategies, Contact Hours and Student Learning Time (SLT):

Learning Strategies	Contact Hours	Student Learning Time (SLT)
Lecture	15	45
Revision	-	-
Total	**15**	**45**

Assessment Methods:						
Formative:	**Summative:**					
Assignments	Mid Semester/Sessional Exam (Theory)					
Mapping of Assessment with COs:						
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Assignments			x		x	x
Mid Semester / Sessional Examination		x	x	x		
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. **Subhash C. Kashyap, Our Constitution,** National Book Trust. (2011) 2. P. M. Bhakshi. The Constitutution of India. Universal Law Publishing.(2017)					
Additional References	1. Dr. B. R. Ambedkar. The Constitution of India. Educreation Publishing. (2020) 2. Bipan Chandra.History of Modern India. Orient BlackSwan. (2009) 3. Dr. Durga Das Basu. Introduction to the Constitution of India. Lexis Nexis.(2013)					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical correlation of food and nutrition - I**
Course Code	**CND1101**
Academic Year	First Year
Semester	I
Number of Credits	4
Course Prerequisite	Knowledge of Basic Science
Course Synopsis	This module provides 1. The basic concepts of nutrition, malnutrition, health, brief history of nutritional Science. 2. Knowledge of mechanisms of digestion, absorption, and metaboism. 3. The list of classes of nutrients and identify a major role of each class of nutrient in the body. 4. The identification of minimum Nutritional Requirements and RDA. 5. The fundamental knowledge regarding the functions of the major nutrients (carbohydrates, lipids and proteins) and food sources of each. 6. The factors that contribute to malnutrition in the world.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Define the terms diet, nutrition, nutrient, essential nutrient, macronutrient, micronutrient, kilocalorie, phytochemical, metabolism and malnutrition (C1)
CO2	Explain the key basic nutrition concepts, RDA and Dietary Guidelines(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Introduction to Nutrition		
Introduction • Source of nutrients • Functions of food • Nutrients & energy • Adequate, optimum & good nutrition, malnutrition	• Explain the food as source of nutrients(C2) • Explain the physiological and metabolic signals that determine food intake(C2) • Interpret how social and cultural influences play a role in modifying basic physiological mechanisms(C2) • Illustrate the energy Balance, assessment of Energy Requirements(C2) • Explain the concept of energy density (C2) • Give examples of energy-dense foods(C2) • Express the terms optimum, good nutrition and	7

Content	Competencies	Number of Hours
	malnutrition(C2) • Interpret how balance and variety can help ensure the Nutritional adequacy of a diet(C2)	
Unit 2:Interrelation between nutrition and health		
Visible symptoms of goods health	• Explain the fundamental ideas about healthy eating and the goals that have been developed(C2) • Define the characteristics of health and nutrition according to WHO (C2) • Explain about the signs of good health(C2) • Relate lifestyle factors that contribute to the leading causes of diseases(C2) • Give an example in planning a nutritionally adequate diet(C2) • Express the basic steps in nutrition assessment (C2)	7
Unit 3:Metabolism of food		
Digestion, Absorption, transport & utilization	• Describe the processes of digestion, absorption, and metabolism(C1) • Illustrate the organs in the digestive system and their functions(C2) • Explain the enzymes or digestive juices secreted by each organ and gland in the digestive system(C2) • Record your basal metabolic rate (BMR)(C1)	6
Unit 4: Food guide		
Basic five food groups. How to use food guide (according to R.D.A.)	• Explain the five food groups (cereals&pulses, • vegetables,fruits,milk and milk products, lean meat,fish,egg) (C2) • Identify each of the food groups that provide a range of nutrients, and have a role in helping the body function(C1,C2) • Explain the use of the Food Guide as a starting point to shape the eating pattern(C2)	6
Unit 5: Carbohydrates		
Composition, functions, classification, food sources, storage in body	• Explain the classification of carbohydrates(C2) • Identify the major carbohydrates in human diets and their major food sources(C1) • List the functions of carbohydrates in the body (C1) • Explain the carbohydrate utilisation in the Body(C2) • Describe how the body digests carbohydrates and regulates blood glucose(C1,C2) • Define Dietary Fibre(C1) • Define lactose intolerance, explain why the condition occurs, and discuss dietary measures that will reduce signs and symptoms of the	9

Content	Competencies	Number of Hours
	disorder(C1,C2)	
Unit 6: Proteins		
Composition, sources, essential & non-essential amino acids, functions, Protein deficiency	• List the primary functions of proteins in the body (C1) • Identify the basic structural unit of proteins(C1) • Compare between essential and nonessential amino acids(C2) • Explain the basic steps of protein synthesis and digestion(C2) • Illustrate conditions that contribute to positive nitrogen balance, negative nitrogen balance, and nitrogen balance(C2) • Identify food sources of protein and foods that provide high- and low-quality proteins(C1) • Describe how protein-energy malnutrition (PEM) can affect the body (C1, C2)	10
Unit 7: Fats & oils		
Composition, saturated and unsaturated fatty acids, classification, food sources, function of fats	• Explain the nature of various fats and oils in the diet and the nutritional importance of the same(C2) • Interpret the classification, food sources and functions of fat and oils(C2) • Illustrate the advantages and disadvantages of fat in the diet(C2) • Explain the importance of omega-3 fatty acids in the body(C2) • Summarize the general importance of fat in the body and its role in health. (C2)	7

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	9	-
Case Based Learning (CBL)	-	-
Practical	-	-
Revision	-	-
Assessment	4	-
Total	**52**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Assignments/Presentations	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**				
Mid Semester Examination	x	x				
Quiz / Viva						
Assignments/Presentations	x	x				
End Semester Exam	x	x				
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nded.). Published by Bangalore Printing and Publishing Ltd, Bangalore 2. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi					
Additional References	1. The “Indian Food Composition tables-(IFCT 2017)” T.Longvah,R.Ananthan,K.Bhaskarachary and K.Venkaiah 2. Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi 3. Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2006) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Therapeutic practice in food and nutrition - I**
Course Code	**CND1161**
Academic Year	First Year
Semester	I
Number of Credits	5
Course Prerequisite	Knowledge of basic science
Course Synopsis	This module provides the basic practical concept in Clinical correlation of food and Nutrition

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Apply of dietary goals and specific guidelines (C3,P3)
CO2	Demonstrate different kitchen equipment's and cooking methods with portion size (C2,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Nutritional value of food		
Nutritional value and criteria of food selection in Indian diet according to	• Describe formulation of dietary goals and specific guidelines which will help in providing required guidance to people in ensuring nutritional adequacy(P1) • Choose variety of foods, which are available and are within the reach of the common man, can be selected to formulate nutritionally adequate diets(P3)	21
Unit 2: Use and care of kitchen equipment		
Use and care of kitchen equipment	• Demonstrate different kitchen equipment and their care and functions(P4) • Describe quality control (QC) process and aims to identify and rectify the defects in products(P1) • Explain in recipes, quantities of ingredients specified by mass (commonly called weight), by volume, or by count(P2) • Classify the units of household measure for volume include teaspoon- full, tablespoonful and cup(P3) • Classify the units of household measure for weight as kilograms ounces and pinch(P3)	36

Content	Competencies	Number of Hours
Unit 3: Different cooking methods		
Different cooking methods	• Demonstrate the differences between dry and moist heat cooking methods(P4) • List the different cooking methods under dry and moist heat (P1) • Compile the list of foods that can be cooked using the dry and moist heat (P2)	40
Unit 4: Portion size		
Amount of ingredients to be in standard recipe portion size	1. Explain standardized recipes, specifically describing the exact, measurable amount of ingredients and the method of preparation needed to consistently produce a high-quality product(P2,P3) 2. Explain recommended serving size/portion size is the amount of each food supposed to consume during a meal or snack(P2,P3) **3.** Describe portion size - the amount of food that we actually eat(P1,P3)	72

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Clinic	117	-
Practical	52	-
Revision	-	-
Assessment	-	-
Total	**169**	**-**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination						
Quiz / Viva	x	x				
Assignments/Presentations						
Clinical/Practical Log Book/ Record Book	x	x				
Any others: WPBA						
End Semester Exam						

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback

Main Reference:	1. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nded.). Published by Bangalore Printing and Publishing Ltd, Bangalore 2. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
Additional References	1. The “Indian Food Composition tables-(IFCT 2017)” T.Longvah,R.Ananthan,K.Bhaskarachary and K.Venkaiah 2. Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi 3. Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2006) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Basic computer applications**
Course Code	**CND1121**
Academic Year	First Year
Semester	I
Number of Credits	2
Course Prerequisite	Basic knowledge of Computer Science
Course Synopsis	This introductory course in computer applications prepares students in the use of office automation, internet and basic knowledge of cyber security.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Identify the function and role of important tools in office automation (C1,P2)
CO2	Explain the execution of important tools in office automation (C2)
CO3	Comprehend the importance of search engine (C2)
CO4	Demonstrate the ability to correctly use tools in a given context (C3, P4)
CO5	Display proficiency of cyber security as a user in an organization (C6)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x	x						
CO3			x					
CO4				x				
CO5			x					

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Module I: Word Processor		
Creating & Printing Documents, Protecting Files Drawing Tools, Using Templates and Mail merge	• Design letters, invitations, menus, templates and brochures for business (C5,P2) • Demonstrate document protection using password other techniques (C3) • Create or send business communication to large audience using mail merge facility (C5)	12
Module II: Application of Spreadsheet		
Creating Business Statements, In-built functions, Charts, Data – Sorting, Sub Totals, Filter, What-if-Analysis, Protecting Sheets and Workbook	• Create business reports (C6) • Prepare visual representation for given dataset (C3, P2) • Analyse given dataset using what-if tool (C4) • Demonstrate data protection (C3, P2)	12

Content	Competencies	Number of Hours
Module III: Electronic Presentation		
Creating Presentations, Using different media items, Animation, Transition	• Create presentation for given context (C6, P4)	10
Module IV: Internet and Search Engine		
Browsing, browser settings, email and search engine	• Comprehend the importance of internet and search engine (C2)	10
Module V: Introduction to Cyber Security		
Elements of cyber security, online predators & cyberbullies. Security Policy of an organisation	• Comprehend the importance of cyber security all aspects related to information technology (C2)	12

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	13	52
Seminar	10	-
Small group discussion (SGD)	5	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	6	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	13	-
Revision	5	-
Assessment	4	-
Total	**56**	**52**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	
Viva	End Semester Exam (Internal)
Assignments/Presentations	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	
Mid Semester Examination						
Quiz / Viva	x	x	x	x	x	
Assignments/Presentations	x	x	x	x	x	
Clinical/Practical Log Book/ Record Book	x	x	x	x	x	
Any others: WPBA						
End Semester Exam						

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Ron Mansfield, Working in Microsoft office, Tata McGraw Hill
Additional References	1. https://www.4hoteliers.com/features/article/11754 2. https://www.coursera.org

SEMESTER - II

COURSE CODE	:	COURSE TITLE
BIC1201	:	Biochemistry
CND1201	:	Clinical correlation of food and nutrition - II
CND1261	:	Therapeutic practice in food and nutrition - II
CND1202	:	Introduction to food science - I
CND1262	:	Analysis in food science - I

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Biochemistry**
Course Code	**BIC1201**
Academic Year	First Year
Semester	II
Number of Credits	3
Course Prerequisite	Basic knowledge of Biology and Chemistry
Course Synopsis	Biochemistry broadly deals with the chemistry of life and living processes. It helps in understanding the building blocks - proteins, carbohydrates, fats, nucleic acids and is necessary for allied health professions students to understand various biochemical mechanisms so as to correlate with or identify the pathological processes. Knowledge of biomolecules is necessary to understand the various laboratory investigations and their relevance in clinical practice

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain the classification, composition and functions of macromolecules (C2)
CO2	Describe the process of digestion, absorption and metabolism of carbohydrates, lipids and proteins (C2)
CO3	Summarize the concepts of nutrition, balanced diet and role of macro and micronutrients in the maintenance of health (C2)
CO4	Summarize the features and investigations in diabetes mellitus and acid-base disorders (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x							

Course Content and Outcomes:

Unit	**Content**	**Competencies**	**Number of Hours**
Unit 1: ENZYMES			
At the end of this chapter, a student should be able to 1. Define the term ‘enzyme’ (C1) 2. Classify enzymes based on reaction specificity (IUBMB classification) (C2) 3. Give one example (names of enzymes & reaction catalyzed) for each class of enzymes (C1) 4. Define the term ‘isoenzymes’ (C1)			2

Unit	Content	Competencies	Number of Hours
5. Explain isoenzymes with examples (creatine kinase, lactate dehydrogenase) (C2) 6. Define the term 'proenzyme or zymogen' with pepsinogen and trypsinogen as examples (C1) 7. Describe the utility of serum enzymes as diagnostic markers (C2) 8. Mention the diagnostic utility of following enzymes (C1) • CK • ALP • AST • ALT • LDH			
Unit 2: CARBOHYDRATE CHEMISTRY			
At the end of this chapter, a student should be able to 1. Define the term 'carbohydrates' (C1) 2. Classify carbohydrates with examples for each class (C2) 3. Classify monosaccharides with examples based on (C2) • Number of carbon atoms • Functional groups 4. Mention the source and composition of following disaccharides (C1) • Sucrose • Lactose • Maltose 5. Classify polysaccharides based on composition with examples (C2) 6. Explain the structure of starch and glycogen with schematic representation (C2 7. List the differences between starch and glycogen (C1) 8. Mention the occurrence and functions of heparin and chondroitin sulphate (C1)			2
Unit 3: CARBOHYDRATE DIGESTION AND ABSORPTION			
At the end of this chapter, a student should be able to 1. Describe the complete digestion of dietary polysaccharides (starch and glycogen) (C2) 2. Describe the reactions catalyzed by the following brush border enzymes (C2) • Maltase • Sucrase-isomaltase • Lactase 3. Illustrate the mechanisms of absorption of monosaccharides in the small intestine (C2) 4. Explain the significance of including sodium chloride along with glucose in the oral rehydration solution (C2)			2
Unit 4: CARBOHYDRATE METABOLISM			
A. Glycolysis At the end of this chapter, a student should be able to 1. Define aerobic and anaerobic glycolysis (C1) 2. Mention the site and subcellular site of glycolysis (C1) 3. Describe the steps of glycolysis with all the enzymes and coenzymes at each step (C2) 4. Mention the regulatory enzymes and list the names of hormones that			2

Unit	Content	Competencies	Number of Hours
		regulate it in the well-fed state and starvation (C1) 5. Calculate the energetics of aerobic and anaerobic glycolysis (C2)	
		B. Gluconeogenesis At the end of this chapter, a student should be able to 1. Define gluconeogenesis (C1) 2. Mention the sites & subcellular sites of gluconeogenesis (C1) 3. List the precursors for gluconeogenesis (C1) 4. List the key enzymes of gluconeogenesis (C1) 5. Describe the synthesis of glucose from pyruvate and lactate (C2) 6. Mention the regulatory enzymes and list the names of hormones that regulate it in the well-fed state and starvation (C1) 7. Explain the significance of gluconeogenesis (C2)	2
		C. Citric acid cycle At the end of this chapter, a student should be able to 1. Recall the reaction catalyzed by pyruvate dehydrogenase complex and mention its coenzymes (C1) 2. Mention the site and subcellular site of citric acid cycle (C1) 3. Describe the reactions of citric acid cycle with all enzymes and coenzymes (C2) 4. Mention the regulatory enzymes of citric acid cycle (C1) 5. Calculate the energetics of citric acid cycle (C2)	2
		D. Glycogen metabolism At the end of this chapter, a student should be able to 1. Mention the function of glycogen in liver and muscle (C1) 2. Define glycogenesis & glycogenolysis (C1) 3. Mention the site and subcellular site of glycogen metabolism (C1) 4. Mention the fate of end products of glycogenolysis in liver (role of glucose 6-phosphatase) and muscle (C1) 5. Mention the regulatory enzymes and the hormones involved in regulation in well-fed state and starvation (C1) 6. List the glycogen storage disorders mentioning their names, defects and tissues affected (Type I, V & VI) (C1)	1
Unit 5: ELECTRON TRANSPORT CHAIN AND OXIDATIVE PHOSPHORYLATION			
		At the end of this chapter, a student should be able to 1. Define the electron transport chain (ETC) (C1) 2. Name the subcellular site of ETC (C1) 3. Describe the complexes of ETC (with their components and order of arrangement) and mention the mobile electron carriers (C2) 4. Name the inhibitors for each of the complexes of ETC (C1) 5. Define oxidative phosphorylation (C1)	1
Unit 6: LIPID CHEMISTRY			
		At the end of this chapter, a student should be able to 1. Define lipids (C1) 2. Explain the functions of lipids in the body (C2) 3. Classify lipids with examples for all the subclasses (C2) 4. Classify fatty acids with examples-saturated, unsaturated (based on number of double bonds), essential fatty acids (C2)	1

