



MANIPAL

ACADEMY of HIGHER EDUCATION

(Institution of Eminence Deemed to be University)

Manipal College of Health Professions

Manipal Academy of Higher Education, Manipal

Outcome-Based Education (OBE) Framework

**Four Years Full Time
Undergraduate Program
(Choice-Based Credit System)**

**Bachelor of Science in
Clinical Nutrition and Dietetics
(B.Sc. CND)**

With effect from July 2024




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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 disorders 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 interdisciplinary 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/Teamwork	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 COURSEOUTCOMES (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
ANA1303	Anatomy	3	-	-	-	3	30	70	100
PHY1303	Physiology	2	-	-	-	2	30	70	100
CSK1501	Communication Skills	2	-	-	-	2	100	-	100
EIC1501	Environmental Science & Indian Constitution	2	-	-	-	2	100	-	100
CND1301	Fundamentals of Food and Nutrition -I	3	1	-	-	4	50	50	100
CND1302	Fundamentals of Food and Nutrition Practical - I	-	-	6	12	7	100	-	100
Total		12	1	6	12	20	410	190	600

NOTE: ESE for ANA1303 & PHY1303 will be conducted for 50 marks and normalized to 70 marks for grading.
 ESE for CND1301 will be conducted out of 100 and normalized to 50 marks.
 A student needs to complete computer course offered by the Swayam/ Coursera course by the end of first semester.

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
BIC1401	Biochemistry	3	-	-	-	3	30	70	100
CND1401	Fundamentals of Food and Nutrition - II	3	1	-	-	4	50	50	100
CND1402	Food Science - I	3	1	-	-	4	50	50	100
CND1403	Fundamentals of Food and Nutrition Practical - II	-	-	4	9	5	100	-	100
CND1404	Analysis in Food Science - I	-	-	4	6	4	100	-	100
Total		9	2	8	15	20	330	170	500

NOTE: ESE for BIC1401 will be conducted for 50 marks and normalized to 70 marks for grading. ESE for CND1401, CND1402 will be conducted out of 100 and normalized to 50 marks.
 A student needs to complete a life skill training course offered by the university by the end of first year.

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
MCB2303	Microbiology	3	-	-	-	3	30	70	100
CND2301	Medical Nutrition Therapy - I	3	1	-	-	4	50	50	100
CND2302	Food Science - II	2	-	-	-	2	50	50	100
CND2303	Clinical Practice in Medical Nutrition Therapy- I	-	-	4	6	4	100	-	100
CND2304	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 MCB2303 will be conducted for 50 marks and normalized to 70 marks for grading.
 ESE for CND2301 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
BST3401	Biostatistics & Research Methodology	3	-	-	-	3	30	70	100
GPY2401	General Psychology	2	-	-	-	2	30	70	100
CND2401	Medical Nutrition Therapy - II	3	1	-	-	4	50	50	100
CND2402	Food Quality Control	3	1	-	-	4	50	50	100
CND2403	Clinical Practice in Medical Nutrition Therapy - II	-	-	4	6	4	50	50	100
CND2404	Program Elective - I Nutrition for Special Children	3	-	-	-	3	50	50	100
CND2405	Program Elective - I Nutrition & Entrepreneurship								
Total		14	2	4	6	20	260	340	600

NOTE: ESE for BST3401 will be conducted for 100 marks and normalized to 70 marks for grading.
 ESE for CND2401 and CND2402 will be conducted out of 100 and normalized to 50 marks.
 ESE for GPY2401 will be conducted for 50 marks and normalized to 70 marks for grading.

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
CND3301	Nutrition in Critical Care	3	1	-	-	4	50	50	100
CND3302	Clinical Nutrition through Life Cycle - I	3	1	-	-	4	50	50	100
CND3303	Dietetics and Counselling	3	-	-	-	3	50	50	100
CND3304	Therapeutic Practice in Critical Care Nutrition & Life Cycle - I	-	-	4	12	6	100	-	100
*** ****	Open Elective - II	-	-	-	-	3	-	-	S/NS
Total		9	2	4	12	20	250	150	400

NOTE: ESE for subjects CND3301, CND3302, CND3303 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
CND3401	Clinical Nutrition through Life Cycle - II	3	-	-	-	3	50	50	100
CND3402	Food Preservation	2	-	2	-	3	50	50	100
CND3403	Community Nutrition	3	-	-	-	3	50	50	100
CND3404	Therapeutic Practice in Nutrition through Life Cycle - II	-	-	2	9	4	50	50	100
CND3405	Clinical Practice in Community Nutrition	-	-	4	6	4	100	-	100
CND3406	Program Elective - II Nutritional Consideration during Disasters	3	-	-	-	3	50	50	100
CND3407	Program Elective - II Eating Behavior								
Total		11	-	8	15	20	350	250	600

NOTE: ESE for subjects CND3401, CND3402 and CND3403 will be conducted out of 100 and normalized to 50 marks.

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

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	12	1	6	12	20	410	190	600
SEMESTER - II	9	2	8	15	20	330	170	500
SEMESTER - III	8	1	8	12	20	330	170	500
SEMESTER - IV	14	2	4	6	20	260	340	600
SEMESTER - V	9	2	4	12	20	250	150	400
SEMESTER - VI	11	-	8	15	20	350	250	600
SEMESTER - VII	-	-	-	48	NA	-	-	-
SEMESTER - VIII				48	NA	-	-	-
Grand Total	63	8	38	168	120	1930	1270	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
ANA1303	: Anatomy
PHY1303	: Physiology
CSK1501	: Communication skills
EIC1501	: Environmental Science & Indian Constitution
CND1301	: Fundamentals of Food and Nutrition - I
CND1302	: Fundamentals of Food and Nutrition Practical - 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		Anatomy						
Course Code		ANA1303						
Academic Year		First						
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, respiratory, system of the human body (C1, C2)							
CO2	Explain the cardiovascular, digestive system of the human body (C1, C2)							
CO3	Explain the excretory, reproductive system of the human body (C1, C2)							
CO4	Explain the endocrine, central nervous system, special senses of the human body (C1, 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 (Theory)
Unit 1:		
General Anatomy	<ul style="list-style-type: none"> • 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) 	7

Content	Competencies	Number of Hours (Theory)
	<ul style="list-style-type: none"> • 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) 	
Unit 2:		
Respiratory system	<ul style="list-style-type: none"> • List the parts of respiratory tract (C1) • Explain the boundaries of the Nasal cavity (C2) • 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) 	5
Unit 3:		
Cardiovascular system	<ul style="list-style-type: none"> • Explain the heart - position, external features, right atrium internal features (C1, C2) 	4

Content	Competencies	Number of Hours (Theory)
	<ul style="list-style-type: none"> • 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 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	<ul style="list-style-type: none"> • 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) 	6

Content	Competencies	Number of Hours (Theory)
	<ul style="list-style-type: none"> • 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) 	
Unit 5:		
Urinary system	<ul style="list-style-type: none"> • 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) • Explain the urethra- female urethra, male urethra- parts (C2) 	2
Unit 6:		
Male reproductive system	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	2

Content	Competencies	Number of Hours (Theory)
	nerve supply (C2) • Explain the ovary – position and structure (C2)	
Unit 8:		
Endocrine glands	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 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 	12



Content	Competencies	Number of Hours (Theory)
	system (C2) <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 Out of class engagement				
Learning Strategies	Contact Hours	Out of class engagement		
Lecture	45	-		
Revision				
Assessment				
Total	45	45		
Assessment Methods:				
Formative:		Summative:		
Nil		Sessional Exam I / Sessional Exam II (Theory)		
		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
End Semester Exam	x	x	x	x
Feedback Process:	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
Course Code	PHY1303
Academic Year	First
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	Explain the various transport mechanisms across the cell membrane, composition and distribution of body fluids, components of blood and their functions, blood groups, blood coagulation and the basis for related diseases. (C1, C2)
CO2	Describe the morphology and functions of nerve and muscles. (C1, C2)
CO3	Explain the functions of cardiovascular and respiratory systems to facilitate the understanding of health & disease process (C1, C2)
CO4	Describe the physiology of special sense organs and the related disease process (C1, 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	<ul style="list-style-type: none"> 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