Unit	Content	Competencies	Number of Hours
Unit 7: LIPID DIGESTION, ABSORPTION AND ASSOCIATED DISORDERS			
		At the end of this chapter, a student should be able to 1. Explain the process of emulsification of lipids (C2) 2. Describe the digestion of lipids in the stomach and intestine (C2) 3. Illustrate the process of absorption of lipids (C2) 4. Define steatorrhea and list its causes (C1)	2
Unit 8: LIPID METABOLISM			
	A. De novo synthesis of fatty acids	At the end of this chapter, students should be able to 1. Mention the site and subcellular site of de novo synthesis of fatty acids (C1) 2. List the sources of acetyl CoA for de novo synthesis of fatty acids (C1) 3. Explain the reaction catalyzed by acetyl CoA carboxylase (C2) 4. Mention the regulatory enzyme and the hormones involved in regulation in well-fed state and starvation (C1)	1
	B. Synthesis of triacylglycerol (TAG)	At the end of this chapter, students should be able to 1. Show the schematic structure of triacylglycerol (C1) 2. Mention the site and subcellular site of TAG synthesis (C1) 3. Describe the reactions of TAG synthesis (C2) 4. Mention the fate of TAG in liver and adipose tissue (C1)	1
	C. Lipolysis	At the end of this chapter, students should be able to 1. Mention the site and subcellular site of lipolysis (C1) 2. Describe the reactions of lipolysis (C2) 3. Mention the regulatory enzymes and the hormones involved in regulation in well-fed state and starvation (C1)	1
	D. Beta oxidation of fatty acids	At the end of this chapter, students should be able to 1. Define beta-oxidation (C1) 2. List the site and subcellular site of beta-oxidation (C1) 3. Describe the activation of palmitic acid (C2) 4. Explain the transport of activated palmitic acid into mitochondria (carnitine shuttle) (C2) 5. Describe the reactions of beta oxidation (C2) 6. Calculate the energetics of beta oxidation of palmitic acid (C2)	2
	E. Lipoproteins	At the end of this chapter, student should be able to 1. Classify lipoproteins based on their electrophoretic mobility and ultracentrifugation properties (C2) 2. Mention the site of synthesis and the functions of Chylomicrons, VLDL, LDL and HDL (C1)	1

Unit	Content	Competencies	Number of Hours
Unit 9: AMINO ACID & PROTEIN CHEMISTRY			
At the end of this chapter, student should be able to 1. Recognize the general structure of D and L amino acids (C1) 2. Classify amino acids based on the following with examples (C2) • Presence in proteins (standard and non-standard amino acids) • Metabolic fate (glucogenic and ketogenic amino acids) • Nutritional requirement (essential and non-essential amino acids) 3. Classify proteins based on composition, functions and shape with examples (C2) 4. Describe the structure of mature collagen with diagram (C2) 5. Explain with illustrations the biosynthesis of mature collagen emphasizing the importance of prolyl hydroxylase, lysyl hydroxylase and lysyl oxidase (C2)			3
Unit 10: PROTEIN DIGESTION AND ABSORPTION			
At the end of the chapter, a student should be able to 1. Outline the activation of zymogens in the GIT (C1) 2. List the endo and exopeptidases in the digestive juices (C1)			1
Unit 11: AMINO ACID METABOLISM			
At the end of the chapter, a student should be able to 1. Explain transamination of amino acids with suitable examples (C2) 2. Describe the generation of ammonia by oxidative deamination using L-glutamate dehydrogenase. (C2) 3. Study urea cycle as follows a. Name its site and subcellular site (C1) b. Describe its reactions (C2) c. Mention its significance (C1) 4. Recall the physiologically important products derived from the following amino acids (C1) a. Glycine b. Tyrosine c. Methionine d. Tryptophan			2
Unit 12: GENERAL CONCEPTS OF NUTRITION			
At the end of the chapter, a student should be able to 1. Define the term balanced diet (C1) 2. Define caloric value of food and list the caloric values of carbohydrates, proteins and fats (C1) 3. State the total daily caloric requirements of an adult male and female (for sedentary, moderate and heavy workers) and for pregnant and lactating women (C1) 4. Define recommended dietary allowance (RDA) (C1) 5. Study basal metabolic rate as follows a. Define (C1) b. List the normal values for men and women (C1) c. Explain the factors affecting BMR (C2) 6. Define thermic effect (SDA) of food and recall the values for macronutrients (C1)			2

Unit	Content	Competencies	Number of Hours
Unit 13: CARBOHYDRATES, PROTEINS AND FATS IN NUTRITION			
A. Carbohydrates At the end of the chapter, a student should be able to 1. Mention the RDA (C1) 2. Study dietary fibers as follows a. Define (C1) b. Mention its RDA (C1) c. List the examples with their sources (C1) d. Explain its beneficial effects (C2) **B. Proteins** At the end of the chapter, a student should be able to 1. Mention the RDA (C1) 2. Define essential amino acids with examples (C1) 3. Study biological value as follows a. Define (C1) b. Name the protein used as standard for determining it (C1) c. List the protein sources with high and low biologic values (egg albumin, milk, fish, meat, rice, wheat and soy protein) (C1) 4. Define the term nitrogen balance (C1) 5. Explain positive and negative nitrogen balance with conditions during which they occur (C2) 6. Define the term limiting amino acids giving suitable examples (C1) 7. Explain mutual supplementation of proteins with examples (C2) **C. FATS** At the end of the chapter, a student should be able to 1. Mention the RDA (C1) 2. List the functions of cholesterol in the body (C1) 3. Study essential fatty acids as follows a. Define (C1) b. Mention its RDA (C1) c. Explain their functions and deficiency manifestations (C2) 4. Explain saturated and unsaturated (mono and poly) fatty acids with suitable examples, mentioning its sources and functions (C2)			2
Unit 14: MINERALS			
At the end of this chapter, a student should be able to 1. Define the terms macro and micro minerals with examples. (C1) 2. Mention the sources and RDA for iron (C1) 3. Explain the functions, disorders of deficiency & excess for iron (C2) 4. Mention the sources, RDA and functions for calcium and phosphorus (C1) 5. Mention the normal serum levels of calcium and phosphorus and the hormones which regulate it **(**C1**)**			2
Unit 15: VITAMINS			
At the end of this chapter, a student should be able to 1. Define the term vitamins (C1) 2. List the classes of vitamins based on solubility (C1) 3. Study the water soluble vitamins mentioned below			3

Unit	Content	Competencies	Number of Hours
• Thiamine • Riboflavin • Niacin • Pantothenic acid • Pyridoxine • Biotin • Cobalamin • Folic acid • Ascorbic acid as follows ➢ List the RDA, sources and coenzyme forms (C1) ➢ Describe the biochemical functions (C2) ➢ List the features of disorders associated with their deficiencies (C1) 4. Study the fat soluble vitamins A, D, E, K as follows ➢ List the RDA, sources and chemical forms. (C1) ➢ Describe the biochemical functions. (C2) ➢ List the features of disorders associated with their deficiencies and excess. (C1)			
16. MALNUTRITION			
At the end of this chapter, a student should be able to 1. Define the classes of protein energy malnutrition. (C1) 2. Compare the similarities and differences between marasmus and kwashiorkor (C2)			1
17. CLINICAL BIOCHEMISTRY			
A. GLUCOSE HOMEOSTASIS AND DIABETES MELLITUS At the end of this chapter, a student should be able to 1. Summarize the effect of the hormones involved in blood glucose homeostasis (C2) 2. Study diabetes mellitus as follows • Define (C1) • Classify and compare the types 1 and 2 (C2) • Mention the signs and symptoms (C1) • Mention the normal plasma levels of fasting, postprandial and random glucose & their utility in diagnosis (C1) • Explain the relevant investigations involved in the diagnosis and management (HbA_{1C}, procedure and interpretation of GTT, microalbuminuria) (C2) • Explain the biochemical basis for features of diabetic ketoacidosis (C2) **B. SIGNIFICANCE OF ESTIMATIONS OF VARIOUS BIOCHEMICAL PARAMETERS IN BLOOD** At the end of this chapter, a student should be able to 1. Mention the normal serum levels of glucose, protein, urea, uric acid, bilirubin, cholesterol and creatinine and conditions in which they are altered **(**C1**)**			2 1

Unit	Content	Competencies	Number of Hours
C. ACID BASE BALANCE AND DISTURBANCES At the end of this chapter, a student should be able to: 1. Define the terms acid, base, pH and pKa (C1) 2. Study buffers as follows • Define (C1) • Write the Henderson-Hasselbalch equation for different buffer systems (C1) • List the principal buffer systems in ECF, ICF and in urine (C1) • Mention the pKa value, normal ratio of base/acid in the plasma for bicarbonate and phosphate buffer systems (C1) 3. Study acid-base disorders as follows • Define the different classes (C1) • Explain the conditions causing acidosis & alkalosis (metabolic & respiratory) (C2) 4. Mention the primary and compensatory changes in acid base disorders (C1)			1
Unit 18: MOLECULAR BIOLOGY			
At the end of this chapter, a student should be able to 1. Name the purine and pyrimidine bases (C1) 2. Define nucleosides and nucleotides with examples (C1) 3. Illustrate the Watson and Crick model of B-DNA structure (C2) 4. List the different types of RNA (C1) 5. Recall the structural differences between DNA and RNA (C1) **6.** Define replication, transcription and translation (C1)			2

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	45	135
Assessment	4	16
Total	**49**	**151**

Assessment Methods:	
Formative:	**Summative:**
Nil	Sessional Exam I & II
	End Semester Exam (Theory)

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Sessional Examination 1	x	x				
Sessional Examination 2	x	x	x	x		
End Semester Exam	x	x	x	x		

Feedback Process:	Mid-Semester Feedback
Main Reference:	Essentials of Biochemistry, U satyanarayana, U Chakrapani (2nd edition) Handbook of Biochemistry for Allied & Nursing Students, Shivananda Nayak B (2nd edition)

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical correlation of food and nutrition - II**
Course Code	**CND1201**
Academic Year	First Year
Semester	II
Number of Credits	4
Course Prerequisite	Knowledge of Basic Science
Course Synopsis	This module provides knowledge on 1. Role and source of vitamins and minerals 2. Recognizing the consequence for health of an inadequate or excessive intake of particular vitamins , minerals and supplements needed 3. Fiber and its benefits to health 4. Understanding the body's need for fluid and electrolyte how this can be met 5. Understanding acid-base balance of the human body 6. Effect of heat and other food processing methods have on the nutritive value of foods. 7. Role of functional foods on health and disease
Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Describe the role and function of vitamins, minerals, water, fiber and functional food in the body(C1)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):								
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							

Course Content and Outcomes:

Content	Competencies	Number of Hours
Unit 1: Vitamins		
Definition classification Sources and Functions	Fat-soluble Vitamins (A, D, E & K) • Describe Major Functions in the Body(C1) • Explain Absorption, transport, and storage(C2) • Explain the Dietary Adequacy(C2) • Which are the major Dietary Sources(C1) • Explain major Deficiency -Signs & Symptoms(C2) • Explain Major Toxicity- Signs & Symptoms(C2) **Water soluble vitamins**: Thiamin, Riboflavin, Niacin,Vitamin B6,Folate,Vitamin B12,Pantothenic acid,Biotin, Vitamin C • Describe Major Functions in the Body(C1) • Explain Absorption, transport, and storage(C2)	15

Content	Competencies	Number of Hours
	• Explain the Dietary Adequacy(C2) • Which are the major Dietary Sources(C1) • Explain major Deficiency -Signs & Symptoms(C2) • Explain Major Toxicity- Signs & Symptoms(C2)	
Unit 2: Minerals		
Definition classification Sources , Functions, Bioavailability and Deficiency	**Minerals – macronutrients** Calcium, Phosphorus ,Magnesium ,Sodium, Chloride Potassium, Sulphur Major Functions in the Body • Describe major function(C1) • Explain the Dietary Adequacy(C2) • Which are the Major Dietary Sources(C1) • Explain Major Deficiency -Signs & Symptoms(C2) • Explain Major Toxicity- Signs & Symptoms(C2) **Minerals - micronutrients** • Iodine, Iron, Zinc, Copper, Fluoride, Selenium, Chromium, Molybdenum, Manganese • Describe major function(C1) • Explain the Dietary Adequacy(C2) • Which are the Major Dietary Sources(C1) • Explain Major Deficiency -Signs & Symptoms(C2) • Explain Major Toxicity- Signs & Symptoms(C2)	14
Unit 3: Fiber		
Role of Fibers in Human Nutrition	Explain Role, composition ,function and sources of fiber(C2)	3
Unit 4: Water		
Function, sources, requirement, water balance & effect of deficiency.	• Explain Water Balance and function(C2) • Explain Water Intoxication(C2) • What are the effects of Dehydration(C1)	4
Unit 5: Electrolyte and acid base balance		
Electrolyte and acid base balance	**Electrolytes** • List Extracellular electrolytes: sodium, calcium, chloride, and bicarbonate(C1) • List Intracellular electrolytes: potassium, magnesium, and phosphate(C1) • Explain their functions(C2) • What is the normal electrolyte concentration of serum(C1) **Acid-Base Balance** • List Intracellular buffers – proteins and phosphates; extracellular buffers – bicarbonate and carbonic acid(C1) • Explain Acid-Base Balance Disorder(C2) • Explain Classification of Acid-Base	3

Content	Competencies	Number of Hours
	Imbalances(C2) • Explain Three Buffer Systems That Function in the Kidney(C2) • Explain Four Major Acid-Base Imbalances and Possible Etiologies (C2)	
Unit 6: Effect of cooking & heat processing on the nutritive value of foods		
Effect of cooking & heat processing on the nutritive value of foods	• Explain aims of food processing(C2) • What are the different methods of food processing(C1) **Physical Methods-** Pasteurization, Frying, Fermentation, Baking and Cooking, Blanching, irradiation, Drying, Canning, Extrusion Cooking **Chemical Methods -** pH Balance, Control of Water Activity Fermentation, Use of Food Additives, Intermediate Moisture Foods (IMF) Blanching Irradiation Drying Canning • Explain effect of Food Processing on Nutrient Content(C2)	5
Unit 7: Functional Food		
Functional Food	Definition & classification of functional foods, nutraceuticals and its role in disease management(C1)	8

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	4	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	9	-
Total	**52**	**117**
Assessment Methods:		
Formative:	**Summative:**	
Unit Test	Mid Semester Exam	
Assignments/Presentations	End semester Exam	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination	x					
Quiz / Viva						
Assignments/Presentations	x					
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x					

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nded.). Published by Bangalore Printing and Publishing Ltd, Bangalore 2. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
Additional References	1. The “Indian Food Composition tables-(IFCT 2017)” T.Longvah,R.Ananthan,K.Bhaskarachary and K.Venkaiah 2. Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi 3. Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2006) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Therapeutic practice in food and nutrition - II**
Course Code	**CND1261**
Academic Year	First Year
Semester	II
Number of Credits	5
Course Prerequisite	Knowledge of Basic Science
Course Synopsis	This module provides Practical knowledge in Clinical correlation of food and Nutrition

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Classify food preparations as good moderate and poor sources of nutrients (C3,P3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		

Content	**Competencies**	**Number of Hours**
Unit 1: Nutritive value of foods		
Nutritive value of foods	Utilizing IFCT book to identify nutritive value of foods(P3)	19
Unit 2: Calculating nutritive value of prepared foods		
Calculating nutritive value of prepared foods	Preparing recipes and calculating their nutritive values(P3)	70
Unit 3:Source of Nutrients		
Classifying recipes as good, moderate or poor as a source of nutrients	Planning and classifying recipes as good, moderate or poor, sources of Carbohydrate, protein, fat (C3,P3)	80

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	117	-
Practical	52	-
Assessment	-	-
Total	**169**	**-**

Assessment Methods:							
Formative:		**Summative:**					
Unit Test		Mid Semester Exam					
Viva							
Clinical/Practical Log Book/ Record Book							
Mapping of Assessment with COs:							
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination							
Quiz / Viva		x					
Assignments/Presentations							
Clinical/Practical Log Book/ Record Book		x					
End Semester Exam							
Feedback Process:	Mid-Semester Feedback						
	End-Semester Feedback						
Main Reference:	1. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nded.). Published by Bangalore Printing and Publishing Ltd, Bangalore 2. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi						
Additional References	1. The “Indian Food Composition tables-(IFCT 2017)” T.Longvah,R.Ananthan,K.Bhaskarachary and K.Venkaiah 2. Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi 3. Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2006) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins						

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Introduction to food science - I**
Course Code	**CND1202**
Academic Year	First Year
Semester	II
Number of Credits	4
Course Prerequisite	Knowledge of basic science
Course Synopsis	This module provides 1. The basic knowledge to study the nature of foods and the changes occur in them naturally and as a result of handling and processing. 2. Knowledge with all technical aspects of food, beginning with harvesting or slaughtering, and ending with its cooking and consumption 3. Knowledge of the physicality and chemical natures of food, and the principles behind the making of food we eat today. 4. A basic theoretical knowledge of the food service sanitation and dining room management.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Describe the major chemical reactions that occur during food preparation and storage (C2)
CO2	Describe the skills and knowledge required to critically evaluate the provision and management of food services in a health care setting (C2)
CO3	Explain the chemistry underlying the properties of various food components(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x	x						
CO3	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Cereal		
Structure and composition, Nutritional value, Processing- Milling, polishing. Parboiling, flaking, parching and roasting. Use in variety of preparations selection, storage and care, breakfast	• Explain and demonstrate the overall structure of all cereal grains (C2) • List the nutritive value of different cereals(C1) • Explain the composition, milling process and different products of wheat (C2) • Explain the composition, milling process, parboiling and different products of rice(C2) • List the advantages and disadvantages of parboiling process(C1) • Define the process of parched rice, parched	12

Content	Competencies	Number of Hours
cereals.	paddy (C1) • Define the processing of puffed rice and flaked rice (C1) • List the advantages of parched rice products(C1) • Explain the process of ageing (C2) • Explain the composition of oats, rye and barley (C2) • Find the types of millets (C1) • List the nutritive value of maize or corn, Jowar(C1) • Describe the processing of maize or corn, Jowar(C1) • List the products of maize and Jowar(C1) • Explain the cereal protein – gluten, factors that affect the gluten formation(C2) • Describe the cereal starch, effect of moist heat, changes in cooked starches and effect of dry heat(C1) • Explain the fermented products, advantages of fermentation, unfermented products and breakfast cereals(C2) • Illustrate the effect of cooking on nutritive value of food and points to remember while cooking cereals(C2) • Describe role of cereals in cookery(C1)	
Unit 2: Pulses		
Composition and nutritional value, processing, soaking, germination. Cooking and fermentations	• Define the pulses and list some of the common legumes (C1) • Find the nutritive value of pulses(C1) • Explain the milling or decortication, soaking, germination and fermentation of pulses (C2) • Illustrate the storage and infestation of pulses (C2) • Explain the toxic constituents(C2) • Extend the steeping process and parboiling process (C2) • Illustrate the pulse cookery (C2) • Describe the effect of cooking(C1) • Describe the factors affecting cooking quality (C1) • List the forms of pulses and role of pulses in cookery (C1)	10
Unit 3: Milk and Milk products		
Composition of milk, properties and effect of heat, nutritional importance, milk processing, milk products	• Explain the composition of milk(C2) • Describe the physical properties of milk(C1) • Find the nutritive value of milk (C1) • Illustrate the effect of heat on milk(C2) • Explain the effect of acid on milk (C2) • Explain the effect of enzymes on milk(C2) • Explain the effect of phenolic compounds and	6

Content	Competencies	Number of Hours
	salt(C2) • Explain the microbial spoilage of milk and steps involved in in spoilage of milk (C2) • Define the processing of milk(C1) • Explain the clarification, pasteurization, homogenization process of milk(C2) • State the freezing effect(C1) • Classify the non-fermented and fermented products of milk (C2) • Define the milk substitutes (C1) • Explain the role of milk and milk products in cookery (C2) • List out the points to be remembered in using milk and milk products in cookery(C1)	
Unit 4: Flesh Foods		
Selection, storage, uses and nutritional aspects of meat, fish and poultry, spoilage of fish	• Show the structure of meat (C2) • List the classes of meat and related products (C1) • Define the composition and nutritive value(C1) • Find the post mortem changes(C1) • Explain the ageing, tendering and curing of meats(C2) • Define the cuts and grades of meat (C1) • Describe the meat cookery(C1) • Explain the changes during meat cooking(C2) • Classify the methods of cooking meat (C2) • Define and classify poultry(C1) (C2) • Explain the processing, composition and nutritive value of poultry (C2) • Describe the poultry cookery(C1) • Explain the preservation and storage of poultry(C2) • Define and classify fish(C1) (C2) • Define the composition and nutritive value of fish(C1) • Describe the selection of fish(C1) • Illustrate the fish cookery (C2) • Explain spoilage, storage and preservation of fish (C2)	7
Unit 5: Egg		
Composition & classification of egg & egg products, its nutritive value	• Explain the structure and composition of egg(C2) • Describe pigments and nutritive value of egg(C1) • Explain the effect of cooking on nutritive value of egg (C2) • Describe the evaluation of egg quality (C1) • Explain the egg cookery, buying, handling and preservation of egg (C2) • Describe the role of egg in cookery (C1)	4

Content	Competencies	Number of Hours
Unit 6: Food service Management		
Types of catering institutions and services, Service of food. Different types of catering institutions and services, Service of food. Art in food service, Colour, Table service, Management. Catering institutions, Personnel Management, Sanitation and safety. Menu Planning, Delivery and Service of Foods, Food service systems. Food Purchase, Selection and Storage	• Define the food service industry, types of food service industry(C1) (C2) • Explain the food and beverage service methods (C2) • Describe the features of hospital catering(C1) • Classify the Types of food service system (C2) • Explain the table service style, place setting and service order(C2) • Describe the guide for serving and for general working(C1) • Find the sequence of table service (C1) • Explain preliminary preparation of food(C2) • Describe the basic cuts and shapes of vegetables (C1) • Describe the factors to keep in mind while designing a menu(C1) • Illustrate the principles of quantity food purchase-selection, buying and storage of different foods(C2) • Explain the hygiene and sanitation in preparation and serving area – Personal hygiene, types, and sources of contamination, prevention, safety measures, methods of controlling infestation, and methods of dish washing(C2)	13

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	7	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	6	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment		-
Total	**52**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Assignments/Presentations	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**			
Mid Semester Examination	x	x	x			
Quiz / Viva						
Assignments/Presentations	x	x	x			
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x	x			

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi: Food Science. New Age International Publishers, New Delhi. 6th edition 2014 2. Sethi M and Malhan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach.New Age International (P) Ltd
Additional References	1. Bhojwani M (2007) Food service management: Principles and practice

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Analysis in food science - I**
Course Code	**CND1262**
Academic Year	First Year
Semester	II
Number of Credits	4
Course Prerequisite	Knowledge of Basic Science
Course Synopsis	This module provides the basic practical knowledge to study food science

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Apply and incorporate the principles of food science in real- world situations and problems (C3,P2)
CO2	Identify and explain nutrients in specific foods(C3,P3)
CO3	Apply food science knowledge to describe functions of ingredients in food. (C3,P2)
CO4	Demonstrate basic food composition and its effect on food characteristics. (C3,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x					x		
CO3	x					x		
CO4		x				x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:Percentage of edible portion		
Determination of the percentage of edible portion	• Identify the percentage of edible portion(P3)	9
Unit 2: Cereal cookery		
Cereal cookery: Methods of cooking fine and coarse cereals, Preparation of selected Indian cereal recipes Pulses cookery: Cooking of soaked and raw pulses - Effects of adding salt, acid and alkali on cooking. Preparation of selected	• Apply cooking methods using fine and coarse cereals (P2,P3) • Prepare the selected Indian cereal recipes (P3) • Use the soaked and raw pulses in cookery (P3) • Identify the effects of adding salt, acid and alkali on cooking(P3) • Demonstrate selected common pulse recipes (P4)	55

Content	Competencies	Number of Hours
common recipes.		
Unit 3:MILK		
Milk cookery - Experimental cookery on milk, Common preparations with milk, cheese and curds. Preparation of selected common recipes with milk	• Prepare common recipes with cheese and curds (P3) • Demonstrate common recipes with milk(P4)	43
Unit 3: Egg cookery		
Egg cookery - Evaluation of fresh egg. Experimental cookery – boiled egg, poached egg, omelette and custard.	Identify the fresh egg (P3) Experimental cookery – boiled egg, poached egg, omelette and custard(P3)	23

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Clinic	78	-
Practical	52	-
Total	**130**	-

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	Record Book

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination						
Quiz / Viva	x	x	x	x		
Clinical/Practical Log Book/ Record Book	x	x	x	x		
End Semester Exam						

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi: Food Science. New Age International Publishers, New Delhi. 6th edition 2014 2. Sethi M and Malhan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach.New Age International (P) Ltd
Additional References	1. Bhojwani M (2007) Food service management: Principles and practice

SEMESTER - III

COURSE CODE	:	COURSE TITLE
MCB2103	:	Microbiology
CND2101	:	Medical nutrition therapy - I
CND2161	:	Clinical practice in medical nutrition therapy - I
CND2102	:	Introduction to food science - II
CND2162	:	Analysis in food science - II
*******	:	Open elective - I

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Microbiology**
Course Code	**MCB2103**
Academic Year	Second Year
Semester	III
Number of Credits	3
Course Prerequisite	Nil
Course Synopsis	This course focuses on acquiring the knowledge pertaining to basics of medical microbiology, host immune response, common infectious diseases prevalent in India, healthcare associated infections and aseptic measures to prevent infections

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain the process of disease causation by infectious agents and appraise the role of microbiology laboratory in the diagnosis, management and control of infectious diseases with an emphasis on diseases prevalent in India (C2)
CO2	Explain the development of immune response, its relation to infection and other diseases with an immunological basis (C2)
CO3	Explain the implications of antibiotic susceptibility (C2)
CO4	Understanding the principles of asepsis and infection control in clinical practice (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Introduction To Medical Microbiology	i) Historical introduction to microbiology a. Describe the contributions of: (C1) • Louis Pasteur • Robert Koch ii) Classify the microorganisms (C2) iii) List the branches of microbiology and their significance (C1)	1
Bacterial Anatomy And Classification	i) Explain the bacterial cell structure, organelles and their functions (C2) ii) Explain the bacterial envelope of gram positive and gram negative bacteria (C2)	2

Content	Competencies	Number of Hours
	iii) Explain the following bacterial structure and their significance (C2) a. Cytoplasm b. Ribosomes c. Mesosomes d. Nucleoid e. Inclusion granules f. Flagella g. Pili h. Capsule i. Plasmid j. Spores iv) Classify bacteria based on morphology and nutrition (C2)	
Growth, Cultivation And Identification Of Bacteria	i) Explain the following: (C2) a. Bacterial growth curve b. Cultivation of bacteria • Culture media • Culture methods c. Identification of bacteria • Microscopy and Staining techniques • Biochemical reactions • Serology • Molecular techniques	2
Antimicrobial Susceptibility	i) Explain the disc diffusion methods – Kirby Bauer's and E - test (C2)	1
Introduction To Virology, Mycology & Parasitology	i) Explain the following: (C2) a. General features of viruses b. Virion structure c. Classification of viruses d. Diagnosis of viral diseases e. General properties and classification of fungi (morphological classification) f. Infections produced by fungi and their diagnosis g. General properties and classification of parasites h. Parasitic infections and their diagnosis	3
Sterilization And Disinfection	i) Classify sterilization methods (C2) ii) Explain the following (C2) a. Physical: Heat b. Sterilization by heat c. Dry heat sterilization – • Hot air oven and incinerator d. Moist heat sterilization • Below 100 ^{o}C, • At 100 ^{o}C • Above 100 ^{o}C e. Classification of disinfectants used in	3

Content	Competencies	Number of Hours
	hospital and their mechanism of action	
Infection & Immunity	i) Define infection (C1) a. List the types, sources, routes and spread of infectious diseases (C1) ii) Define and classify immunity (C1) iii) Explain the following: (C2) a. Types of immunity b. Types of vaccines iv) List the immunization schedule in India (C1)	2
Antigen & Antibody	i) Define antigen (C1) ii) Define(C1) and classify antibodies (C2) iii) Explain the following (C2) a. Functions of antibodies b. Diagnostic importance of antigen-antibody reactions • Agglutination • Immunofluorescence • ELISA	1
Immune Response	i) List the cells of immune system (C1) ii) Explain the following: (C2) a. Humoral Immunity – Primary and secondary immune response b. Cell mediated Immunity -Constituents and significance	2
Hypersensitivity	i) Define (C1) and classify hypersensitivity (C2) ii) Explain the following: (C2) a. Immediate hypersensitivity • Mechanisms and mediators of Anaphylaxis and atopy b. Cytotoxic hypersensitivity - Mechanism and associated disorders c. Immune complex hypersensitivity- • Arthus reaction, serum sickness and immune complex diseases d. Delayed type hypersensitivity- Mechanism and clinical importance of • Contact dermatitis and tuberculin type hypersensitivity	2
Autoimmunity	i) Define autoimmunity (C1) ii) Explain the mechanisms of autoimmunity (C2) iii) List the diseases involving predominantly one type of cell or organs (C1) iv) List the diseases involving multiple organs (systemic) (C1)	1
Healthcare Associated Infections	i) List the common Healthcare associated infections (C1) ii) Explain the following: (C2) a. Causes b. Sources	1

Content	Competencies	Number of Hours
	c. Routes of spread d. Host risk factors e. MRSA and its importance f. Prevention g. Investigation	
Standard Precautions And Overview Of Laboratory Diagnosis Of Microbial Infections	i) Explain the following (C2) a. Hand hygiene b. Personal protective equipment (PPE) c. Respiratory hygiene d. Sharp safety e. Sterile instruments and devices. f. Clean and disinfected environmental surfaces ii) Explain laboratory diagnosis of microbial infections (C2) a. Specimen Collection b. Specimen transport c. Specimen processing and handling d. Identification of microbes	3
Respiratory Tract Infections	i) Bacterial pneumonia a. List the causative agents associated (C1) b. Explain the pathogenesis and laboratory diagnosis of the following organisms (C2) • Streptococcus pneumoniae • Haemophilus influenzae • Klebsiella pneumoniae c. Describe the preventive measures(C1) ii) Viral pneumonia a. List the causative agents (C1) • Influenza b. Explain the etio-pathogenesis (C2) c. Explain the lab diagnosis (C2) d. Describe the preventive measures(C1) iii) Tuberculosis a. Describe the general properties of etiological agent (C1) b. Explain the pathogenesis (C2) c. Explain the lab diagnosis (C1) **d.** Describe the preventive measures (C1)	3
CNS Infections	i).Acute bacterial meningitis a. List the causative agents (C1) b. Explain the pathogenesis(C2) c. Explain the laboratory diagnosis(C2) d. Describe the preventive measures (C1) ii). Poliomyelitis a. Describe the general properties of etiological agent (C1) b. Explain the pathogenesis (C2) c. Explain the preventive measures (C2)	3

Content	Competencies	Number of Hours
	iii). Tetanus a. Describe the general properties of etiological agent (C1) b. Explain the pathogenesis (C2) c. Explain the laboratory diagnosis (C2) d. Describe the preventive measures (C1)	
Skin & Muscle Infections	i) Explain the etio-pathogenesis and laboratory diagnosis of following agents: (C2) a. Staphylococcus aureus b. Streptococcus pyogenes c. Clostridium perfringens	3
Cardiovascular System Infections	i) Infective endocarditis and Acute Rheumatic Fever (ARF) a. List the etiological agents (C1) b. Explain the pathogenesis and laboratory diagnosis of infective endocarditis and ARF (C2) c. Describe the preventive measures of ARF(C1) ii) Pyrexia of Unknown Origin (PUO) a. Define (C1) and classify (C2) b. Explain the investigation of classical PUO (C2)	2
GIT Infections	i) List the agents causing food poisoning and food associated infections (C1) ii) Explain the etio-pathogenesis and laboratory diagnosis of thefollowing:(C2) a. Escherichia coli diarrhoea b. Cholera c.Bacillary dysentery d. Enteric fever iii) Describe the preventive measures of cholera and enteric fever (C1) iv) Explain the morphology, transmission, clinical features and laboratory diagnosis of following parasites (C2) a. Entamoeba histolytica b. Ascaris lumbricoides **c.** Ancylostoma duodenale v) Viral hepatitis a. List the etiological agents (C1) b. Explain the transmission, pathogenesis, laboratory diagnosis and prevention of HBV infection(C2)	6
Urogenital Infection	**i) URINARY TRACT INFECTION** a. List the etiological agents (C1) b. List predisposing factors – Host factors and Microbial factors (C1) c.Explain the clinical features and laboratory diagnosis (C2)	2