Content	Competencies	Number of Hours
Body fluid compartments	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Describe the morphology of a neuron (C2) • Mention the structure and functions of myelinated and unmyelinated nerve fibers (C2) 	
Membrane potential	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Mention the types of smooth muscle(C1) 	
Unit 3: BLOOD		
Composition and functions of blood	<ul style="list-style-type: none"> • Describe the composition of blood(C2) • List the functions of blood (C1) 	6
Plasma proteins	<ul style="list-style-type: none"> • Name the different types of plasma proteins (C1) • List the functions of plasma proteins(C1) 	
Red blood cells	<ul style="list-style-type: none"> • Mention the morphology and functions of red blood cells (C1) • Mention the normal count of RBC and its variations (C1) • Describe the sites, 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 and describe the morphological classification of anemia (C1, C2) 	
White blood cells	<ul style="list-style-type: none"> • Classify White Blood Cells (WBC) (C2) • List the functions of WBCs(C1) • Mention the normal count of various types of WBCs (C1) 	

Content	Competencies	Number of Hours
Hemostasis	<ul style="list-style-type: none"> • 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) 	
Blood types/groups	<ul style="list-style-type: none"> • State Landsteiner's law (C1) • 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	<ul style="list-style-type: none"> • List the functions of lymph (C1) 	
Unit 4: CARDIOVASCULAR SYSTEM		
Organization of cardiovascular system	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Define cardiac cycle (C1) • State the normal duration of cardiac cycle (C1) • Describe the left ventricular pressure and volume changes during a cardiac cycle(C2) 	
Heart sounds	<ul style="list-style-type: none"> • Enumerate the differences between first and second heart sounds(C2) 	
Electrocardiogram (ECG)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Mention the normal value and variations of heart rate(C1) 	
Cardiac output	<ul style="list-style-type: none"> • 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) 	

Content	Competencies	Number of Hours
Blood pressure (BP)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Describe the functional anatomy of the respiratory system (C2) 	6
Mechanics of Respiration	<ul style="list-style-type: none"> Mention the muscles of respiration(C1) Describe the mechanism of inspiration and expiration(C2) Describe the intra-pulmonary and intra-pleural pressure changes during the various phases of respiration(C2) 	
Lung volumes and capacities	<ul style="list-style-type: none"> Draw a labelled spirogram(C2) Define various lung volumes and capacities (C1) Mention the normal values of lung volumes and capacities (C1) 	
Ventilation	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Describe the structure of respiratory membrane (C2) Mention the factors affecting diffusion of gases across it (C1) 	
Transport of gases	<ul style="list-style-type: none"> 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) 	

Content	Competencies	Number of Hours
Regulation of respiration	<ul style="list-style-type: none"> • Explain the neural regulation of respiration(C2) • Explain the chemical regulation of respiration(C2) 	
Applied aspects	<ul style="list-style-type: none"> • Define hypoxia(C1) • Mention the types of hypoxia with example (C1) • Define cyanosis(C1) • Mention the cause of cyanosis (C1) • Define apnea, dyspnea and asphyxia(C1) 	
Unit 6: SPECIAL SENSES		
Vision	<ul style="list-style-type: none"> • 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 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) 	4
Hearing and vestibular apparatus	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Name the receptors for taste and smell (C1) • Mention the disorders of taste and smell (C1) 	

Learning Strategies, Contact Hours and Out of class engagement		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	33	-
Revision	4	-
Total	37	37
Assessment Methods:		
Formative:	Summative:	
Nil	Sessional Exam I / Sessional Exam II (Theory)	
	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
End Semester Exam	x	x	x	x
Feedback Process:	End-Semester Feedback			
Main Reference:	1. Basics of Medical Physiology, 4 th edition, D.Venkatesh, H.H.Sudhakar			

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		CSK1501						
Academic Year		First						
Semester		1						
Number of Credits		2						
Course Prerequisite		Nil						
Course Synopsis		Orients students to focus on diverse interactive situations and enhances the interpersonal skills required as per the needs of the current 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 with an emphasis on professional communication specifically on presentation and corporate etiquette (C3)							
CO2	Outline effective oral communication skills in diverse contexts (C2)							
CO3	Summarise different ways to write creatively, coherently and effectively on a given topic (C2)							
CO4	Develop active listening skills involving feedback in diverse interactive situations. (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 (Theory)
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 with an emphasis on	8

Content	Competencies	Number of Hours (Theory)
	presentation and corporate etiquette (C3) 7. Identify the difference between formal and informal communication (C3)	
Unit 2:		
Reading Skills	1. Explain the types of reading (C2) 1. (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 presentations (C2) 6. Summarise the role played by prepositions in understanding what to read (C2)	6
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. 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, and 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 Out of class engagement		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	24	-
Seminar	6	-
Total	30	30

Learning Assessment Methods:				
Formative:		Summative:		
Class Presentation/Assignment		Sessional Exam II (Theory)		
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:	End-Semester Feedback			
Main Reference:	<ol style="list-style-type: none"> 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 3. The Professional Communications Toolkit by D. Joel Whalen Sage publication 2006. 			
Additional References	<ol style="list-style-type: none"> 1. 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	EIC1501
Academic Year	First
Semester	1
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 students 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)	2

Content	Competencies	Number of Hours
	3. Explain the global environmental concerns (C2)	
Unit 2:		
Biodiversity, Ecosystem, Energy and natural resources	1. Classify the natural resources (C2) 2. List the renewable and non-renewable resources (C1) 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)	4
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

Content	Competencies	Number of Hours
	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)	

Learning Strategies, Contact Hours and out of class engagement:					
Learning Strategies	Contact Hours	Out of class engagement			
Lecture	13				
Seminar	-				
Assessment	2				
Total	15	15			
Assessment Methods:					
Formative:			Summative:		
Assignments			Mid Semester/Sessional Exam (Theory)		
Mapping of Assessment with COs:					
Nature of Assessment	CO1	CO2	CO3	CO4	CO5
Class test	-	-	X	X	X
Mid Semester / Sessional Examination	X	X	X	-	-
Feedback Process:	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	EIC1501
Academic Year	First
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	List various laws listed under IPC and CrPC and understand importance of voting in a democracy and RTI (C1)

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,	3

Content	Competencies	Number of Hours
	Common Law, Civil Law and Socialist Legal System) 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 out of class engagement :					
Learning Strategies	Contact Hours	Out of class engagement			
Lecture	15				
Total	15	15			
Assessment Methods:					
Formative:		Summative:			
Assignments		Mid Semester/Sessional Exam (Theory)			
Mapping of Assessment with COs:					
Nature of Assessment	CO1	CO2	CO3	CO4	CO5
Class test	-	x	-	x	x
Mid Semester / Sessional Examination	x	x	x	-	-
Feedback Process:	End-Semester Feedback				
Main Reference:	1. Subhash C. Kashyap, Our Constitution, National Book Trust. (2011) 2. P. M. Bhakshi. The Constitution 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	Fundamentals of Food and Nutrition - I
Course Code	CND1301
Academic Year	First
Semester	1
Number of Credits	4
Course Prerequisite	Knowledge of basic science
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 1. The basic concepts of nutrition, malnutrition, health, brief history of nutritional Science. 2. Knowledge of mechanisms of digestion, absorption, and metabolism. 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, kilocalorie, phytochemical, metabolism and malnutrition, brief history of nutritional Science (C1)
CO2	Explain the key basic nutrition concepts, RDA and dietary guidelines(C2)
CO3	Identify the functions of the major nutrients (carbohydrates, lipids and proteins) and food sources of each(C3)

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

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

Course Content and Outcomes:

Content	Competencies	Number of Hours
Unit 1: Introduction to Nutrition		
Introduction • Source of nutrients • Functions of food	• Outline the history of nutrition(C2) • Explain the food as source of nutrients(C2) • Explain the physiological and metabolic	9

Content	Competencies	Number of Hours
<ul style="list-style-type: none"> Nutrients & energy Adequate, optimum & good nutrition, malnutrition 	<ul style="list-style-type: none"> 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) Recall examples of energy-dense foods(C1) Interpret the terms optimum, good nutrition and malnutrition(C2) Identify how balance and variety can help ensure the nutritional adequacy of a diet(C3) 	
Unit 2: Interrelation between nutrition and health		
Visible symptoms of goods health	<ul style="list-style-type: none"> 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 (C1) Explain about the signs of good health(C2) Relate lifestyle factors that contribute to the leading causes of diseases(C2) Infer an example in planning a nutritionally adequate diet(C2) Identify the basic steps in nutrition assessment (C3) 	8
Unit 3: Metabolism of food		
Digestion, absorption, transport & utilization	<ul style="list-style-type: none"> Outline the processes of digestion, absorption, and metabolism(C2) Identify the organs in the digestive system and their functions(C3) Explain the enzymes or digestive juices secreted by each organ and gland in the digestive system(C2). Recall your basal metabolic rate (BMR)(C1). Find different metrics in the dietary reference intake and their specifications(C1) 	7
Unit 4: Food guide		
Basic five food groups. How to use food guide (according to R.D.A.)	<ul style="list-style-type: none"> Explain the five food groups (cereals, grains and products, pulses and legumes, milk and meat products, fruits and vegetables, vegetables (green leafy), other vegetables, fats and sugars) (C2) Identify each of the food groups that provide a range of nutrients, and have a role in helping the body function (C3) Explain the use of the food guide as a starting 	7

Content	Competencies	Number of Hours
	point to shape the eating pattern(C2)	
Unit 5: Carbohydrates		
Composition, functions, classification, food sources, storage in body	<ul style="list-style-type: none"> • Explain the classification of carbohydrates(C2) • Identify the major carbohydrates in human diets and their major food sources(C3) • List the functions of carbohydrates in the body (C1) • Explain the carbohydrate utilization in the body(C2) • Illustrate how the body digests carbohydrates and regulates blood glucose (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 disorder (C1) 	10
Unit 6: Proteins		
Composition, sources, essential & non- essential amino acids, functions, Protein deficiency	<ul style="list-style-type: none"> • List the primary functions of proteins in the body (C1) • Identify the basic structural unit of proteins(C3) • 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(C3) • Infer how protein-energy malnutrition (PEM) can affect the body (C2) 	10
Unit 7: Fats & oils		
Composition, saturated and unsaturated fatty acids, classification, food sources, function of fats	<ul style="list-style-type: none"> • 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) 	9

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	-
Seminar	10	-
Case Based Learning (CBL)	-	-
Practical	-	-
Revision	-	-
Assignment	5	-
Total	60	60
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
End Semester Exam	x	x	x
Feedback Process:	Mid-Semester Feedback		
	End-Semester Feedback		
Main Reference:	1. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nd ed.). Published by Bangalore Printing and Publishing Ltd, Bangalore 2. Srilakshmi B (2015) Nutrition science - 4th Ed., Newage 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	Fundamentals of Food and Nutrition Practical- I							
Course Code	CND1302							
Academic Year	First							
Semester	I							
Number of Credits	7							
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 (P3)							
CO2	Demonstrate different kitchen equipment's and cooking methods with portion size(P2)							
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	<ul style="list-style-type: none"> Explain the formulation of dietary goals and specific guidelines which will help in providing required guidance to people in ensuring nutritional adequacy(P2) 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) 	43
Unit 2: Use and care of kitchen equipment		
Use and care of kitchen equipment	<ul style="list-style-type: none"> Identify different kitchen equipment and their care and functions(P4) Infer quality control (QC) process and aims to identify and rectify the defects in products(P2) 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(P4) 	58

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> Classify the units of household measure for weight as kilograms ounces and pinch(P4) 	
Unit 3: Different cooking methods		
Different cooking methods	<ul style="list-style-type: none"> Identify the differences between dry and moist heat cooking methods(P3) List the different cooking methods under dry and moist heat (P1) List the foods that can be cooked using the dry and moist heat (P4) 	61
Unit 4: Portion size		
Amount of ingredients to be in standard recipe portion size	<ul style="list-style-type: none"> 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) Explain recommended serving size/portion size is the amount of each food supposed to consume during a meal or snack (P2) Define portion size – the amount of food that we actually eat (P1) 	108

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Clinic	180	-
Practical	90	-
Revision	-	-
Assignment	-	-
Total	270	270
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	-	-
Quiz / Viva	-	-
Assignments/Presentations	-	-
Clinical/Practical Log Book/ Record Book	x	x
Any others: WPBA	x	x
End Semester Exam	-	-

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	<ol style="list-style-type: none"> 1. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nd ed.). Published by Bangalore Printing and Publishing Ltd, Bangalore 2. Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
Additional References	<ol style="list-style-type: none"> 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

SEMESTER - II

COURSE CODE	: COURSE TITLE
BIC1401	: Biochemistry
CND1401	: Fundamentals of Food and Nutrition - II
CND1402	: Food Science - I
CND1403	: Fundamentals of Food and Nutrition Practical - II
CND1404	: 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	BIC 1401
Academic Year	First
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 and lipids (C2)
CO3	Explain protein digestion and amino acid metabolism, general concepts of nutrition, balanced diet, role of macronutrients in the maintenance of health and features of malnutrition (C2)
CO4	Explain the role of micronutrients in maintenance of health and 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		2

Unit	Content	Competencies	Number of Hours
	<p>classification)(C2)</p> <p>3. Give one example(names of enzymes & reaction catalyzed)for each class of enzymes(C1)</p> <p>4. Define the term'isoenzymes' (C1)</p> <p>5. Explain isoenzymes with examples(creatine kinase, lactate dehydrogenase) (C2)</p> <p>6. Define the term'proenzyme or zymogen'with pepsinogen and trypsinogen as examples(C1)</p> <p>7. Describe the utility of serum enzymes as diagnostic markers(C2)</p> <p>8. Mention the diagnostic utility of following enzymes(C1)</p> <ul style="list-style-type: none"> • CK • ALP • AST • ALT • LDH 		
Unit 2: CARBOHYDRATE CHEMISTRY			
	<p>At the end of this chapter, a student should be able to</p> <p>1. Define the term'carbohydrates' (C1)</p> <p>2. Classify carbohydrates with examples for each class(C2)</p> <p>3. Classify monosaccharides with examples based on(C2)</p> <ul style="list-style-type: none"> • Number of carbon atoms • Functional groups <p>4. Mention the source and composition of following disaccharides(C1)</p> <ul style="list-style-type: none"> • Sucrose • Lactose • Maltose <p>5. Classify polysaccharides based on composition with examples(C2)</p> <p>6. Explain the structure of starch and glycogen with schematic representation(C2)</p> <p>7. List the differences between starch and glycogen(C1)</p> <p>8. Mention the occurrence and functions of heparin and chondroitin sulphate(C1)</p>		2
Unit 3: CARBOHYDRATE DIGESTION AND ABSORPTION			
	<p>At the end of this chapter, a student should be able to</p> <p>1. Describe the complete digestion of dietary polysaccharides(starch and glycogen) (C2)</p> <p>2. Describe the reactions catalyzed by the following brush border enzymes(C2)</p> <ul style="list-style-type: none"> • Maltase • Sucrase-isomaltase • Lactase <p>3. Illustrate the mechanisms of absorption of monosaccharides in the small intestine(C2)</p> <p>4. Explain the significance of including sodium chloride along with glucose in the oral rehydration solution (C2)</p>		2

Unit	Content	Competencies	Number of Hours
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 regulate it in the well-fed state and starvation(C1) 5. Calculate the energetics of aerobic and anaerobic glycolysis (C2)		2
	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)		1