Content	Competencies	Number of Hours
	ii) SEXUALLY TRANSMITTED DISEASES a. List the organisms causing STDs (C1) b. Human immunodeficiency virus infections • Explain general properties, pathogenesis, clinical features complications and laboratory diagnosis (C2)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**		**Student Learning Time (SLT)**			
Lecture	40		120			
Seminar						
Clinic						
Practical						
Revision						
Assessment	3		9			
Total	**45**		**129**			
Assessment Methods:						
Formative:	**Summative:**					
Unit Test- Nil	Sessional Examination I SEQ (theory) Sessional Examination II– MTF (theory)					
Quiz - Nil	University Examination – SEQ theory					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Sessional Examination 1	x	x	x	x	-	-
Sessional Examination 2	x	x	x	x	-	-
End Semester / University Exam	x	x	x	x	-	-
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Textbook of Microbiology for Dental students, Prof: C.P. Baweja 2. Medical Parasitology, D. R. Arora and D. Arora					
Additional References	Review of Medical Microbiology and Immunology by Warren Levinson, 15th Edition					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Medical nutrition therapy - I**
Course Code	**CND2101**
Academic Year	Second Year
Semester	III
Number of Credits	4
Course Prerequisite	Basic Knowledge of Nutrients and Dietary Guidelines
Course Synopsis	This Module provides 1. Explains the components of energy balance: energy intake and energy output; to consider the different requirements for energy in various individuals in different activities, units of measuring energy, factors affecting it, specific dynamic action of food, calculation of energy requirement and balanced diet. 2. Knowledge of nutrition assessment in-depth, evaluation of both objective and subjective data related to an individual's food and nutrient intake, lifestyle, and medical history. 3. The principles of Therapeutic Nutrition and Dietetics with concepts of diet therapy and special diets for special conditions. 4. Description in a lucid manner the principles of food as a preventive and therapeutic agent in disease. 5. Knowledge on “normal,” “regular,” or “house” diet that is the most frequent used of all diets in hospitals. 6. The identification in epidemiology, pathophysiology and diet therapy for various diseases and metabolic disorders like fever, obesity, anaemia, diabetes, cardiovascular, allergy and cancer.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Identify standards by which data will be compared, possible problem areas for making nutrition diagnoses using medical, and health, social, nutritional, and medication histories; physical examination; anthropometric measurements; and laboratory data(C1)
CO2	Explain nutrient requirements that is required for growth or maintenance person of a defined age, gender, weight, height, and level physical activity and different disease conditions(C2)
CO3	Explain the components of total energy expenditure-basal energy expenditure (BEE), thermic effect of food (TEF), and activity thermogenesis (AT) (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x			x				
CO2		x				x		
CO3	x							

Course Content and Outcomes:

Content	Competencies	Number of Hours
Unit 1: Basics of energy metabolism, nutrition & dietetics		
Unit of measuring energy, calorific value of food, BMR & factors affecting it, SDA of food, calculation of energy requirement balanced diet.	• Illustrate how energy is measured(C2) • Define energy balance, unit of measuring weight(C1) • Identify the energy-producing nutrients and state their fuel value(C1,C2) • Interpret the calorie content of foods based on their carbohydrate, protein, fat, and/or alcohol content (C2) • Express weight by using the body mass index (BMI) (C2) • Name the different factors affecting BMR(C1) • Explain the thermic action of food(C2) • Define balanced diet and its importance(C1,C2)	9
Unit 2: Nutritional Assessment(ABCD)		
Principles of therapeutic diets, modification of normal diet, classification of therapeutic diets.	• Identify some physical signs of malnutrition(C1) • Illustrate tools used in the assessment of nutritional status, such as: a. Diagnostic tests (radiologic/laboratory data). b. Anthropometric measurements. c. Dietary history and recalls. d. Physical findings and sociological data(C2) • Recognize some common nutrition problems, and propose corrective measures(C1,C2) • Define the principles of diet therapy(C1) • Explain the objectives of diet therapy(C2) • Explain the methods used to adapt a normal diet to treat a specific clinical disorder(C2) • Identify the most common therapeutic diets used in clinical care(C1)	4
Unit 3: Routine hospital diets		
Preoperative and postoperative diets, study and review of hospital diet. Basic concepts and methods of - (a) Oral feeding (b) Enteral nutrition (c) Parenteral nutrition	• Explain the basic Principles of hospital diets(C2) • Explain the kinds and Uses of Exchange lists(C2) • Transform diet modifications for therapeutic care(C2) • modifying basic nutrients • modifying energy value • modifying texture or consistency • modifying seasonings • Explain basic concepts in alterations in feeding methods(C2) • Explain different types of formula and its characteristics(C2) • Identify different kinds of feeding routes(C1))	6

Content	Competencies	Number of Hours
Unit 4: Diet in fever		
Definition metabolic changes and dietary management	• Definition of fever(C1) • Explain types of fever(C2) • Interpret causes of fever(C2) • Explain metabolic changes in body during fever(C2) • Explain dietary modifications and management(C2)	3
Unit 5: Nutritional anaemia		
Epidemiology, pathophysiology causes & dietary management	• Define anaemia and prevalence (C1C2) • Explain the symptoms and causes(C2) • Explain the different types of anaemia(C2) • Explain the risk factors, complications and prevention of anaemia. (C2) • Explain the dietary modification and management and fortification(C2)	3
Unit 6: Obesity		
Causes, complication and health effects, dietary management	• Define overweight and obesity(C1) • Explain variations in body weight and grades of obesity(C2) • Define BMI and assessment of body fat content(C1,C2) • Explain the causes of overweight and obesity(C2) • Interpret the different treatments of obesity(C2) • Explain prevention of overweight and obesity in children and adults(C2) • Recognize the complications and dietary management in obesity(C1,C2)	5
Unit 7: Diabetes		
Epidemiology, pathophysiology, causes & dietary management	• Illustrate diabetes mellitus and identify the types(C1,C2) • Explain the symptoms of diabetes mellitus(C2) • Explain the relationship of insulin to diabetes mellitus(C2)	7
Unit 8: Cardiovascular Diseases		
Epidemiology, pathophysiology, causes & dietary management	• Relate factors that contribute to heart disease(C2) • Explain why cholesterol and saturated fats are limited in some cardiovascular conditions(C2) • Identify foods to avoid or limit in a cholesterol-controlled diet(C1) • Explain why sodium is limited in some cardiovascular conditions(C2) • Identify foods that are limited or prohibited in sodium-controlled diets9-(C1)	6

Content	Competencies	Number of Hours
Unit 9: Diet in allergy		
Definition, common food allergies and dietetic treatment.	• Definition of allergy and allergens(C1) • Interpret the types of reactions caused(C2) • Explain food as allergens(C2) • Relate symptoms and diagnosis.(C2) • Explain allergies ,elimination diets and their uses(C2)	3
Unit 10: Cancer		
Epidemiology, pathophysiology, causes & dietary management.	• Illustrate how nutrition can be related to the development or the prevention of cancer(C2) • Interpret the effects of cancer on the nutritional status of the host(C2) • Explain the nutritional problems resulting from the medical treatment of cancer(C2) • Summarize nutritional therapy for cancer clients(C2)	6

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**		**Student Learning Time (SLT)**			
Lecture	39		117			
Seminar	-		-			
Small group discussion (SGD)	-		-			
Self-directed learning (SDL)	13		-			
Total	**52**		**117**			
Assessment Methods:						
Formative:	**Summative:**					
Unit Test	Mid Semester Exam					
Assignments/Presentations	End Semester Exam					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination	x	x	x			
Assignments/Presentations	x	x	x			
End Semester Exam	x	x	x			
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.					
Additional References	1. Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co 2. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical practice in medical nutrition therapy - I**
Course Code	**CND2161**
Academic Year	Second Year
Semester	III
Number of Credits	4
Course Prerequisite	Basic Knowledge of Nutrients and Dietary Guidelines
Course Synopsis	This module provides knowledge of Clinical Practice in Medical Nutrition Therapy
Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Apply Clinical Practice in diet therapy such as nutrition assessment, intervention, and education to patients (C3, P3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		

Content	**Competencies**	**Number of Hours**
Unit 1: Clinics ,Therapeutic diet chart Planning and preparations-Disease specific		
Clinics ,Therapeutic diet chart Planning and preparations-Disease specific	• Illustrate the construction of therapeutic diets(P3) • Classify different steps in planning a menu(P3) • Demonstrate the diets planned for patients with fever(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with anaemia(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with obesity(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with diabetes(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with cardiovascular diseases(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management	130

Content	Competencies	Number of Hours
	• Demonstrate the diets planned for patients with allergy(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with cancer(P3) 1. Modification of nutrients. 2. Principles of diet 3. Dietary management	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Clinic	78	-
Practical	52	-
Revision	-	-
Assessment	-	-
Total	**130**	**-**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination						
Quiz / Viva	x					
Clinical/Practical Log Book/ Record Book	x					
End Semester Exam						

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	1. Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co 2. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Introduction to food science - II**
Course Code	**CND2102**
Academic Year	Second Year
Semester	III
Number of Credits	2
Course Prerequisite	Basic Knowledge on Food Groups
Course Synopsis	This module provides 1. The basic knowledge to study the nature of foods and the changes occur in them naturally and as a result of handling and processing. 2. Knowledge with all technical aspects of food, beginning with harvesting or slaughtering, and ending with its cooking and consumption 3. Knowledge of the physicality and chemical natures of food, and the principles behind the making of food we eat today. 4. A basic theoretical knowledge of the food service sanitation and dining room management.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Describe the major chemical reactions that occur during food preparation and storage (C2)
CO2	Describe the skills and knowledge required to critically evaluate the provision and management of food services in a health care setting (C2)
CO3	Explain the chemistry underlying the properties of various food components (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x	x						
CO3	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Fats and oils		
Types of fats and oils, Processing of fats and oils, Changes during cooking, effect of heating, changes in fat on heating. Storage, spoilage, rancidity. Role of fats and oils in cookery. Nuts and oil seeds:	• Explain the nutritive value and fatty acid composition of oil (C2) • Explain the refining and processing of fats (C2) • List the specific fats and oils (C1) • Explain emulsions and rancidity (C2) • Illustrate the effect of heating (C2) • Describe the role of fat/oil in cooking (C1) • Explain the unconventional oils (C2) • Describe the nutritive value of nuts and oil seeds (C1)	10

Nutritive value, importance & classification	• List the specific nuts and oilseeds (C1) • Explain the toxins and role of nuts and oilseeds in cookery (C2)	
Unit 2: Fruits and vegetables		
Classifications, composition and importance in human nutrition storage, cooking of vegetables, changes during cooking, effect of heat, acid and alkali.	• Describe the vegetables and the classification of vegetables (C1) • Define the composition and nutritive value of vegetables (C1) • Describe the selection of vegetables (C1) • Explain the vegetable cookery (C2) • Illustrate the loss of nutrients during cooking and effect of cooking on pigments (C2) • Describe the storage of vegetables (C1) • Describe the fruits and the classification of fruits (C1) • Define the composition and nutritive value of fruits (C1) • Explain the post- harvest changes and storage of fruits (C2) • Describe the ripening of fruits (C1) • Explain the enzymatic and non-enzymatic browning (C2)	7
Unit 3: Sugar and Sugar products		
Form of sugar and liquid sweetness , Caramelization, Hydrolysis, Crystallization , Indian confectionery	• Describe the nutritive value of sugar and related products (C1) • Explain the properties of sugar and related products (C2) • List the sugar related products (C1) • Explain the sugar cookery (C2) • Describe the artificial sweeteners (C1)	5
Unit 4: Role of spices in food science		
Importance, composition & classification	• Explain the importance and composition of spices (C2) • List the different spices (C1)	4

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	78
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment		-
Total	**26**	**78**

Assessment Methods:							
Formative:		**Summative:**					
Unit Test		Mid Semester Exam					
		End Semester Exam					
Mapping of Assessment with COs:							
Nature of Assessment		**CO1**	**CO2**	**CO3**			
Mid Semester Examination		x	x	x			
Quiz / Viva							
Assignments/Presentations							
Clinical/Practical Log Book/ Record Book							
Any others: WPBA							
End Semester Exam		x	x	x			
Feedback Process:	Mid-Semester Feedback						
	End-Semester Feedback						
Main Reference:	1. Srilakshmi: Food Science. New Age International Publishers, New Delhi. 6th edition 2014 2. Sethi M and Malhan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach.New Age International (P) Ltd						
Additional References	1. Bhojwani M (2007) Food service management: Principles and practice						

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Analysis in food science - II**
Course Code	**CND2162**
Academic Year	Second Year
Semester	III
Number of Credits	4
Course Prerequisite	Basic Knowledge on Food Groups
Course Synopsis	This module provides the basic practical knowledge to study food science

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Apply and incorporate the principles of food science in real- world situations and problems (C3,P3)
CO2	Identify and explain nutrients in specific foods(C3,P2)
CO3	Apply food science knowledge to describe functions of ingredients in food. (C3,P3)
CO4	Demonstrate basic food composition and its effect on food characteristics. (C3,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x					x		
CO3	x					x		
CO4		x				x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Fats and oils		
Smoking point, Preparation of common recipes	• Identify the smoking point of any oils (P2) • Demonstrate factor affecting absorption of oil (P4) • Prepare the shallow frying recipes (P3) • Prepare the deep fat frying recipes (P3)	37
Unit 2: Vegetables and fruits		
Browning reaction, Effect of acid and alkali, Preparation of selected common recipe	• Demonstrate enzymatic browning in vegetables and fruits (P4) • Demonstrate the effect of acid and alkali on vegetables (P4) • Preparation of common recipes using vegetables and fruits (P3)	42
Unit 3: Survey		
Survey of marketed processed and labelling of processed food	• Survey of marketed processed and labelling of processed food items (P4)	6

Content	Competencies	Number of Hours
items.		
Unit 4: confectionary products		
Preparation of some confectionary products.	• Demonstrate the different stages of sugar cookery (P4) • Preparation of some confectionary products (P3)	35
Unit 5: Visit to confectionaries		
Visit to confectionaries.	• Survey of the confectionaries (P4)	10

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	-	-
Clinic	78	-
Practical	52	-
Revision	-	-
Assessment		-
Total	**130**	**-**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination						
Quiz / Viva	x	x	x	x		
Clinical/Practical Log Book/ Record Book	x	x	x	x		
End Semester Exam						

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi: Food Science. New Age International Publishers, New Delhi. 6th edition 2014 2. Sethi M and Malhan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach.New Age International (P) Ltd
Additional References	1. Bhojwani M (2007) Food service management: Principles and practice

SEMESTER - IV

COURSE CODE	:	COURSE TITLE
BST3201	:	Biostatistics & research methodology
CND2201	:	Medical nutrition therapy - II
CND2261	:	Clinical practice in medical nutrition therapy - II
CND2202	:	Quality control
		Program elective - I
CND3241	:	Nutrition for special children
CND3242		Dietetics and counselling

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Biostatistics and research methodology**
Course Code	**BST3201**
Academic Year	Second
Semester	IV Semester
Number of Credits	3
Course Prerequisite	Nil
Course Synopsis	1. To provide necessary foundation on • Introductory level biostatistics • Demography, vital statistics and epidemiology • Survey sampling methods • Fertility, morbidity, and mortality indices 2. To introduce the steps involved in research process

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain characteristics of statistical data, types of variables, scales of measurement, presentation of data, normal distribution. (C2)
CO2	Apply measures of location and variation for statistical data (C3)
CO3	Outline the sources of demographic data and vital statistics, merits and demerits of probability and non-probability sampling techniques. (C2)
CO4	Explain the indices of fertility, morbidity and mortality, Epidemiology, observational study designs (C2)
CO5	Explain the concept of correlation and regression. (C2)
CO6	Summarize the steps involved in a research process (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4		x						
CO5	x							
CO6	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Introduction to Biostatistics	• Define biostatistics (C1) • Describe the characteristics of statistical data (C2) • Explain the role of statistics in health sciences (C2)	2
Variables	• Distinguish between qualitative & quantitative with	4

Content	Competencies	Number of Hours
	appropriate examples (C2) • Distinguish between continuous & discrete variables with appropriate examples (C2) • Distinguish between nominal & ordinal variables with appropriate examples (C2)	
Scales of Measurement	• Describe nominal scale of measurement of variables with appropriate examples (C2) • Describe ordinal scale of measurement of variables with appropriate examples (C2) • Describe interval scale of measurement of variables with appropriate examples (C2) • Describe ratio scale of measurement of variables with appropriate examples (C2)	4
Unit 2:		
Tabular presentation of data	• Describe the three types of class intervals – inclusive, exclusive and open ended (C2) • Explain the concepts of relative and cumulative frequencies (C2) • Construct the frequency table (C3)	2
Graphical presentation of data	• Explain the concepts of Histogram, Frequency Polygon, Frequency Curve (C2) • Construct Histogram, Frequency Polygon, Frequency Curve for statistical data (C3)	2
Diagrammatic presentation of data	• Explain the concepts of Bar diagram and Pie diagram (C2) • Construct Bar diagram and Pie diagram for statistical data (C3)	2
Unit 3:		
Measures of Location	• Explain the concepts of Mean, Median, Mode (C2) • Explain the concepts of Quartiles and Percentiles (C2)	2
Unit 4:		
Measures of Variation	Describe the concepts of Range, Inter-quartile range, Variance, Standard deviation and Coefficient of variation (C2)	2
Unit 5:		
Sampling	• Explain sampling and non-sampling error (C2) • Define and distinguish probability and non-probability sampling methods (C1) • Explain each sampling technique by stating their merits and demerits (C2)	4
Unit 6:		
Normal Distribution	• Explain the characteristics of normal distribution (C2) • Compute the area under the normal distribution curve (C3)	2
Skewness and	• Explain the concept of skewness and describe three	2

Content	Competencies	Number of Hours
Kurtosis	types of skewness (C2) • Explain the concept of kurtosis and describe three types of kurtosis (C2)	
Unit 7:		
Correlation	• Define correlation (C2) • Explain positive and negative correlation with appropriate examples (C2) • Explain the Pearson's correlation coefficient and outline its properties (C2) • Explain the Spearman's correlation coefficient and outline its properties (C2) • Illustrate using scatter plot the different types of correlation (C3)	2
Regression	• Distinguish between dependent and independent variables. (C2) • Explain the simple linear regression model along with the assumptions involved. (C2) • Identify the slope and intercept coefficient from the model. (C2) • Predict the dependent variable from the model for a given set of independent variables. (C3)	2
Unit 8:		
Demography and Vital statistics	• Define Demography and Vital statistics (C1) • What are the sources of demographic data and vital statistics (C1) • Define and distinguish rate, ratio and proportion (C1)	2
Morbidity, mortality and fertility rates	• Explain prevalence and incidence (C2) • Explain each measure of morbidity, mortality and fertility rates by stating the formula (C2)	4
Unit 9:		
Research	• Explain sampling and non-sampling error (C2) • Define and distinguish probability and non-probability sampling methods (C1) • Explain each sampling technique by stating their merits and demerits (C2)	3
Unit 10:		
Epidemiology	• Define Epidemiology (C1) • Explain the observational study designs (case report, case series, cross-sectional, ecological) (C2)	4

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	45	135
Total	**45**	**135**

Assessment Methods:							
Formative:		**Summative:**					
Unit Test		Mid Semester Exam					
		End Semester Exam					
Mapping of Assessment with COs:							
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination		x	x				
End Semester Exam		x	x	x	x	x	x
Feedback Process:	Mid-Semester Feedback						
	End-Semester Feedback						
Main Reference:	1. Lwanga SK, Tye CY, Ayeni O. Teaching health statistics: lesson and seminar outlines. World Health Organization, Marketing and Dissemination, 1211 Geneva 27, Switzerland; 1999. 2. Health research methodology: a guide for training in research methods. World Health Organization; 2001. 3. Bonita R, Beaglehole R, Kjellström T. Basic epidemiology. World Health Organization; 2006. 4. Campbell MJ, Swinscow TD. Statistics at square one. John Wiley & Sons; 2011.						
Additional References	1. Degu G, Tessema F. Biostatistics [Internet]. Gondor: University of Gondar; January 2005. Available from: http://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/ln_biostat_hss_final.pdf 2. Kebede Y. Epidemiology [Internet]. Gondor: University of Gondar; 2004. Available from: http://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/Epidemiology.pdf 3. Degu G, Yigzaw T. Research Methodology [Internet]. Gondor: University of Gondar; 2006. Available from: http://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/ln_research_method_final.pdf 4. Morris JN. Uses of epidemiology. Edinburgh, UK: Churchill Livingstone; 1975. 5. Campbell MJ, Machin D, Walters SJ. Medical statistics: a textbook for the health sciences. John Wiley & Sons; 2010. 6. Rao PS, Richard J. An Introduction to Biostatistics: A manual for students in health sciences. Prentice/Hall of India; 1996. 7. Mahajan BK, Khanal AB. Methods in biostatistics: for medical students and research workers. Jaypee Brothers Medical Publishers; 2010.						

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Medical nutrition therapy - II**
Course Code	**CND2201**
Academic Year	Second Year
Semester	IV
Number of Credits	4
Course Prerequisite	Basic Knowledge of Nutrients and Dietary Guidelines
Course Synopsis	This module introduces the role of medical nutrition therapy in the prevention and treatment of clinical diseases and disorders and aims to expand knowledge on a variety of common pathophysiological conditions and integrate this knowledge with the intervention of clinical nutrition therapies.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain the factors for chronic diseases (Renal disease, Gout, Gastro Intestinal Diseases, Genetic Disorders) and an evidence-based medical nutrition approach to treat the conditions (C2)
CO2	Explain Interactions between Drugs, Food Nutrients and Nutritional Status (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):								
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x					x		

Course Content and Outcomes:

Content	Competencies	Number of Hours
Unit 1: Renal disease		
Epidemiology, pathophysiology causes & dietary management	• Explain Physiology & function of normal kidney a brief review(C2) • Explain Diseases of the kidney, classification(C2) 1. Glomerulo nephritis – Acute and Chronic – Etiology, Characteristics, Objectives, Principles of Dietary Treatment and Management 2. Nephrotic syndrome – objectives, principles of Dietary Treatment and Management 3. Uremia and Renal –Failure History, General Principles of Protein Nutrition in Renal Failure and Uremia. 4. Acute Renal Failure – Causes, dietary management fluid, sodium and potassium balance, protein and energy requirements 5. Chronic renal failure medical treatment,	8

Content	Competencies	Number of Hours
	Renal transplants. Dialysis and types hemodialysis, Peritoneal Dialysis & Continuous Ambulatory Peritoneal Dialysis (CAPD). Dietary Management in conservative treatment, dialysis and after renal transplantation. 6. Use of Sodium and Potassium Exchange lists in Renal (diet planning) 7. Chronic renal failure in patients with diabetes mellitus 8. Chronic renal failure in children 9. Nephrolithiases – Etiology, types of stones, Nutritional care, alkaline-ash diets	
Unit 2: Gout		
Causes & dietary management	• Explain nature and occurrence of uric acid, causes, symptoms and diet(C2)	2
Unit 3: Gastro Intestinal Diseases		
Diet therapy in gastrointestinal disturbances	• Explain epidemiology, pathophysiology causes & dietary management of Diarrhoea, Constipation, Peptic Ulcer, Gastritis ,Inflammatory bowel disease (C2) • Explain the major functions of the normal liver(C2) • Identify the appropriate diet therapy for treating liver diseases and state the rationale for its use in treating hepatitis, cirrhosis, hepatic coma and liver failure(C3) • Illustrate the diet therapy used for liver transplantation(C2) • Explain the causes of gallbladder and pancreatic disorders, and describe how they affect food metabolism(C2) • Illustrate difference among cholecystitis, cholelithiasis, and cholecystectomy in to their effects on the digestion and metabolism of foods(C2) • Describe and give examples of the diet therapy used for gallbladder disease(C1) • Identify the major causes of pancreatitis (C1) • Relate the association between pancreatitis and gallbladder disease(C1) • Describe the diet therapy for pancreatitis (C1)	20
Unit 4: Respiratory diseases		
Diet therapy in COPD, Tuberculosis	• Explain epidemiology, pathophysiology causes & dietary management of COPD, Tuberculosis(C1,C2)	6

Content	Competencies	Number of Hours
Unit 5: Diet in Genetic Disorders		
Phenylketonuria, Galctosemia, Fructosuria	• Explain the etiology of phenylketonuria Galctosemia, Fructosuria(C2) • Relate the symptoms of untreated genetic disorders(C1) • Describe the dietary management of Phenylketonuria, Galctosemia Fructosuria(C1) 1. Requirements 2. Restrictions 3. Appropriate supplements	8
Unit 6: Interactions between Drugs, Food Nutrients and Nutritional Status		
Interactions between Drugs, Food Nutrients and Nutritional Status	• Explain drug and nutrient interaction (C2) • Explain the effect on ingestion, digestion, absorption and metabolism of nutrients, (C2) • Explain the effect on nutritional status, organ function, drug dosage and efficacy, drug abuse and drug resistance(C2)	8

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**				
Lecture	39	117				
Seminar	13	-				
Total	**52**	**117**				
Assessment Methods:						
Formative:	**Summative:**					
Unit Test	Mid Semester Exam					
Assignments/Presentations	End Semester Exam					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**				
Mid Semester Examination	x	x				
Assignments/Presentations	x	x				
End Semester Exam	x	x				
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.					
Additional References	1. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical Practice in medical nutrition therapy II**
Course Code	**CND2261**
Academic Year	Second Year
Semester	IV Semester
Number of Credits	6
Course Prerequisite	Basic Knowledge of Nutrients and Dietary Guidelines
Course Synopsis	This module provides knowledge of Clinical Practice in Medical Nutrition Therapy

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Application of Clinical Practice in diet therapy such as nutrition assessment, intervention, and education to patients (C3, P3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Clinics ,Therapeutic diet chart Planning and preparations-Disease specific		
Clinics ,Therapeutic diet chart Planning and preparations-Disease specific	Demonstrate the diets planned for patients with Renal disease, Gout Gastro Intestinal Diseases-Diarrhoea, Constipation, Peptic Ulcer, Gastritis, Inflammatory bowel disease, liver diseases (hepatitis, cirrhosis, hepatic coma and liver failure, liver transplantation), gallbladder , pancreatic disorders, COPD, and Tuberculosis(P3) • Modification of nutrients. • Principles of diet • Dietary management	208

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	-	-
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	156	-

Practical	52	-
Revision	-	-
Assessment	-	-
Total	**208**	**-**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	End Semester Exam
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination	x					
Quiz / Viva	x					
Assignments/Presentations						
Clinical/Practical Log Book/ Record Book	x					
Any others: WPBA						
End Semester Exam	x					

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	1. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Quality control**
Course Code	**CND2202**
Academic Year	Second Year
Semester	IV
Number of Credits	4
Course Prerequisite	Basic Knowledge of Food Groups
Course Synopsis	This module provides 1. Basic knowledge to study the quality management in food production chain. 2. Knowledge on the issues of safety and quality in food production, handling, processing and trade. 3. Knowledge of the latest trends and techniques in food science 4. Knowledge on food standardization and regulation.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Identify the hazard of the food chain to ensure food safety(C1)
CO2	Identify the adulteration in food samples (C1)
CO3	Explain the application of food quality and food safety system (C2)
CO4	Extend the chemical and microbiological quality of food samples (C2)
CO5	Explain the application of food safety regulations using HACCP principles in food production operations. (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x					x		
CO3	x							
CO4	x							
CO5	x					x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Food quality and quality control		
Definitions, Principles of quality control, Food quality, Sample and sampling methods, Industrial quality control: Raw material control, Process control, Finished Product control and inspection.	• Define quality control (C1) • List the principles of quality control (C1) • Explain the methods of sampling (C2) • Illustrate raw material control (C2) • Explain processed product and finished product control (C2) • Extend the purpose of inspection (C2) • List the stages of inspection (C1) • Explain the methods of inspection (C2)	10

Content	Competencies	Number of Hours
	• Find the drawbacks of inspection (C1)	
Unit 2: Food additives, fortification and enrichment		
Definitions and importance. Principles and objectives. Classification and uses. Colouring agents: Natural, Synthetic and non-certified colours. Leavening agents: Classification and uses. Flavouring agents: Natural and Synthetic flavours. Commonly fortified and enriched foods. Non-nutritional constituents and food safety: naturally occurring toxicants, microbial toxins, bacterial food poisoning and contamination arising from processing	• Define food additives (C1) • Illustrate importance, principles and objectives for food additives (C2) • Describe food preservatives (C1) • Explain principal preservatives in current use (C2) • Describe colour additives (C1) • Explain natural colour, synthetic colours and non-certified colours (C2) • Describe flavouring agents (C1) • Explain natural and synthetic colours (C2) • Define food fortification and enrichment (C1) • Illustrate the role and objective of food fortification (C2) • Explain restoration to natural level, fortification above natural level and enrichment with public health objectives(C2) • List types of fortification (C1) • Explain the criteria and benefits of fortification (C2) • Find the food vehicles identified for food fortification in India (C1) • Extend naturally occurring toxicants, microbial toxicants bacterial food poisoning and contamination arising from processing (C2)	16
Unit 3: Sensory evaluation of food quality		
Sensory characteristics of food, Types of tests. Objective evaluation: Types of tests, Texture evaluation. Conducting sensory tests and preparation of evaluation card	• Define sensory evaluation (C1) • Describe the sensory characteristics of food (C1) • Find the types of sensory tests (C1) • Extend the preparation of evaluation card for sensory tests (C2) • Illustrate objective evaluation (C2) • Find the tests used for objective evaluation (C1) • Identify the instruments used for texture evaluation (C1)	9
Unit 4: Adulteration of food		
Definition. Types. Contamination of food by incidental adulteration by microorganisms, packing materials and other sources. Tests to detect common adulterants	• Define food adulteration (C1) • Extend the types of adulterants (C2) • Explain intentional and incidental adulterants (C2) • Illustrate the different test to detect common adulterants (C2)	10

Content	Competencies	Number of Hours
Unit 5: Food standards		
ISI, AGMARK, Export inspection council, consumer protection act, CODEX Alimentarius, FSSAI. HACCP - Importance. Principles. Determination of CCP. Problems in implementing HACCP. Importance of TQM, GMP and GLP	• Find the national and international food standards (C1) • Extend the importance, principles and determination of CCP (C2) • Explain the problems in implementing HACCP (C2) • Explain the importance of total quality management, good manufacturing practice and good laboratory practices (C2)	7

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**		**Student Learning Time (SLT)**			
Lecture	39		117			
Seminar	-		-			
Small group discussion (SGD)	-		-			
Self-directed learning (SDL)	13		-			
Total	**52**		**117**			
Assessment Methods:						
Formative:	**Summative:**					
Unit Test	Mid Semester Exam					
Assignments/Presentations	End Semester Exam					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	
Mid Semester Examination	x	x	x	x	x	
Assignments/Presentations	x	x	x	x	x	
End Semester Exam	x	x	x	x	x	
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Martin EH (1986) Standard methods for the examination of dairy products 2. Bhartiya C (2010). Managing food quality. Surendra publishing					
Additional References	1. Ranjanna S (1985) Handbook of analysis and quality control for fruit and vegetable products					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Nutrition for special children**
Course Code	**CND3241**
Academic Year	Second Year
Semester	IV
Number of Credits	3
Course Prerequisite	Basic Knowledge of Nutrients and Food groups
Course Synopsis	This module introduces the management of nutritional component among special children.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain common feeding problems in Special Children (C2)
CO2	Explain about behavioural interventions frequently used to treat feeding issues in special children (C2)
CO3	Interpret and apply nutrition concept to improve overall health (C2)
CO4	Illustrate recommendation for improving nutritional status of special children (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2				x		x		
CO3	x	x						
CO4	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Nutrition for special children		
Nutrition for special children- Autism ADHD, Cerebral Palsy Down syndrome Epilepsy • Nutritional ABCD • Practices and Issues of feeding toddlers and Young Children • Meal Planning, Food Safety, Nutrition Education. • Use of right feeding equipment.	• Illustrate anthropometry measurements, biochemical methods of nutritional status, clinical assessment of nutritional deficiencies and diet recommendation(C2) • Interpret the medical condition and nutrition management(C2) • Explain the different feeding practices and challenges in feeding the children with neuro disabilities (C2) • Explain the right feeding equipment and nutritional management(C2)	39