Unit	Content	Competencies	Number of Hours
	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)		
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 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		2

Unit	Content	Competencies	Number of Hours
	mitochondria(carnitine shuttle) (C2) 5. Describe the reactions of beta oxidation(C2) 6. Calculate the energetics of beta oxidation of palmitic acid (C2)		
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 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) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Name its site and subcellular site(C1) • Describe its reactions(C2) • Mention its significance(C1) 4. Recall the physiologically important products derived from the following amino acids(C1) <ul style="list-style-type: none"> • Glycine • Tyrosine • Methionine • 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		2

Unit	Content	Competencies	Number of Hours
	<p>carbohydrates, proteins and fats(C1)</p> <p>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)</p> <p>4. Define recommended dietary allowance(RDA) (C1)</p> <p>5. Study basal metabolic rate as follows</p> <ul style="list-style-type: none"> • Define(C1) • List the normal values for men and women(C1) • Explain the factors affecting BMR(C2) <p>6. Define thermic effect(SDA)of food and recall the values for macronutrients (C1)</p>		
Unit 13: CARBOHYDRATES, PROTEINS AND FATS IN NUTRITION			
	<p>A. Carbohydrates</p> <p>At the end of the chapter, a student should be able to</p> <p>1. Mention the RDA(C1)</p> <p>2. Study dietary fibers as follows</p> <ul style="list-style-type: none"> • Define(C1) • Mention its RDA(C1) • List the examples with their sources(C1) • Explain its beneficial effects(C2) <p>B. Proteins</p> <p>At the end of the chapter, a student should be able to</p> <p>1. Mention the RDA(C1)</p> <p>2. Define essential amino acids with examples (C1)</p> <p>3. Study biological value as follows</p> <ul style="list-style-type: none"> • Define(C1) • Name the protein used as standard for determining it(C1) • List the protein sources with high and low biologic values(egg albumin, milk, fish, meat, rice, wheat and soy protein) (C1) <p>4. Define the term nitrogen balance(C1)</p> <p>5. Explain positive and negative nitrogen balance with conditions during which they occur(C2)</p> <p>6. Define the term limiting amino acids giving suitable examples(C1)</p> <p>7. Explain mutual supplementation of proteins with examples(C2)</p> <p>C.FATS</p> <p>At the end of the chapter, a student should be able to</p> <p>1. Mention the RDA(C1)</p> <p>2. List the functions of cholesterol in the body(C1)</p> <p>3. Study essential fatty acids as follows</p> <ul style="list-style-type: none"> • Define(C1) • Mention its RDA(C1) • Explain their functions and deficiency manifestations(C2) <p>4. Explain saturated and unsaturated(mono and poly)fatty acids with suitable examples, mentioning its sources and functions (C2)</p>		2
Unit 14: MINERALS			

Unit	Content	Competencies	Number of Hours
	At the end of this chapter, a student should be able to		2
	<ol style="list-style-type: none"> 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) 		
Unit 15: VITAMINS			
	At the end of this chapter, a student should be able to		3
	<ol style="list-style-type: none"> 1. Define the term vitamins(C1) 2. List the classes of vitamins based on solubility(C1) 3. Study the water soluble vitamins mentioned below <ul style="list-style-type: none"> • Thiamine • Riboflavin • Niacin • Pantothenic acid • Pyridoxine • Biotin • Cobalamin • Folic acid • Ascorbic acid as follows <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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
	<ol style="list-style-type: none"> 1. Define the classes of protein energy malnutrition. (C1) 2. Compare the similarities and differences between marasmus and kwashiorkor (C2) 		
17. CLINICAL BIOCHEMISTRY			
	A. GLUCOSE HOMEOSTASIS AND DIABETES MELLITUS		2
	At the end of this chapter, a student should be able to		
	<ol style="list-style-type: none"> 1. Summarize the effect of the hormones involved in blood glucose homeostasis(C2) 2. Study diabetes mellitus as follows <ul style="list-style-type: none"> • Define(C1) • Classify and compare the types 1 and 2(C2) • Mention the signs and symptoms(C1) 		

Unit	Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> 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) 		
	<p>B. SIGNIFICANCE OF ESTIMATIONS OF VARIOUS BIOCHEMICAL PARAMETERS IN BLOOD</p> <p>At the end of this chapter, a student should be able to</p> <p>1.Mention the normal serum levels of glucose, protein, urea, uric acid, bilirubin, cholesterol and creatinine and conditions in which they are altered(C1)</p>		1
	<p>C. ACID BASE BALANCE AND DISTURBANCES</p> <p>At the end of this chapter, a student should be able to:</p> <p>1. Define the terms acid, base, pH and pKa(C1)</p> <p>2. Study buffers as follows</p> <ul style="list-style-type: none"> 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) <p>3. Study acid-base disorders as follows</p> <ul style="list-style-type: none"> Define the different classes(C1) Explain the conditions causing acidosis & alkalosis(metabolic & respiratory) (C2) <p>4. Mention the primary and compensatory changes in acid base disorders (C1)</p>		1
Unit 18: MOLECULAR BIOLOGY			
	At the end of this chapter, a student should be able to		2
	<ol style="list-style-type: none"> Name the purine and pyrimidine bases(C1) Define nucleosides and nucleotides with examples(C1) Illustrate the Watson and Crick model of B-DNA structure(C2) List the different types of RNA(C1) Recall the structural differences between DNA and RNA(C1) Define replication, transcription and translation (C1) 		

Learning Strategies, Contact Hours and Out of class engagement		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	
Assessment	4	
Total	49	49

Assessment Methods:				
Formative:		Summative:		
Nil		Sessional Exam I / Sessional Exam II (Theory)		
		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
End Semester Exam	x	x	x	x
Feedback Process:		End Semester Feedback		
Main Reference:		1. Essentials of Biochemistry, U satyanarayana, U Chakrapani (2 nd edition) 2. Handbook of Biochemistry for Allied & Nursing Students, Shivananda Nayak B (2 nd 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	Fundamentals of Food and Nutrition - II
Course Code	CND1401
Academic Year	First
Semester	II
Number of Credits	4
Course Prerequisite	Knowledge of basic science
Course Synopsis	<p>This module provides knowledge on</p> <ol style="list-style-type: none"> 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	Define functional foods, nutraceuticals and list the effect of cooking and heat processing on nutritive value of foods. (C1).
CO2	Explain the sources, role and function of vitamins, minerals, water, fiber and functional food in the body (C2).
CO3	Identify the major deficiency and toxicity of the micronutrients (C3).
Mapping of Course Outcomes (COs) to Program Outcomes (POs):	
COs	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8
CO1	x
CO2	x
CO3	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) <ul style="list-style-type: none"> • List major functions in the body (C1) • Explain absorption, transport, and storage (C2) • Explain the dietary adequacy (C2) • Which are the major dietary sources (C1) 	16

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> • Explain major deficiency -signs & symptoms(C2) • Explain major toxicity- signs & symptoms(C2) <p>Water soluble vitamins: Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic acid, Biotin, Vitamin C</p> <ul style="list-style-type: none"> • List 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) 	
Unit 2: Minerals		
Definition classification sources, functions, bioavailability and deficiency	<p>Minerals – macronutrients Calcium, Phosphorus, Magnesium, Sodium, Chloride Potassium, Sulphur Major Functions in the Body</p> <ul style="list-style-type: none"> • List 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) <p>Minerals - micronutrients</p> <ul style="list-style-type: none"> • Iodine, Iron, Zinc, Copper, Fluoride, Selenium, Chromium, Molybdenum, Manganese • List 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) 	15
Unit 3: Fiber		
Role of fibers in Human Nutrition	Explain the role, composition, function and sources of fiber(C2)	3
Unit 4: Water		
Function, sources, requirement, water balance & effect of deficiency.	<ul style="list-style-type: none"> • Explain water balance and function(C2) • Explain water intoxication(C2) • What are the effects of dehydration(C1) 	4

Content	Competencies	Number of Hours
Unit 5: Electrolyte and acid base balance		
Electrolyte and acid base balance	<p>Electrolytes</p> <ul style="list-style-type: none"> 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) <p>Acid-Base Balance</p> <ul style="list-style-type: none"> List intracellular buffers – proteins and phosphates; extracellular buffers – bicarbonate and carbonic acid(C1) Explain acid-base balance disorder(C2) Explain classification of acid-base imbalances(C2) Explain three buffer systems that function in the kidney(C2) Explain four major acid-base imbalances and possible etiologies (C2) 	6
Unit 6: Effect of cooking & heat processing on the nutritive value of foods		
Effect of cooking & heat processing on the nutritive value of foods	<ul style="list-style-type: none"> Explain effect of cooking on nutrients(C5) <ul style="list-style-type: none"> - changes in proteins - changes in carbohydrates - changes in lipids (Fats) - changes in vitamins and minerals. Explain effect of processing methods on nutrients. (C5) List advantages, disadvantages of various methods of cooking on nutrients(C1) How to preserve the nutrient value of food(C1) 	7
Unit 7: Functional Food		
Functional Food	<ul style="list-style-type: none"> Definition & classification of functional foods, nutraceuticals and its role in disease management(C1) 	9

Learning Strategies, Contact Hours and Out of class engagement			
Learning Strategies	Contact Hours	Out of class engagement	
Lecture	45	-	
Seminar	12	-	
Small group discussion (SGD)	-	-	
Self-directed learning (SDL)	-	-	
Problem Based Learning (PBL)	-	-	
Case Based Learning (CBL)	-	-	
Clinic	-	-	
Practical	-	-	
Revision	-	-	
Assignment	3	-	
Total	60	120	
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. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nd ed.). 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	Food Science - I
Course Code	CND1402
Academic Year	First
Semester	II
Number of Credits	4
Course Prerequisite	Knowledge of basic science
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 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	Explain the major chemical reactions that occur during food preparation and storage (C2)
CO2	Explain 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.	<ul style="list-style-type: none"> • 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) 	14



Content	Competencies	Number of Hours
parboiling, flaking, parching and roasting. Use in variety of preparations selection, storage and care, breakfast cereals.	<ul style="list-style-type: none"> • 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 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) • Infer the processing of maize or corn, jowar(C2) • List the products of maize and jowar(C1) • Explain the cereal protein – gluten, factors that affect the gluten formation(C2) • Illustrate the cereal starch, effect of moist heat, changes in cooked starches and effect of dry heat(C2) • 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). • List the role of cereals in cookery(C1) 	
Unit 2: Pulses		
Composition and nutritional value, processing, soaking, germination. Cooking and fermentations	<ul style="list-style-type: none"> • 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) • Interpret the effect of cooking(C2) • Infer the factors affecting cooking quality (C2) • List the forms of pulses and role of pulses in cookery (C1) 	11

Content	Competencies	Number of Hours
Unit 3: Milk and Milk products		
Composition of milk, properties and effect of heat, nutritional importance, milk processing, milk products	<ul style="list-style-type: none"> • Explain the composition of milk(C2) • Interpret the physical properties of milk(C2) • 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 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) • Define 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) 	7
Unit 4: Flesh Foods		
Selection, storage, uses and nutritional aspects of meat, fish and poultry, spoilage of fish	<ul style="list-style-type: none"> • Show the structure of meat (C1) • 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) • Interpret the meat cookery(C2) • Explain the changes during meat cooking(C2) • Classify the methods of cooking meat (C2) • Define and classify poultry(C1) • Explain the processing, composition and nutritive value of poultry (C2) • Illustrate the poultry cookery(C2) • Explain the preservation and storage of poultry(C2) • Define and classify fish(C1) • Define the composition and nutritive value of fish(C1) • Interpret the selection of fish(C2) • Illustrate the fish cookery (C2) • Explain spoilage, storage and preservation of fish (C2) 	8

Content	Competencies	Number of Hours
Unit 5: Egg		
Composition & classification of egg & egg products, its nutritive value	<ul style="list-style-type: none"> • Explain the structure and composition of egg(C2) • Illustrate the pigments and nutritive value of egg(C2) • Explain the effect of cooking on nutritive value of egg (C2) • Interpret the evaluation of egg quality (C2) • Explain the egg cookery, buying, handling and preservation of egg (C2) • Summarize the role of egg in cookery (C2) 	4
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	<ul style="list-style-type: none"> • Define the food service industry, types of food service industry(C1) (C2) • Explain the food and beverage service methods (C2) • Interpret the features of hospital catering(C2) • Classify the types of food service system (C2) • Explain the table service style, place setting and service order(C2) • Illustrate the guide for serving and for general working(C2) • Find the sequence of table service (C1) • Explain preliminary preparation of food(C2) • Identify the basic cuts and shapes of vegetables (C3) • List 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) 	16

Learning Strategies, Contact Hours and Out of class engagement:			
Learning Strategies	Contact Hours	Out of class engagement	
Lecture	45	-	
Seminar	12	-	
Small group discussion (SGD)	-	-	
Self-directed learning (SDL)	-	-	
Problem Based Learning (PBL)	-	-	
Case Based Learning (CBL)	-	-	
Clinic	-	-	
Practical	-	-	
Revision	-	-	
Assignment	3	-	
Total	60	60	
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. 6 th edition 2014 2. Sethi M and Malhan S (Revised 2 nd 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	Fundamentals of Food and Nutrition Practical - II							
Course Code	CND1403							
Academic Year	First							
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 (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: Nutritive value of foods		
Nutritive value of foods	Utilizing IFCT book to identify nutritive value of foods (P3)	28
Unit 2: Calculating nutritive value of prepared foods		
Calculating nutritive value of prepared foods	Preparing recipes and calculating their nutritive values (P3)	79
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)	88

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	135	-
Practical	60	-
Assignment	-	-
Total	195	195

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	
Any other WPBA	x
Assignments/Presentations	
Clinical/Practical Log Book/ Record Book	x
End Semester Exam	
Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	<ol style="list-style-type: none"> Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2nd ed.). Published by Bangalore Printing and Publishing Ltd, Bangalore Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
Additional References	<ol style="list-style-type: none"> The "Indian Food Composition tables-(IFCT 2017)" T.Longvah, R.Ananthan, K.Bhaskarachary and K.Venkaiah Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi 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	Analysis in Food Science - I							
Course Code	CND1404							
Academic Year	First							
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 (P3)							
CO2	Identify and explain nutrients in specific foods (P3)							
CO3	Apply food science knowledge to describe functions of ingredients in food. (P3)							
CO4	Demonstrate basic food composition and its effect on food characteristics. (P2)							
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	<ul style="list-style-type: none"> Identify the percentage of edible portion (P3) 	12
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 common recipes.	<ul style="list-style-type: none"> Apply cooking methods using fine and coarse cereals (P3) Plan and prepare the selected Indian cereal recipes (P3) Choose the soaked and raw pulses in cookery (P1) Identify the effects of adding salt, acid and alkali on cooking (P3) Demonstrate selected common pulse recipes (P2) 	61

Content	Competencies	Number of Hours
Unit 3: MILK		
Milk cookery - experimental cookery on milk, common preparations with milk, cheese and curds. Preparation of selected common recipes with milk	<ul style="list-style-type: none"> Plan and prepare common recipes with cheese and curds (P3) Demonstrate common recipes with milk(P2) 	49
Unit 4: Egg cookery		
Egg cookery - evaluation of fresh egg. experimental cookery – boiled egg, poached egg, omelet and custard.	<ul style="list-style-type: none"> Identify the fresh egg (P3) Experimental cookery – boiled egg, poached egg, omelet and custard(P3) 	28

Learning Strategies, Contact Hours and Out of class engagement:

Learning Strategies	Contact Hours	Out of class engagement
Clinic	90	-
Practical	60	-
Total	150	150

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	-	-	-	-
Any other WPBA	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. 6 th 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
MCB2303	:	Microbiology
CND2301	:	Medical Nutrition Therapy - I
CND2302	:	Food Science - II
CND2303	:	Clinical Practice in Medical Nutrition Therapy - I
CND2304	:	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	MCB2303							
Academic Year	Second							
Semester	III							
Number of Credits	03							
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							

Course Content and Outcomes:

Content	Competencies	Number of Hours
Introduction To Medical Microbiology	i) Historical introduction to microbiology a. Describe the contributions of: (C1) <ul style="list-style-type: none"> • 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)	2

Content	Competencies	Number of Hours
	ii) Explain the bacterial envelope of gram positive and gram negative bacteria (C2) 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	3

Content	Competencies	Number of Hours
	d. Moist heat sterilization <ul style="list-style-type: none"> • Below 100 ° C, • At 100 ° C • Above 100 ° C e. Classification of disinfectants used in hospital and their mechanism of action	
Infection & Immunity	i) Define infection (C1) <ul style="list-style-type: none"> a. List the types, sources, routes and spread of infectious diseases (C1) ii) Define and classify immunity (C1) iii) Explain the following: (C2) <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> a. Functions of antibodies b. Diagnostic importance of antigen-antibody reactions <ul style="list-style-type: none"> • Agglutination • Immunofluorescence • ELISA 	1
Immune Response	i) List the cells of immune system (C1) ii) Explain the following: (C2) <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> a. Immediate hypersensitivity <ul style="list-style-type: none"> • Mechanisms and mediators of Anaphylaxis and atopy b. Cytotoxic hypersensitivity - Mechanism and associated disorders c. Immune complex hypersensitivity- <ul style="list-style-type: none"> • Arthus reaction, serum sickness and immune complex diseases d. Delayed type hypersensitivity- Mechanism and clinical importance of <ul style="list-style-type: none"> • 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	1

Content	Competencies	Number of Hours
	<p>type of cell or organs (C1)</p> <p>iv) List the diseases involving multiple organs (systemic) (C1)</p>	
Healthcare Associated Infections	<p>i) List the common Healthcare associated infections (C1)</p> <p>ii) Explain the following: (C2)</p> <ol style="list-style-type: none"> Causes Sources Routes of spread Host risk factors MRSA and its importance Prevention Investigation 	1
Standard Precautions And Overview Of Laboratory Diagnosis Of Microbial Infections	<p>i) Explain the following (C2)</p> <ol style="list-style-type: none"> Hand hygiene Personal protective equipment (PPE) Respiratory hygiene Sharp safety Sterile instruments and devices. Clean and disinfected environmental surfaces <p>ii) Explain laboratory diagnosis of microbial infections (C2)</p> <ol style="list-style-type: none"> Specimen Collection Specimen transport Specimen processing and handling Identification of microbes 	3
Respiratory Tract Infections	<p>i) Bacterial pneumonia</p> <ol style="list-style-type: none"> List the causative agents associated (C1) Explain the pathogenesis and laboratory diagnosis of the following organisms (C2) <ul style="list-style-type: none"> Streptococcus pneumoniae Haemophilus influenzae Klebsiella pneumoniae Describe the preventive measures(C1) <p>ii) Viral pneumonia</p> <ol style="list-style-type: none"> List the causative agents (C1) <ul style="list-style-type: none"> Influenza Explain the etio-pathogenesis (C2) Explain the lab diagnosis (C2) Describe the preventive measures(C1) <p>iii) Tuberculosis</p> <ol style="list-style-type: none"> Describe the general properties of etiological agent (C1) Explain the pathogenesis (C2) Explain the lab diagnosis (C1) Describe the preventive measures (C1) 	3

Content	Competencies	Number of Hours
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) 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)	3
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 the following:(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	6

Content	Competencies	Number of Hours
	b. <i>Ascaris lumbricoides</i> c. <i>Ancylostoma duodenale</i> v) Viral hepatitis a. List the etiological agents (C1) b. Explain the transmission, pathogenesis, laboratory diagnosis and prevention of HBV infection(C2)	
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	2
	diagnosis (C2) ii) SEXUALLY TRANSMITTED DISEASES a. List the organisms causing STDs (C1) b. Human immunodeficiency virus infections <ul style="list-style-type: none"> 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	80
Revision	2	-
Assessment	3	10
Total	45	90

Assessment Methods:

Formative:	Summative:
Unit Test- Nil	First Sessional Examination SEQ (theory) Second Sessional Examination – SEQ (theory)
Quiz - Nil	University Examination – SEQ theory

Mapping of Assessment with COs:

Nature of Assessment	CO1	CO2	CO3	CO4
Mid Semester / Sessional Examination 1	x	x		
Sessional Examination 2			x	x
End Semester / University Exam	x	x	x	x

Feedback Process:	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, 15 th 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		CND2301						
Academic Year		Second						
Semester		III						
Number of Credits		4						
Course Prerequisite		Basic knowledge of nutrients and dietary guidelines						
Course Synopsis		<p>This module provides</p> <ol style="list-style-type: none"> 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	Outline the history and food culture of India, the basic principles of hospital diets and understanding disease and pathophysiology, characteristics of fad diet (C2).							
CO2	Identify nutritional needs in clinical setting, cultural and social influence of food, analyze the potential risk and benefits of fad diets, application of nutrition therapy(C3).							
CO3	Analyze medical nutrition therapy management, cultural competency in nutrition counselling(C4).							
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: Fad Diets, Food and Culture		
Definition, causes, benefits, drawbacks.	<ul style="list-style-type: none"> • Explain the historic introduction to the evaluation of Indian cuisine from its origin to the contemporary cuisine(C2) • Analyze how socio economic, physical and socio-cultural environments contribute to Indian food and culture(C4) • Identify different Indian festival cuisine, street food, occasion and ceremony food(C3) • Define fad diets, benefits and drawback(C1) • Explain benefits and drawbacks of vegan diet, atkins diet, keto diet, mediterranean diet, general motor diet, gluten free diet, paleo diet, raw food diet, commercial diet, south beach die(C2) 	8
Unit 2: 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	<ul style="list-style-type: none"> • Explain the basic principles of hospital diets(C2) • Explain the kinds and uses of exchange lists(C2) • Interpret diet modifications for therapeutic care(C2) <ul style="list-style-type: none"> -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(C3) 	7
Unit 3: Diet in fever		
Definition metabolic changes and dietary management	<ul style="list-style-type: none"> • Definition of fever(C1) • Explain types of fever(C2) • Interpret causes of fever(C2) • Identify metabolic changes in body during fever(C3) • Analyze dietary modifications and management(C4) 	4
Unit 4: Nutritional anaemia		
Epidemiology, pathophysiology causes & dietary management	<ul style="list-style-type: none"> • Define anaemia and prevalence (C1) • Explain the symptoms and causes(C2) • Explain the different types of anaemia(C2) 	5

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> Identify the risk factors, complications and prevention of anaemia. (C3) Analyze the dietary modification and management and fortification(C4) 	
Unit 5: Obesity		
Causes, complication and health effects, dietary management	<ul style="list-style-type: none"> Define overweight and obesity(C1) Explain variations in body weight and grades of obesity(C2) Define BMI and assessment of body fat content (C1) Explain the causes of overweight and obesity(C2) Identify the different treatments of obesity(C3) Explain prevention of overweight and obesity in children and adults(C2) Analyze the complications and dietary management in obesity (C4) 	6
Unit 6: Diabetes		
Epidemiology, pathophysiology, causes & dietary management	<ul style="list-style-type: none"> Illustrate diabetes mellitus and identify the types (C2) Identify the symptoms of diabetes mellitus(C3) Analyze the relationship of insulin and dietary management in diabetes mellitus (C4) 	8
Unit 7: Cardiovascular Diseases		
Epidemiology, pathophysiology, causes & dietary management	<ul style="list-style-type: none"> 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(C3) Explain why sodium is limited in some cardiovascular conditions(C2) Analyze dietary management in cardiovascular diets(C3) 	7
Unit 8: Diet in allergy		
Definition, common food allergies and dietetic treatment.	<ul style="list-style-type: none"> Definition of allergy and allergens(C1) Interpret the types of reactions caused(C2) Explain food as allergens(C2) Identify symptoms and diagnosis of allergy (C3) Analyze allergies, elimination diets and their uses(C4) 	3