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**39**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination	x	x	x	x		
Quiz / Viva						
Assignments/Presentations						
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
Additional References	1. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Dietetics and counselling**
Course Code	**CND3242**
Academic Year	Second Year
Semester	IV
Number of Credits	3
Course Prerequisite	Basic Knowledge of Nutrients and Food groups
Course Synopsis	This subject clearly explains theoretical models of accepted counselling practice underpinning the skills described.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Tell Patients regarding nutrition to manage disease through teaching aids (C1)
CO2	Interpret the practical consideration in giving dietary advice and counselling (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x			x				
CO2		x						x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Dietetics and Counselling		
Practical consideration in giving dietary advice and counselling –	• Relate factors affecting individual food choice.(C2) • Illustrate communication of dietary advice.(C2) • Describe the consideration of behaviour modification(C1) • Explain motivation in dietary advice.(C2)	13
Unit 2: Counselling and educating patient		
Counselling and educating patient	• Define nutrition counselling(C1) • Explain the role of nutrition counsellor (C2) • Illustrate the responsibilities of the nutrition counsellor(C2) • Compare Practitioner v/s client managed care(C2) • Summarize entrepreneur skills and behaviour(C2) • Summarize communication and negotiation skills.(C2)	13
Unit 3: Teaching aids used by dieticians		
Teaching aids used by dieticians	• Explain teaching aids-Charts, leaflets, posters(C2) • Describe teaching material for patients(C2)	13

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**39**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
	End Semester Exam

Mapping of Assessment with COs:							
Nature of Assessment	**CO1**	**CO2**					
Mid Semester Examination	x	x					
Quiz / Viva							
Assignments/Presentations							
Clinical/Practical Log Book/ Record Book							
Any others: WPBA							
End Semester Exam	x	x					

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company

SEMESTER - V

COURSE CODE	:	COURSE TITLE
CND3101	:	Nutrition in critical care
CND3102	:	Clinical nutrition through life cycle - I
CND3161	:	Therapeutic practice in critical care nutrition & life cycle - I
CND3103	:	Food sanitation and hygiene
*** ****	:	Open elective - II

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Nutrition in critical care**
Course Code	**CND3101**
Academic Year	Third Year
Semester	V Semester
Number of Credits	4
Course Prerequisite	Basic Knowledge of Medical Nutrition therapy
Course Synopsis	This module provides 1. The basic concept to nutrition as a treatment (therapy)/intervention versus nutritional support for "prevention of malnutrition." 2. Knowledge of the advantages of enteral nutrition over parenteral nutrition. 3. The identification of treatment goals of nutritional care of the burn patient/surgical condition/palliative care 4. In understanding the metabolic adaptations that occur in response to exercise /sports training that allows individualized nutrition strategies to be developed.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Define the terms subjective global assessment, oral nutrition, enteral nutrition, parenteral nutrition refeeding syndrome, overfeeding. physical activity, exercise, physical fitness, sports physiology and sports nutrition (C1)
CO2	Describe the nutritional status in critically ill patients (C1)
CO3	Explain the nutritional care plan for the critically ill, surgical conditions, burns and palliative care(C2)
CO4	Explain the key basic nutritional requirements for a sports person(C2)
CO5	Explain the poor understanding of good nutrition principles and practices in sports science (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2		x				x		
CO3	x					x		
CO4	x	x						
CO5	x					x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Enteral and Parenteral Nutrition		
Introduction , Management and	• Explain the concept of assessment of nutritional status -Subjective Global	13

Content	Competencies	Number of Hours
Complications	Assessment (C2) • Explain the route of nutrition and its requirements (C2) • Illustrate the type of enteral/parenteral feed that can be given. (C2) • Explain the complications of nutritional support (C2)	
Unit 2: Nutrition Support in Critically ill Patients		
Surgical conditions, Burns and Palliative care	• Illustrate the physiological and psychological effects of body trauma or stress (C2) • Compare the outcomes of surgery in a patient with poor nutritional status and in a patient with good nutritional status(C2) • Explain the diet therapy regime for the postoperative • /preoperative patient and rationale for its use(C2) • Describe the severity of a burn by its degree(C1) • Explain the treatment goals and nutritional care of a burn patient (C2) • Infer the nutrient needs of a burn patient (C2) • Explain palliative care nutrition (C2) • Illustrate Optimising nutrition in palliative care(C2)	21
Unit 3: Basic Sports Nutrition		
1.Definition of • Physical activity • Exercise • Physical fitness • Sports physiology • Sports nutrition 2. Benefits of physical activity and exercise. 3. Classification of Sports activities. 4. Nutritional requirements of sports person. 5. Pre- event meal.	• Explain the role of nutrition in Performance and exercise(C2) • Illustrate the General Dietary Guidelines for Active Individuals(C2) • Explain the Fluid Intake Recommendations (C2) • Explain the factors influencing nutritional requirements for different types of spot activities(C2) • Explain the pre-competition meal (C2)	18

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	3	-
Small group discussion (SGD)	-	-

Self-directed learning (SDL)	10	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**52**	**117**

Assessment Methods:

Formative:	**Summative:**
Unit Test	Mid Semester Exam
Assignments/Presentations	End Semester Exam

Mapping of Assessment with COs:

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	
Mid Semester Examination	x	x	x	x	x	
Quiz / Viva						
Assignments/Presentations	x	x	x	x	x	
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x	x	x	x	

Feedback Process:	**Mid-Semester Feedback**
	End-Semester Feedback
Main Reference:	**Text book / Reference Books:** 1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmed 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published by WB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	1. Sports and Fitness Nutrition – Robert Wildmon and Berry Miller 2. Practical Application in Sports Nutrition – Heather Hedrick Fink, Lisa Burgoon, Alan Mikesky. 3. Nutrition for Sports and Exercise – Jacqueline Berming and Suzame Nelson 4. Nutrition , Exercise and Behavior – Lione Summerfield.

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical nutrition through life cycle - I**
Course Code	**CND3102**
Academic Year	Third Year
Semester	V
Number of Credits	4
Course Prerequisite	Basic Knowledge of Nutrients and Food groups
Course Synopsis	This module provides a basic knowledge to study the nutrition requirements and challenges change throughout the human lifecycle and how alteration in nutritional requirements impact on human health.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Describe how nutrition affects growth and development and the physiological basis of nutritional requirements throughout the life span (C1)
CO2	Identify eating patterns, nutritional problems and selected chronic diseases characteristic of age groups throughout the life span (C1)
CO3	Explain current issues in life span nutrition (C2)
CO4	Explain, compare and contrast the nutritional requirements of humans during different stages of the life cycle (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x					x		
CO3	x							
CO4	x					x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Nutrition during Pregnancy and lactation		
Physiological stages of pregnancy b) Effect of Nutritional status on Pregnancy outcome c) Nutritional Requirements d) Guide for eating during pregnancy e) Complications of pregnancy and their dietary Implications. Lactation: Physiology b) Nutritional Requirements, breast feeding an infant.	• Explain the physiological changes during pregnancy (C2) • Describe preconceptual nutrition (C1) • Illustrate the nutritional requirement during pregnancy (C2) • Describe dietary modification during pregnancy (C1) • Extend the general dietary problems during pregnancy (C2) • Describe the weight gain during pregnancy (C1) • Explain the complications during pregnancy (C2) • List the general dietary guidelines for	20

Content	Competencies	Number of Hours
	pregnancy (C1) • Describe the role of hormones (C1) • List the factors affecting the volume and composition of breast milk (C1) • Illustrate the nutritional requirement during lactation (C2) • Describe the food requirement and general dietary guidelines for lactating mothers (C1)	
Unit 2: Nutrition during Infancy		
a) Physiologic Development b) Nutritional Requirements) Milk for Infants- Composition of human and cow's milk, formulas d) Complimentary foods- weaning pattern, composition, general principles in feeding infants, special feeding problems. Nutritional requirements of Toddlers (1-3years)	• Describe the growth and development during infancy (C1) • Illustrate the nutritional requirements during infancy (C2) • Explain the breast feeding, advantages of breast feeding and nutritional factors of breast milk (C2) • Extend the artificial feeding (C2) • Illustrate the modification of the formula and technique of feeding (C2) • Explain the nutritional requirement of preterm baby (C2) • Describe the feeding problems (C1) • Define the weaning (C1) • Extend the need for weaning (C2) • Explain the types of supplementary foods (C2) • List the problems in weaning (C1) • Explain the nutritional requirements of toddlers (C2)	19
Unit 3: Nutrition In Childhood Pre-School and School going		
a) Growth and Development b)Nutritional Requirement's c)Factors influencing food intake d)Nutritional Concerns	• Explain the nutritional requirements of preschool children (C2) • Extend the factors affecting nutritional status of preschool children (C2) • Describe the food requirements of preschool children (C1) • List the general dietary guidelines for preschool children (C1) • Illustrate the nutritional related problems of preschoolers (C2) • Explain the nutritional requirements for school children (C2) • Describe the food requirements of school children (C1) • Extend the feeding problems of school children (C2) • Explain the packed lunches and school lunch programmes (C2)	13

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	10	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	3	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment		-
Total	**52**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Assignments/Presentations	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination	x	x	x	x		
Quiz / Viva						
Assignments/Presentations	x	x	x	x		
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited 2. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 3. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 4. Shils ME, Olson JA, Shike M, Ross AC, Cabellaro B and Cousins RJ (2006). Modern Nutrition in Health and Disease (10thed.). Lippincott, Williams and Wilkins publications
Additional References	1. Gordon M Ward law (1999) Perspectives in Nutrition 4th ed.WCB/Mcgraw Hill. International edition 2. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi 3. Passmore, R and Davidson S (1986) Human Nutrition and Dietetics.Living stone Publishers

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Therapeutic practice in critical care nutrition & life cycle - I**
Course Code	**CND3161**
Academic Year	Third Year
Semester	V Semester
Number of Credits	6
Course Prerequisite	Basic Knowledge of Nutrients and Food groups
Course Synopsis	This module provides 1. Basic practical knowledge on handling critically ill patients, based on guidelines for critical care nutrition. 2. Basic practical knowledge on the nutrition requirements and challenges throughout the human lifecycle and how alteration in nutritional requirements impact on human health.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Apply nutrition support therapy in critically ill patients (C3,P3)
CO2	Demonstrate the ability to determine nutrient requirements across the lifespan (C3,P4)
CO3	Demonstrate working knowledge of the influence of age, growth, and normal development on nutritional requirements (C3,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x	x						
CO3	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Nutrition in Critical care		
Nutrition in Critical care– Disease Specific	• Planning and preparation of the diet for critically ill patients (surgical, burns, palliative care , enteral and parenteral care) (P3)	94
Unit 2: Diet for Pregnant, lactating Woman, toddler and preschool		
Planning a day's diet for Pregnant, lactating Woman, toddler and preschool	• Planning and preparing a day's diet for pregnant, lactating, women, toddler and preschool (P3)	88
Unit 3: Complimentary Feeds		
Preparing Complimentary Feeds for Infants-weaning foods	• Demonstrate common complimentary feeds for infants (P4)	26

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	-	-
Seminar	-	-
Clinic	156	-
Practical	52	-
Revision	-	-
Assessment		-
Total	**208**	**-**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**			
Mid Semester Examination						
Quiz / Viva	x	x	x			
Clinical/Practical Log Book/ Record Book	x	x	x			
End Semester Exam						

Feedback Process:	**Mid-Semester Feedback**
	End-Semester Feedback
Main Reference:	1. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited 2. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 3. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 4. Shils ME, Olson JA, Shike M, Ross AC, Cabellaro B and Cousins RJ (2006). Modern Nutrition in Health and Disease (10thed.). Lippincott, Williams and Wilkins publications
Additional References	5. Gordon M Ward law (1999) Perspectives in Nutrition 4th ed.WCB/Mcgraw Hill. International edition 6. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi 7. Passmore, R and Davidson S (1986) Human Nutrition and Dietetics.Living stone Publishers

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Food Sanitation and Hygiene**
Course Code	**CND3103**
Academic Year	Third Year
Semester	V
Number of Credits	3
Course Prerequisite	Basic Knowledge of Food Group
Course Synopsis	This module provides the basic concepts of sanitation principles, ways to apply the principles in practical situations, and methods for training and motivating food service personnel to follow good sanitation practices

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Identify the characteristics of potentially hazardous foods and dangers of foodborne illness(C1)
CO2	Identify food handler health problems that are a possible threat to food safety(C1)
CO3	Explain various types of food contamination and factors that contribute to foodborne illness(C2)
CO4	Explain the ability to explore and apply proper food handling techniques that will eliminate possible foodborne illness(C2)
CO5	Explain the correct procedures for receiving, preparing, serving and storing food products(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x					x		
CO4	x	x						
CO5	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Personal Hygiene & Importance of Water		
Personal Hygiene & Importance of Water	• Explain general principles of food hygiene(C2) • Illustrate necessity for personal health and Hygiene (Hands and skin, hair, nose, mouth and ears, cuts, boils etc), medical checkup. Habits, Importance of Rest, Exercise and Recreation. Protective Clothing. GMP & GLP and Sanitary aspects of building and equipment. Equipment for personal hygiene(C2) • What are Sources of water, contamination of water. Importance of water and Purification of	20

Content	Competencies	Number of Hours
	Water, Different methods of purification, potable water. Water quality standards, Criteria for judging water quality. Sanitary aspects of water supply, water sewage treatment(C1) (C2)	
Unit 2: Food Contamination, Poisonings Food borne diseases		
Food Contamination, Poisonings Food borne diseases	• What are the different Types of contamination - Bacterial, Physical and Chemical(C1) • Describe Food Poisoning - common types and its symptoms (Salmonella, Clostridium perfringens, Botulism, Staphylococcus). Prevention of food poisoning(C1) • Explain cross contamination in food plants(C2) • Describe food Borne Diseases/ Illness - Amoebiasis, Acute diarrhoea/ dysentery, Typhoid(C1)	19

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**				
Lecture	39	117				
Assessment	-	-				
Total	**39**	**117**				
Assessment Methods:						
Formative:	**Summative:**					
Unit Test	Mid Semester Exam					
	End Semester Exam					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	
Mid Semester Examination	x	x	x	x	x	
End Semester Exam	x	x	x	x	x	
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Park K (2015) Park Textbook of preventive & social medicine 24th Ed., Banarsidas Bhanot Publ. 2. Roday S (2011) Food Hygiene and Sanitation with case studies, 2nd Ed., TATA McGraw Hill Education Pvt. Ltd. New Delhi.					
Additional References	1. Sprenger RA (2000) The Food Hygiene Handbook, High Field Publication					

SEMESTER - VI

COURSE CODE	:	COURSE TITLE
CND3201	:	Clinical nutrition through life cycle - II
CND3221	:	Food preservation
CND3261	:	Therapeutic practice in nutrition through life cycle - II
CND3203	:	Community nutrition
CND3262	:	Clinical practice in community nutrition
CND	:	Program elective - II
CND3243	:	Nutritional consideration during disasters
CND3244	:	Eating behavior

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical nutrition through life cycle - II**
Course Code	**CND3201**
Academic Year	Third Year
Semester	VI Semester
Number of Credits	3
Course Prerequisite	Basic knowledge of Nutrients and Food Groups
Course Synopsis	This module provides a basic knowledge to study the nutrition requirements and challenges change throughout the human lifecycle and how alteration in nutritional requirements impact on human health.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Describe how nutrition affects growth and development and the physiological basis of nutritional requirements throughout the life span (C1)
CO2	Identify eating patterns, nutritional problems and selected chronic diseases characteristic of age groups throughout the life span (C1)
CO3	Explain current issues in life span nutrition (C2)
CO4	Explain, compare and contrast the nutritional requirements of humans during different stages of the life cycle (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x					x		
CO3	x							
CO4	x					x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Nutrition in Adolescence		
a) Growth and Development-Physiologic changes b) Nutritional Requirements c) Situations with special needs.	• Define the adolescence (C1) • Explain the growth, development and physiological changes during adolescence (C2) • Illustrate the nutritional requirements during adolescence (C2) • Describe the food habits during adolescence (C1) • Explain the health and eating related behaviour during adolescence (C2) • Extend the nutritional problems (C2)	15
Unit 2: Nutrition in adults		
a) Nutrient needs modifications for different activity levels and	• Describe the physical development (C1) • Explain the nutritional requirements for adults	14

Content	Competencies	Number of Hours
different income groups.	(C2) • Explain the modification of nutrients for different level and different income groups (C2) • Describe the food security (C1) • Extend the low cost balanced diets (C2) • List the dietary guidelines to reduce the cost of a meal (C1)	
Unit 3: Nutrient requirements during old Age		
a) Process of Aging, b) Nutrient Requirements, Nutrition Related problems of old Age, Nutrition and Bone health in brief) c) Degenerative diseases, d) Health care of elderly and concepts of the use of supplements.	• Describe the process of ageing (C1) • Explain the nutritional requirements during old age (C2) • Extend the food requirements (C2) • Illustrate the nutrition related problems of old age (C2) • Describe the degenerative diseases (C1) • Find the common complaints during old age (C1) • List the general dietary guidelines for old age (C1) • Extend the health care of elderly and concepts of the use of supplements (C2)	10