Content	Competencies	Number of Hours
Unit 9: Cancer		
Epidemiology, pathophysiology, causes & dietary management.	<ul style="list-style-type: none"> • 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) • Identify the nutritional problems resulting from the medical treatment of cancer(C3) • Analyze nutritional therapy for cancer clients(C4) 	6
Unit 10: Acquired immune deficiency syndrome (AIDS)		
Epidemiology, pathophysiology, causes & dietary management	<ul style="list-style-type: none"> • Define AIDS(C1) • Illustrate symptoms and etiological factors of HIV(C2) • Explain the different stages of HIV(C2) • Identify the diagnostic text and treatment(C3) • Analyze the dietary management in AIDS(C4) 	6

Learning Strategies, Contact Hours and Out of class engagement:

Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	-
Seminar	12	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Assignment	3	-
Total	60	60

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
Assignments/Presentations	x	x	x
End Semester Exam	x	x	x

Feedback Process:	
	Mid-Semester Feedback
	End-Semester Feedback

Main Reference:	<ol style="list-style-type: none">1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12th ed.). Published by WB Saunders Company3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	<ol style="list-style-type: none">1. Therapeutic Nutrition, 17th Ed., Mac Millan Publishing Co2. Shubhangini A Joshi (2002): Nutrition and Dietetics 2nd 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	Food Science - II
Course Code	CND2302
Academic Year	Second
Semester	III
Number of Credits	2
Course Prerequisite	Basic knowledge on food groups
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 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	Explain the major chemical reactions that occur during food preparation and storage (C2)
CO2	Interpret 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,	<ul style="list-style-type: none"> • 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) 	11



Content	Competencies	Number of Hours
spoilage, rancidity. role of fats and oils in cookery. Nuts and oil seeds: nutritive value, importance & classification	<ul style="list-style-type: none"> • Illustrate the effect of heating (C2) • Illustrate the role of fat/oil in cooking (C2) • Explain the unconventional oils (C2) • Interpret the nutritive value of nuts and oil seeds (C2) • 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.	<ul style="list-style-type: none"> • Explain the classification of vegetables(C1) • Define the composition and nutritive value of vegetables (C1) • Illustrate on the selection of vegetables (C2) • Explain the vegetable cookery (C2) • Illustrate the loss of nutrients during cooking and effect of cooking on pigments (C2) • Interpret on the storage of vegetables (C2) • Explain the classification of fruits(C2) • Define the composition and nutritive value of fruits (C1) • Explain the post- harvest changes and storage of fruits (C2) • Summarize on the ripening of fruits (C2) • Explain the enzymatic and non-enzymatic browning (C2) 	8
Unit 3: Sugar and Sugar products		
Form of sugar and liquid sweetness, caramelization, hydrolysis, crystallization, Indian confectionery	<ul style="list-style-type: none"> • Explain the nutritive value of sugar and related products (C2) • Explain the properties of sugar and related products (C2) • List the sugar related products (C1) • Explain the sugar cookery (C2) • Interpret the artificial sweeteners (C2) 	6
Unit 4: Spices and Condiments		
Importance, composition & classification	<ul style="list-style-type: none"> • Explain the importance and composition of spices (C2) • List the different spices (C1) 	5

Learning Strategies, Contact Hours and Out of class engagement:			
Learning Strategies	Contact Hours	Out of class engagement	
Lecture	30	-	
Seminar	-	-	
Small group discussion (SGD)	-	-	
Self-directed learning (SDL)	-	-	
Problem Based Learning (PBL)	-	-	
Case Based Learning (CBL)	-	-	
Clinic	-	-	
Practical	-	-	
Revision	-	-	
Assignment	-	-	
Total	30	30	
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. 6 th edition 2014 2. Sethi M and Malhan S (Revised 2 nd 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	Clinical Practice in Medical Nutrition Therapy - I							
Course Code	CND2303							
Academic Year	Second							
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 (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	<ul style="list-style-type: none"> • Illustrate the construction of therapeutic diets(P2) • Classify different steps in planning a menu(P3) • Demonstrate the diets planned for patients with fever(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with anaemia(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with obesity(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with diabetes(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management 	150

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> • Demonstrate the diets planned for patients with cardiovascular diseases(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with allergy(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management • Demonstrate the diets planned for patients with cancer(P2) <ol style="list-style-type: none"> 1. Modification of nutrients. 2. Principles of diet 3. Dietary management 	

Learning Strategies, Contact Hours and Out of class engagement:

Learning Strategies	Contact Hours	Out of class engagement
Clinic	90	-
Practical	60	-
Revision	-	-
Assignment	-	-
Total	150	150

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
Clinical/Practical Log Book/ Record Book	x
End Semester Exam	-
Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback

Main Reference:	<ol style="list-style-type: none">1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12th ed.). Published by WB Saunders Company3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	<ol style="list-style-type: none">1. Therapeutic Nutrition, 17th Ed., Mac Millan Publishing Co2. Shubhangini A Joshi (2002): Nutrition and Dietetics 2nd 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	Analysis in Food Science - II							
Course Code	CND2304							
Academic Year	Second							
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 (P3)							
CO2	Identify and explain nutrients in specific foods (P3)							
CO3	Apply food science knowledge to describe functions of ingredients in food. (P3)							
CO4	Demonstrate basic food composition and its effect on food characteristics. (P2)							
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	<ul style="list-style-type: none"> Identify the smoking point of any oils (P3) Demonstrate factor affecting absorption of oil (P2) Plan and prepare the shallow frying recipes (P3) Plan and prepare the deep fat frying recipes (P3) 	42
Unit 2: Vegetables and fruits		
Browning reaction, effect of acid and alkali, preparation of selected common recipe	<ul style="list-style-type: none"> Demonstrate enzymatic browning in vegetables and fruits (P2) Demonstrate the effect of acid and alkali on vegetables (P2) Plan and preparation of common recipes using vegetables and fruits (P2) 	47
Unit 3: Survey		
Survey of marketed processed and labelling of	<ul style="list-style-type: none"> Survey of marketed processed and labelling of processed food items (P4) 	11

Content	Competencies	Number of Hours
processed food items		
Unit 4: confectionary products		
Preparation of some confectionary products.	<ul style="list-style-type: none"> Demonstrate the different stages of sugarcooking (P2) Plan and preparation of some confectionary products (P3) 	40
Unit 5: Visit to confectionaries		
Visit to confectionaries.	<ul style="list-style-type: none"> Survey of the confectionaries (P4) 	10

Learning Strategies, Contact Hours and Out of class engagement:				
Learning Strategies	Contact Hours	Out of class engagement		
Lecture	-	-		
Clinic	90	-		
Practical	60	-		
Revision	-	-		
Assessment	-	-		
Total	150	150		
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	-	-	-	-
Any other WPBA	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. 6 th 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
BST3401	:	Biostatistics & Research Methodology
GPY2401	:	General Psychology
CND2401	:	Medical Nutrition Therapy - II
CND2402	:	Food Quality Control
CND2403	:	Clinical Practice in Medical Nutrition Therapy - II Program Elective - I
CND2404	:	Nutrition for Special Children
CND2405	:	Nutrition and Entrepreneurship