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Assessment		-
Total	**39**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination	x	x	x	x		
End Semester Exam	x	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited 2. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 3. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 4. Shils ME, Olson JA, Shike M, Ross AC, Cabellaro B and Cousins RJ (2006). Modern Nutrition in Health and Disease (10thed.). Lippincott, Williams and Wilkins publications

Additional References	1. Gordon M Ward law (1999) Perspectives in Nutrition 4th ed.WCB/Mcgraw Hill. International edition 2. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi 3. Passmore, R and Davidson S (1986) Human Nutrition and Dietetics.Living stone Publishers

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Food preservation**
Course Code	**CND3221**
Academic Year	Third Year
Semester	VI Semester
Number of Credits	4
Course Prerequisite	Basic Knowledge of Food Groups
Course Synopsis	This module provides 1. The basic concept in increasing the shelf-life of foods thus increasing the supply. 2. Knowledge in making the seasonal food available throughout the year by adding variety to the diet. 3. Knowledge in saving time by reducing preparation time and energy. 4. To provide a practical knowledge on the principles of food processes that are used to preserve the quality of foods.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Define the terms Asepsis, Food Spoilage, Microbial Spoilage ,Spoilage by Enzymes ,Spoilage by Insects, Food Preservation, Dehydration ,Use of Acid, Use of Chemical Preservatives, Use of Low Temperatures ,Use of High temperatures (C1)
CO2	Describe the Importance of food Preservation (C1)
CO3	Explain the Principles of food Preservation(C2)
CO4	Explain the key basic methods of food preservation(C2)
CO5	Demonstrate recipes for preservation of simple food items (C3,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x							
CO3	x					x		
CO4	x	x						
CO5	x					x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Importance & Scope of Food Preservation		
Introduction -Principle & methods of food preservation	• Explain the prevention or delay of microbial decomposition (C2) • Explain by killing the microorganisms (C2) • Illustrate the prevention or delay of self-decomposition of the food(C2)	5

Content	Competencies	Number of Hours
	• Explain the prevention of damage by insects, animals, mechanical causes (C2)	
Unit 2: Commonly preserved foods by low & high temperature		
Preservation by drying & dehydration principle, Methods, Dehydrated Foods.	• Illustrate the Bacteriostatic Method of preservation(C2) • Explain the Dehydration Principle of preservation(C2) • Explain regarding the Dehydrated Foods (C2)	8
Unit 3: Preservation by Preservatives		
Principles, Types of Preservatives, Action on Foods	• Explain the role of PreservativesC2) • Compare the types of preservatives (C2) • Illustrate the action of preservative on Foods(C2)	7
Unit 4: Preservation by Osmotic Pressure		
Principles and method of preservation	• Explain preservation by high concentration of Sugar /salt(C2) • Explain preservation by low concentration of Sugar /salt(C2)	7
Unit 5: Preservation by Irradiation		
Principles and method of preservation	• Explain preservation by Electromagnetic Irradiation (C2) • Explain preservation by Ultra violet Rays (C2)	4
Unit 6: Introduction to Food Packaging		
Introduction to Food Packaging	• Illustrate the objectives and functions of food packaging(C2) • Explain the requirements for effective food packaging(C2) • Illustrate the types of packaging materials and general properties of packaging material(C2)	8
Practicals		
Unit 1: Preparation of the selected recipes		
Preparation of the selected recipes	Demonstrate the plan and preparation of jellies, jams, squashes, pickles and dehydrated vegetables (P3,P4)	10
Unit 2: Preparation of the selected recipes for preservation		
Preparation of the selected recipes for preservation	Demonstrate the plan and preparation of Tutti frutti, ketchups & sauces, Chutneys, Chutney powder, Frozen fruits and vegetables (P3,P4)	12
Unit 3: Visit to food industry		
Visit to food industry	Survey of the food industry (P4)	4

Learning Strategies, Contact Hours and Student Learning Time (SLT):					
Learning Strategies	**Contact Hours**		**Student Learning Time (SLT)**		
Lecture	39		117		
Seminar	-		-		
Small group discussion (SGD)	-		-		
Self-directed learning (SDL)	-		-		
Case Based Learning (CBL)	-		-		
Clinic	-		-		
Practical	26		-		
Revision	-		-		
Assessment	-		-		
Total	**65**		**117**		
Assessment Methods:					
Formative:	**Summative:**				
Unit Test	Mid Semester Exam				
Viva	End Semester Exam(Theory)				
Clinical/Practical Logbook/ Record Book					
Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**C05**
Mid Semester Examination	x	x	x	x	
Quiz / Viva	x	x	x		x
Clinical/Practical Logbook/ Record Book	x	x	x		x
End Semester Exam	x	x	x	x	
Feedback Process:	Mid-Semester Feedback				
	End-Semester Feedback				
Main Reference:	Text book / Reference Books: 1. Paine FA (Ed.) (2012) the packaging user's handbook, Blackie Academic & Professional Publ. 2. Johnson R, Anderson MT (2012) Food Preservation.				
Additional References	1. Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., New Delhi 2. Khurana A (2010). Text book of food safety. Mohit publication.				

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Therapeutic practice in nutrition through life cycle - II**
Course Code	**CND3261**
Academic Year	Third Year
Semester	VI Semester
Number of Credits	3
Course Prerequisite	Basic Knowledge of Nutrients and Food Groups
Course Synopsis	This module aims 1. To provide basic practical knowledge on the nutrition requirements and challenges throughout the human lifecycle and how alteration in nutritional requirements impact on human health.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Demonstrate the ability to determine nutrient requirements across the lifespan (C3,P4)
CO2	Demonstrate working knowledge of the influence of age, growth, and normal development on nutritional requirements (C3,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Diet for a school going child		
Diet for a school going child	• Demonstrate the plan and preparation of a day's diet for a school going child with special emphasis on Packed Lunches (P3,P4)	24
Unit 2: Diet for an adolescent		
Diet for an adolescent	• Demonstrate the plan and preparation of a day's diet for an adolescent girl (P3,P4) • Demonstrate the plan and preparation of a day's diet for an adolescent boy (P3,P4)	24
Unit 3: Diet for an adult and senior citizen		
Diet for an adult and senior citizen	• Demonstrate planning and preparation of a day's diet for an adult man (sedentary/moderate/ heavy worker) (P3,P4) • Demonstrate the plan and preparation of a day's diet for an adult woman (sedentary/moderate/ heavy worker) (P3,P4) • Demonstrate the plan and preparation of a day's diet for a senior citizen (P3,P4)	56

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	-	-
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	78	-
Practical	26	-
Revision	-	-
Assessment		-
Total	**104**	**-**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**				
Mid Semester Examination	x	x				
Quiz / Viva	x	x				
Clinical/Practical Log Book/ Record Book	x	x				
End Semester Exam	x	x				

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited 2. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 3. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12thed.). Published byWB Saunders Company 4. Shils ME, Olson JA, Shike M, Ross AC, Cabellaro B and Cousins RJ (2006). Modern Nutrition in Health and Disease (10thed.). Lippincott, Williams and Wilkins publications 5. Paine FA (Ed.) (2012) The packaging user's handbook, Blackie Academic & Professional Publ. 6. Johnson R, Anderson MT (2012) Food Preservation
Additional References	1. Gordon M Ward law (1999) Perspectives in Nutrition 4th ed.WCB/Mcgraw Hill. International edition 2. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi 3. Passmore, R and Davidson S (1986) Human Nutrition and Dietetics.Living stone Publishers

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Community nutrition**
Course Code	**CND3203**
Academic Year	Third Year
Semester	VI Semester
Number of Credits	3
Course Prerequisite	Basic Knowledge of Nutrients, Food Groups and Medical Nutrition therapy
Course Synopsis	This module will provide basic knowledge and skills relevant to the practice of community nutrition and will cover the concept of community, the role of nutrition in health promotion and perspectives for resolving community nutrition problems

Course Outcomes (COs):At the end of the course student shall be able to:	
CO1	Describe and understand nutrition problems and practices in the community(C1)
CO2	Describe skills needed to deliver nutrition services and methods of accessing community nutrition resources and information(C1)
CO3	Describe the food assistance programs and role of the public health nutritionist working with these programs(C1)
CO4	Illustrate the various nutrition monitoring and surveillance methodologies and how they are used(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2		x			x			
CO3	x	x						
CO4		x				x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Nutrition and health in National development		
Introduction to nutrition and health in national development	• Explain concept and Scope of Community Nutrition(C2) • Describe the food availability and factors affecting food availability and intake(C1) • Explain food security and adequacy of diets(C2)	5
Unit 2: Concept of community nutrition and malnutrition		
Nutritional problems of communities and implications for public health. Common Nutritional Problems in	• Describe Infant mortality rate, Child Mortality. Maternal mortality rate, Birth rate, Death rate. Identification of vulnerable groups - Pregnant women, Nursing mother, Infants, Children with Special emphasis to	10

Content	Competencies	Number of Hours
India. Incidence – National, Regional. Nutritional and Non-Nutritional signs, symptoms, effect of deficiency and treatment	girl child (including adolescents) (C1) • Explain Nutritional and Non-Nutritional signs, symptoms, effect of deficiency and treatment(C2) • List the Health agencies (FAO, WHO, ICMR, ICDS, ICAR, CSIR, ANP, VHAI, NIN and CFTRI)and Role of voluntary health organisation in the improvement of Community health(C1)	
Unit 3: Methods of assessing nutritional status		
Assessment of Nutritional status	• Describe the methods of assessing nutritional status (C1) 1. Sampling techniques, Identifications of risk groups 2. Direct assessment - Diet surveys, anthropometric, clinical and biochemical estimation 3. Indirect assessment- Food balance sheet, ecological parameters and vital statistics.	8
Unit 4: Improvement of nutrition of a community		
Nutrition Policy of India and Plan of Action.	• List different modern methods of improving nutritional quality of food, food fortification, enrichment and nutrient supplementations (C1)	8
Unit 5: Community nutrition programme planning		
Health and Nutrition Education – Steps in planning, implementation, and evaluations. Use of educational aids – visual, audio, audio-visual, traditional media etc.	• Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the programme(C1)	8

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Assessment	-	-
Clinics	-	-
Revision	-	-
Total	**39**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination	x	x	x	x		
End Semester Exam	x	x	x	x		
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Goel SL (2001) Health Care System and Management. Vol 1-4, New Delhi: Deep and Deep Publication 2. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nded.). Published by Bangalore Printing and Publishing Ltd, Bangalore					
Additional References	1. Wadhwa A, Sharma S (2003) Nutrition in the Community, New Delhi: Elite Publ. House Pvt. Ltd					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Clinical practice in community nutrition**
Course Code	**CND3262**
Academic Year	Third Year
Semester	VI Semester
Number of Credits	4
Course Prerequisite	Basic Knowledge of Nutrients, Food Groups and Medical Nutrition Therapy
Course Synopsis	This module provides the knowledge on practice of community nutrition, discussion of significant community health nutrition problems today, and an overview of food and nutrition programs available to the community

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Apply knowledge and skills in planning nutrition education and intervention programs by understanding beliefs, customs and food practices of various cultural groups of community (C3,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x			x			

Content	**Competencies**	**Number of Hours**
Unit 1: Diet and nutrition surveys		
Diet and nutrition surveys: (Identified field area in the specific no. of families)	• Identification of vulnerable and risk groups(P1) • Applying different anthropometric measurement in children(P3) • Make a diet survey for breast-feeding and weaning practices of specific groups (P3)	54
Unit 2: Preparation of visual aids		
Preparation of visual aids	Demonstrate using visual aids for educating importance of nutrition in community(P3)	16
Unit 3: Field visit		
Field visit to	• Survey the working of nutrition and health oriented programmes(P4) • Identify hospitals based nutritional deficiencies(P1)	60

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	-	-
Seminar	-	-

Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	78	-
Practical	52	-
Revision	-	-
Assessment	-	-
Total	**130**	**-**

Assessment Methods:

Formative:	**Summative:**
Unit Test	Mid Semester Exam
Viva	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:

Nature of Assessment	**CO1**					
Mid Semester Examination						
Quiz / Viva	x					
Assignments/Presentations						
Clinical/Practical Log Book/ Record Book	x					
Any others: WPBA						
End Semester Exam						

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Goel SL (2001) Health Care System and Management. Vol 1-4, New Delhi: Deep and Deep Publication 2. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nded.). Published by Bangalore Printing and Publishing Ltd, Bangalore
Additional References	1. Wadhwa A, Sharma S (2003) Nutrition in the Community, New Delhi: Elite Publ. House Pvt. Ltd

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Nutritional consideration during disasters**
Course Code	**CND3243**
Academic Year	Third year
Semester	VI
Number of Credits	3
Course Prerequisite	Basic Knowledge of Nutrients and Food Groups
Course Synopsis	This module provides 1. The basic concept of assessment of nutritional needs of individuals, vulnerable groups, families, and population. 2. Knowledge in monitoring of nutrient intake in these groups. 3. Knowledge to ensure that adequate quantities of food are being procured/made available for rations, supplements, etc.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Define and recognize the classified emergencies phases and planning (C1)
CO2	Describe the food ration planning in breast feeding and complementary feeding during emergencies (C1)
CO3	Explain the international law and human rights in nutritional emergences(C2)
CO4	Explain the poor understanding of good nutrition principles and practices during emergencies(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x					x		
CO3	x					x		
CO4	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Food Handling in Emergencies		
Different disasters, their trends and consequences on displaced people	• Explain the Disasters affecting the status of food and nutrition(C2) • Explain the Steps to follow in order to ensure an effective food aid program(C2) • Illustrate the priorities of a food aid program during disasters.(C2) • Explain the proper management of food supplies(C2)	14
Unit 2 :Feeding the Victims of Disaster		
Ensuring an appropriate	• Infer food aid rations to be calculated and	15

Content	Competencies	Number of Hours
diet given at all circumstances.	factors to consider when preparing rations (C2) • Explain the medium-term needs for food, based on food rations (C2) • Explain the special nutrition needs of the most vulnerable persons – Infants and young children, pregnant and lactating women, older persons (C2)	
Unit 3 Nutrition and Military performance-		
Introduction to military Rations	• Explain nutritional Advice for Field Feeding(C2) • Illustrate the general dietary guidelines for military Operations in a Hot Environment and for military operations in a cold environment (C2) • Explain the dietary guidelines for Military Operations in a High-Altitude Environment (C2)	10

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies		**Contact Hours**		**Student Learning Time (SLT)**		
Lecture		39		117		
Total		**39**		**117**		
Assessment Methods:						
Formative:		**Summative:**				
Unit Test		Mid Semester Exam				
		End Semester Exam				
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester Examination	x	x	x	x		
End Semester Exam	x	x	x	x		
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	Text book / Reference Books: 1. World Health Organization, UNHCR, World Food Programme & United Nations Children's Fund (UNICEF). (2004). Food and nutrition needs in emergencies .World Health Organization. 2. The Management of Nutrition in Major Emergencies(WHO; 2000; 250 pages)					
Additional References	1. Military Quantitative Physiology: Problems and Concepts in Military Operational Medicine-DANIELLE S. DAY, PhD*; ANDREW YOUNG, PhD†; and ELDON W. ASKEW, PhD					

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Eating behaviour**
Course Code	**CND3244**
Academic Year	Third Year
Semester	VI Semester
Number of Credits	3
Course Prerequisite	Basic Knowledge of Nutrients and Food Group
Course Synopsis	This module will provide basic knowledge to encounter food dilemmas, giving them the analytical tools to identify the roots of potential problems and understand different views on food and eating

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Explain and Illustrate relevance and applications of models and influencing factors of food choices and eating behavior(C1, C2)
CO2	Explain and Illustrate relevance and applications of models and influencing factors of food choices and eating behavior(C1, C2)
CO3	Applications of food psychology for health, disease prevention and product development (C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2	x	x						
CO3	x					x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: The psychology of food choices and eating behavior		
Influences on food choice	• Explain the Biological Influences on food choices(Genetic influences on energy and nutrient intake and Neurobiology of food intake (C2)	15
Unit 2: Social and psychological models of food choice		
Social and psychological models of food choice	• Explain the role of (family and peers ,food and Culture ,mood ,emotions and food choice ,food cravings and addiction , food rewards) on food choice(C2) • Explain the influences of Media on food choice 1. Food choices across the life span. 2. Food product development and marketing ideas based on factors affecting choice of foods.	12
Unit 3: Role of stress and disease condition in food and nutrition choice		
Role of stress in choosing foods and Behaviour	• Explain the role of stress in choosing foods • Describe behaviour modification strategies to influence food and nutrition choices in disease	12

Content	Competencies	Number of Hours
modification strategies to influence food and nutrition choices in disease conditions	conditions and mindful eating-Obesity, Diabetes, Allergies, Cancer(C1)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	117
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**39**	**117**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester Exam
	End Semester Exam

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**			
Mid Semester Examination	x	x	x			
Quiz / Viva						
Assignments/Presentations						
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x	x			

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Ogden J. (2011).The Psychology of Eating: From Healthy to Disordered Behaviour. John Wiley & Sons Stuckey
Additional References	1. Shepherd R. and Raats M. (2010).The Psychology of Food Choice, The Centre for Agriculture and Bioscience International (CABI), Wallingford, England

SEMESTER - VII & SEMESTER - VIII

INTERNSHIP PROGRAM

Manipal College of Health Professions	
Name of the Department	Clinical Nutrition and Dietetics
Name of the Program	Bachelor of Science in Clinical Nutrition and Dietetics
Course Title	**Internship**
Academic Year	Fourth Year
Semester	VII & VIII Semester
Number of Credits	Duration (1 year / 48 hours per week / 7 hours per day)
Course Prerequisite	Students should have knowledge and possess skills on planning and demonstrating the therapeutic diet for the required.
Course Synopsis	This module provide students with an opportunity to integrate and apply acquired knowledge and technical skills in actual clinical settings.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Select a right Practice from the acquired skills as a clinical nutritionist and dietician(P1)
CO2	Demonstrate an attitude of professionalism when working with colleagues and other health professional staff of the hospital (P2)
CO3	Utilize skills in record Keeping, Organizing Material, Presentation of Case Study and Effective Communication(P3)
CO4	Analyse and develop the ability to work independently and as a team member to perform critical thinking and problem solving skills in different domains (P4)(P5)
CO5	Design, evaluate and implement new methods or protocols in different cases (P5, P6)
CO6	Evaluate relationship between nutrition data and pathologic processes, and how nutrition data relate to health and disease(P6)
CO7	Develop the ability to work independently and as a team member to perform critical thinking and problem solving skills in different domains (P4, P5)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2			x	x				
CO3		x				x		
CO4			x		x			x
CO5				x				x
CO6				x				
CO7							x	x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Department Orientation		
Department Orientation	• Define the role of a dietician in hospitals (P1) • Outline the working of the dietary department in a hospital and learn about its working schedules and plans (P2) • List and summarize the knowledge about the	30

Content	Competencies	Number of Hours
	maintenance of the patient's case file and how the details are entered/registered in it (P1, P2)	
Unit 2: Food Service Area		
Food Service Area	• Interpret about the therapeutic and normal diet settings in the kitchen (P2) • Interpret acquiring skills in food procurement ,quality maintenance and patient food service (P2)	30
Unit 3: Medicine		
Medicine	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	132
Unit 4: Nephrology &Urology		
Nephrology &Urology	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	129
Unit 5: Cardiology		
Cardiology	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	132
Unit 6: Gastroenterology		
Gastroenterology	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided,	132

Content	Competencies	Number of Hours
	its administration and formulation (P1, P2)	
Unit 7: Oncology		
Oncology	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	129
Unit 8: Neurology		
Neurology	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	129
Unit 9: Obstetrics and Gynaecology		
Obstetrics and Gynaecology	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	132
Unit 10: Paediatrics		
Paediatrics	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	66
Unit 11: Surgery		
Surgery	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3)	132

Content	Competencies	Number of Hours
	• Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	
Unit 12: Intensive care unit		
Intensive care unit	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	129
Unit 13: Multi-specialty clinics		
Multi-specialty clinics	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	129
Unit 14: Optional		
Any department in which intern needs further training. b. Other departments not listed above such as psychiatry, Rehabilitation and Dialysis	• Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P2, P3) • Explain and develop the dietary counselling given to the patients (P2, P3) • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation (P1, P2)	129
Learning Strategies: Small group discussion (SGD), Problem Based Learning (PBL), Case Based Learning (CBL), Clinics, Seminars.		
Formative Assessment: Quiz, Viva, Clinical assessment (OSCE, OSPE, WBPA), Clinical Log Book Interns will be evaluated periodically i.e. in every quarter of 12 months and aggregate marks of all four assessments will be used to issue internship completion certificate. Internship completion certificate will be issued from Dean's office, only after • Successfully clearing all four assessment exams and • Obtaining satisfactory completion certificate from the head/ In-charge of the department at the end of internship.		

7. Program Outcomes (POs) and Course Outcomes (COs) Mapping

Sem.	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
I	ANA1103	Anatomy	3	CO1 CO2	CO1 CO2						
I	PHY1103	Physiology	2	CO1 CO2 CO3 CO4							
I	CSK1001	Communication Skills	2		CO3	CO4		CO1 CO2		CO1 CO2 CO3 CO4	
I	EIC1001	Environmental Science	1	CO1 CO2 CO3		CO4 CO5	CO2		CO1 CO3 CO5	CO4	
		Indian Constitution	1	CO1		CO3	CO2 CO5	CO2	CO4	CO1 CO3 CO5	CO4
I	CND1101	Clinical correlation of food and nutrition - I	4	CO1 CO2							
I	CND1161	Therapeutic practice in food and nutrition - I	5	CO1, CO2	CO2				CO1		
I	CND1121	Basic Computer Application	2	CO1 CO2	CO1 CO2	CO3 CO5	CO4				
II	BIC1201	Biochemistry	3	CO1 CO2 CO3 CO4							
II	CND1201	Clinical correlation of food and nutrition - II	4	CO1							
II	CND1261	Therapeutic practice in food and nutrition - II	5		CO1				CO1		
II	CND1202	Introduction to food science - I	4	CO1 CO2 CO3	CO2 CO3				CO1		
II	CND1262	Analysis in food science - I	4	CO1 CO2 CO3	CO1 CO4				CO2 CO3 CO4		
III	MCB2103	Microbiology	3	CO1 CO2 CO3 CO4							
III	CND2101	Medical nutrition therapy - I	4	CO1 CO3	CO2		CO1		CO2		
III	CND2161	Clinical practice in medical nutrition therapy - I	4		CO1				CO1		

Sem.	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
III	CND2102	Introduction to food science - II	2	CO1 CO2 CO3	CO2 CO3				CO1		
III	CND2162	Analysis in food science - II	4	CO1 CO2 CO3	CO1 CO4				CO2 CO3 CO4		
III	*** ****	Open elective -I	3	*Open elective is credited, choice-based and is graded as satisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department*							
IV	BST3201	Biostatistics & research methodology	3	CO1 CO2 CO3 CO5 CO6	CO4						
IV	CND2201	Medical nutrition therapy - II	4	CO1 CO2					CO1 CO2		
IV	CND2261	Clinical Practice in Medical Nutrition Therapy - II	6	CO1	CO1						
IV	CND2202	Quality control	4	CO1 CO2 CO3 CO4 CO5					CO1 CO2 CO3 CO5		
IV	CND3241	Nutrition for special children	3	CO1 CO3 CO4	CO3 CO4		CO2		CO2		
IV	CND3242	Dietetics and counselling	3	CO1	CO2		CO1				CO2
V	CND3101	Nutrition in Critical Care	4	CO1 CO3 CO4 CO5	CO2 CO4				CO1 CO2 CO3 CO5		
V	CND3102	Clinical nutrition through Life Cycle - I	4	CO1 CO2 CO3 CO4	CO1				CO2 CO4		
V	CND3161	Therapeutic practice in critical care nutrition & life cycle - I	6	CO1 CO2 CO3	CO1 CO2 CO3						
V	CND3103	Food sanitation and hygiene	3	CO1 CO2 CO3 CO4 CO5	CO4				CO3		
V	*** ****	Open elective - II	3	*Open elective is credited, choice-based and is graded as satisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department*							

Sem.	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
VI	CND3201	Clinical nutrition through Life Cycle - II	3	CO1 CO2 CO3 CO4	CO1				CO2 CO4		
VI	CND3221	Food preservation	4	CO1 CO2 CO3 CO4 CO5	CO1 CO4				CO3 CO5		
VI	CND3261	Therapeutic practice in nutrition through life cycle - II	3	CO1 CO2	CO1 CO2						
VI	CND3203	Community nutrition	3	CO1 CO3	CO2 CO3 CO4			CO2	CO4		
VI	CND3262	Clinical practice in community nutrition	4		CO1			CO1			
VI	CND3243	Nutritional consideration during disasters	3	CO1 CO2 CO3 CO4	CO1 CO4				CO2 CO3		
VI	CND3244	Eating behaviour	3	CO1 CO2 CO3	CO1 CO2				CO3		
VII & VIII	-	Internship (1 year)	-	CO1	CO1 CO3	CO2 CO4	CO2 CO5 CO6	CO4	CO3	CO7	CO4 CO5 CO7

8. PROGRAM REGULATIONS

1. Program Structure

1.1. The program is a choice based credit system.

1.2. An academic year consists of two semesters – Odd semester (July - December) and Even semester (January – June)

1.3. Each semester shall extend over a minimum period of 13 weeks (a maximum up to 15 weeks) of academic delivery excluding examination days, semester breaks, declared holidays and non-academic events.

1.4. Medium of instruction shall be in English

2. Credit Distribution

2.1 Each semester would consist of 20 credits.

2.2 The credit distribution hours for Lecture, Tutorial, Practical, and Clinics are as follows:

Lecture (L) : 1 Hour /week = 1 credit = 13 hours
Tutorial (T) : 1 Hour /week = 1 credit
Practical (P) : 2 Hours/week = 1 credit
Clinics (CL) : 3 Hours/week = 1 credit
Note: For Basic sciences & Biostatistics course, 1 credit =15 hours (maximum)

2.3 A semester has courses structured as theory, practical, and clinics. Each course is of minimum 2 credits.

2.4 The maximum credits for theory course is 4; theory and practical combined is 5.

2.5 Internship is not credited.

2.6 Abbreviations / Symbols used in the credit distribution table:

L - Lectures, T - Tutorials, P -Practical, CL - Clinics, C - Total credits, IAC - Internal assessment component, ESE - End-Semester Exam, * Open Elective, # Program Elective

3. Weightage for Internal Assessment Component (IAC) and End Semester Exam (ESE)

3.1. Any one or a combination of marks distribution criteria applicable to a course.

IAC Weightage (%)	ESE Weightage (%)
30	70
50	50
100	Nil
Nil	100

3.2 The IAC component weightage for theory & practical is:
- 50% from Mid-semester examination
- 50% through Continuous assessment (as applicable to course)

3.3 For courses without continuous evaluation components, two sessional exams are conducted and the average of both sessional exams shall be considered as the final IAC.

4. Attendance

4.1 Minimum attendance requirements for each course is:

i. Theory : 75 %
ii. Clinics / Practical : 85 %

4.2 As per the directives of MAHE, there will be no consideration for leave on medical grounds. The student will have to adjust the same in the minimum prescribed attendance. No leverage will be given by the department for any attendance shortage.

4.3 Students requiring **leave** during the academic session should apply for the same through a formal application to the Head of Department through their respective Class In-charge/ Coordinator. The leave will be considered as absent and reflected in their attendance requirements.

4.4 No leverage will be given by the department for any attendance shortage.

4.5 Students, Parents/ guardians can access the attendance status online periodically. Separate intimation regarding attendance status would not be sent to parents/students.

4.6 Students having attendance shortage in any course (theory & practical) will not be permitted to appear for the End-semester exam of the respective course.

5. Examination

5.1 Exams are in two forms – Sessional examination (conducted as a part of internal assessment) and End semester examination.

5.2 The final evaluation for each course shall be based on Internal Assessment Components (**IAC**) and the End-semester examinations **(ESE)** based on the weightage (as indicated in clause 3.1) given for respective courses.

5.3 IAC shall be done on the basis of a continuous evaluation after assessing the performance of the student in mid semester exam, class participation, assignments, seminars or any other component as applicable to a course (as indicated in clause 3.2).

5.4 All the ESE for the odd semesters **(regular ESE)** will be conducted in November-December. All the ESE for the even semesters **(regular ESE)** will be conducted in May-June.

5.5 For those whose failed to clear any course during regular ESE, a **supplementary exam** is conducted 2 weeks immediately after the ESE result declaration to enable him / her to earn those lost credits. When a student appears for supplementary examination, the **maximum grade awarded is "C"** grade or below irrespective of their performance.

5.6 For core courses, the duration of ESE for a 2 credit course would be 2 hours (50 marks) and for a course with 3 or more credits, 3 hours (100 marks).

5.7 For pre / para clinical course and program elective, irrespective of credit (2 or 3), the ESE is conducted out of 50.

5.8 For non-core courses such as Communication skills, Open electives, Indian constitution, Environmental sciences or courses as specified in curriculum, only internal assessment is conducted.

6. Minimum Requirements for Pass

6.1. Pass in a course will be reflected as grades. No candidate shall be declared to have passed in any course unless he/she obtains not less than **"E" grade**

6.2. For core courses (theory / practical), candidate should obtain a minimum of 50% (IAC + ESE or as applicable to course) to be declared as pass.

6.3. For non-core including pre and para clinical course, a candidate should secure a minimum of 40% in ESE to be declared as pass.

6.4. For students who fail to secure a minimum of 'E' grade for a course, an **improvement examination** is conducted to improve their IAC marks. The student can appear for these examination along with the subsequent batches' mid semester / sessional exams. The marks obtained in other components of IAC can be carried forward without reassessment.

7. **Calculation of GPA and CGPA**

7.1. Evaluation and Grading (**Relative Grading**) of students shall be based on GPA (Grade Point Average) & CGPA (Cumulative Grade Point Average).

7.2. The overall performance of a student in each semester is indicated by the Grade Point Average (GPA). The overall performance of the student for the entire program is indicated by the Cumulative Grade Point Average (CGPA).

7.3. A ten (10) point grading system **(credit value)** is used for awarding a letter grade in each course.

Letter Grade	A+	A	B	C	D	E	F/I/DT
Grade points	10	9	8	7	6	5	0

DT – Detained/Attendance shortage, I – Incomplete

7.4 Calculation of GPA & CGPA: An example is provided

Course code	**Course**	**Credits (a)**	**Grade obtained by the student**	**Credit value (b)**	**Grade Points (a x b)**
AHS 101	Course - 1	4	B	8	32
AHS 103	Course - 2	4	B	8	32
AHS 105	Course - 3	3	A+	10	30
AHS 107	Course - 4	4	C	7	28
AHS 109	Course - 5	5	A	9	45
	TOTAL	**20**	**-**	**-**	**167**

1st Semester GPA = Total grade points / total credits
167/20 = **8.35**

Suppose in **2nd semester GPA** = **7** with respective course credit 25

Then, $\mathbf{1st\ Year\ CGPA} = \frac{(8.35 \text{ x } 20) \ + \ (7 \text{ x } 25)}{20 \ + \ 25} = 7.6$

8. Progression Criteria to higher semesters

8.1 The eligibility for promotion to the next academic year is subject to securing the minimum academic performance as specified below:

- First to second year: a minimum of 70% of the credits at the end of the first year (includes first and second semester)
- Second to third year: a cumulative minimum of 80% of the credits at the end of the second year (includes first, second, third and fourth semester)
- Third year to Internship/externship: Student will be eligible for internship/externship only after successful completion of the entire course work, i.e. 100% credits to be accrued by the end of the third year.

8.2 First year students who have failed to secure a minimum credit (as specified in 8.1), will be on **probation for next one year.** During that period, he / she will not be permitted to attend the second year / III semester classes and have to appear only for exam (during December / May) in order to acquire the missing credits. In the event of failure to acquire the required credits even by the end of second year (70%), he / she has to **exit the program**. Exit from the program is applicable only for first year students failing to acquire the required credits.

8.3 From second year onwards, in the event of failing to acquire required credits (80% or 90%), the students will be on probation. During that period, he / she will not be permitted to attend the classes and have to appear only for exam (during December / May) in order to acquire the missing credits. From second year onwards, failure to acquire the required credits by the end of subsequent year will not result in exit from program.

8.4 However, the student must complete all the course work requirements and credits by a **maximum of double the program duration**. For e.g. 4 years' program, all the academic course work needs to be completed within 8 years. Failure to do so will result in exit from the program.

9. Semester Break

9.1 Students will have a semester break following their odd and even end-semester examinations.

10. Internship

10.1 Internship will not carry any credits and marks

10.2 Any components/ activities that need to be evaluated as part of internship will be assigned a grade without reflecting it in the CGPA.

10.3 The intern should abide by the rules and regulations of the organization during the period of internship.

10.4 An internship certificate with details of clinical/relevant areas of postings with hours will be issued to a candidate on completion of the Internship. The certificate must be authenticated by the HOD/Coordinator and HOI.

10.5 **Degree is awarded** only on successful completion of internship.

Head of the Department **Dean**

Deputy Registrar - Academics **Registrar**