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		BST3401						
Academic Year		Second						
Semester		IV						
Number of Credits		3						
Course Prerequisite		Nil						
Course Synopsis		1. To provide necessary foundation on <ul style="list-style-type: none"> • 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	Summarize the variable types, scales of measurement and understand the role of biostatistics in health professions. (C2)							
CO2	Apply appropriate descriptive statistics, visualizations, point, interval estimation, and Confidence Interval, parametric and non-parametric tests to variables in healthcare studies. (C3)							
CO3	Outline the sources of demographic data and vital statistics, merits and demerits of Sampling distribution, probability and non-probability sampling techniques. (C2)							
CO4	Explain the steps involved in a research process, epidemiology and observational study designs. (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
Module 1: Introductory Biostatistics		
Introduction to Biostatistics	<ul style="list-style-type: none"> • Define statistics and biostatistics. (C1) • Describe the limitations and characteristics of biostatistics. (C2) • Explain the role of statistics in health sciences. 	3



Content	Competencies	Number of Hours
	(C2)	
Variables	<ul style="list-style-type: none"> Summarize the types of variables with examples. (C2) Distinguish between qualitative & quantitative with appropriate examples. (C2) Distinguish between continuous & discrete variables with appropriate examples. (C2) 	
Scales of Measurement	<ul style="list-style-type: none"> Describe nominal, ordinal, interval and ratio scale of measurement of variables with appropriate examples. (C2) Distinguish between the four scales of measurement. (C2) 	
Module 2: Descriptive Statistics		
Summarizing Data: Tabulation Methods	<ul style="list-style-type: none"> Illustrate the qualitative, quantitative and chronological classification to tabulate and summarize data. (C3) 	6 +1 SDL
Summarizing Data: Graphical Methods	<ul style="list-style-type: none"> Describe graphical methods to summarize data: Pie chart, Bar chart, Line Plot, Histogram, Frequency Curve and Frequency Polygon. (C2) 	
Measures of Central Tendency	<ul style="list-style-type: none"> Explain the concepts of Mean, Median, Mode. (C2) Explain the concepts of Quartiles and Percentiles.(C2) 	
Measures of Dispersion	<ul style="list-style-type: none"> Describe the concepts of Range, Inter-quartile range, Variance, Standard deviation and Coefficient of variation. (C2) Explain the concept of skewness and describe three types of skewness. (C2) Explain the concept of kurtosis and describe three types of kurtosis. (C2) 	
Module 3: Introduction to Probability and Normal Distribution		
Probability: An Introduction	<ul style="list-style-type: none"> Define the relative frequency approach to probability. (C1) 	3
Normal Distribution	<ul style="list-style-type: none"> Explain the characteristics of normal distribution. (C2) Compute the area under the normal distribution curve. (C3) 	
Module 4: Sampling Methods		
Need for Sampling	<ul style="list-style-type: none"> Explain the need for sampling and the advantages of sampling over complete enumeration. (C2) Explain sampling and non-sampling error. (C2) 	3

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> Define and distinguish probability and non-probability sampling methods. (C1) 	
Random Sampling Methods	<ul style="list-style-type: none"> Explain the uses and situation of each sampling technique and mention merits and demerits. (C2) 	
Non-random Sampling Methods	<ul style="list-style-type: none"> Explain the uses and situation of each sampling technique and mention merits and demerits. (C2) 	
Module 5: Introduction to Correlation and Regression Analysis		
Correlation Analysis	<ul style="list-style-type: none"> Define correlation and its properties. (C2) Explain types of correlation with diagrams and appropriate examples. (C2) Illustrate using scatter plot the different types of correlation.(C3) Explain the Pearson's correlation coefficient and outline its properties. (C2) Explain the Spearman's correlation coefficient and outline its properties. (C2) 	4
Regression Analysis	<ul style="list-style-type: none"> 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) 	
Module 6: Testing of Significance		
Understanding population, sample, parameter and statistics, estimate and estimator	<ul style="list-style-type: none"> Define and differentiate parameter and statistic with examples. (C2) Define the basic terms-population, sample, sampling, parameter, statistic, estimate and estimator, point estimate. (C1) Define and differentiate standard deviation and standard error. (C2) 	6 +2 SDL
Sampling distribution/standard error	<ul style="list-style-type: none"> Determine the sampling distribution/standard error of sample mean, sample proportion, difference between two means, difference between two proportions (Large sample approximation (CLT).(C3) 	
Confidence Interval	<ul style="list-style-type: none"> Construct and interpret confidence interval for mean, difference between two means, proportion, difference between two proportions (large sample approximation). (C3) 	

Content	Competencies	Number of Hours
Module 7: Testing of Hypothesis		
General procedure of testing of hypothesis	<ul style="list-style-type: none"> Define/explain with example the concept of null hypothesis, alternative hypothesis, type I and type II errors. Define level of significance, power of the test and p-value, one sided and two-sided test. (C2) 	6
Parametric test: Single mean test, difference between two means test, and paired t test.	<ul style="list-style-type: none"> Explain the differences, merits and demerits of parametric and non-parametric over parametric tests. (C2) 	
Non-Parametric test: Chi-square test, Mann-whitney test, Sign test	<ul style="list-style-type: none"> Give the situation for parametric and non-parametric tests. (C2) 	
Module 8: Introduction to Research Methodology		
Research Methodology, Research Design and Review of Literature	<ul style="list-style-type: none"> Explain the research process and describe various research designs with flowchart. (C2) Explain different methods of data collection and data sources. (C2) 	4 +2 SDL
Module 9: Vital Statistics and Epidemiology		
Introduction to demography, vital statistics and epidemiology	<ul style="list-style-type: none"> Define Epidemiology, Demography and Vital statistics. (C1) What are the sources of demographic data and vital statistics. (C1) 	3 +2 SDL
Morbidity, mortality and fertility rates	<ul style="list-style-type: none"> Define and distinguish rate, ratio and proportion (C1) Explain prevalence and incidence. (C2) Explain each measure of morbidity, mortality and fertility rates by stating the formula. (C2) 	
Observational Study Design	<ul style="list-style-type: none"> Explain the observational study designs (case report, case series, case-control, cross-sectional, ecological). (C2) 	

Learning Strategies, Contact Hours and Out of Class Engagement				
Learning Strategies	Contact Hours	Out-of-class engagement		
Lecture	38	-		
SDL	7	-		
Total	45	45		
Assessment Methods:				
Formative:		Summative:		
Unit Test		Mid Semester Exam		
		End Semester Exam		
Mapping of Assessment with COs:				
Nature of Assessment	CO1	CO2	CO3	CO4
Unit Test	x	x	x	x
Mid Semester Examination	x	x	x	-
End Semester Exam	x	x	x	x
Feedback Process:	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. Daniel, W. W., and Cross, C. L. (2018). Biostatistics: a foundation for analysis in the health sciences. Wiley. 2. Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International. 3. Rosner, Bernard, (2010). Fundamentals of Biostatistics, 7 th Edition, Duxbury Press. 4. Peter Armitage, Geoffrey Berry, J. N. S. Matthews, (2002). Statistical Methods in Medical Research, 4 th Edition, Blackwell. 5. Wayne W. Daniel, (2004). Biostatistics_ A Foundation for Analysis in the Health Sciences, 8 th Edition, Wiley Series in Probability and Statistics.			

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	General Psychology							
Course Code	GPY2401							
Academic Year	Second							
Semester	04							
Number of Credits	02							
Course Prerequisite	Nil							
Course Synopsis	1. Orients and familiarises students with the basic psychological processes. 2. Enables the students to understand how psychological principles are applied daily.							
Course Outcomes (Cos):								
At the end of the course, student shall be able to:								
CO1	Explain the history, research methods, and scope of Psychology. (C2)							
CO2	Explain the processes of perception, learning, memory, thinking, and intelligence (C2)							
CO3	Outline the role of motivation, emotion, and personality in shaping human behavior (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:		
Introduction to Psychology	1. Define Psychology(C1) 2. Outline the evolution of Psychology as a scientific discipline (C2) 3. Enumerate the different branches of Psychology(C1) 4. Explain the importance of Experimental method in the field of Psychology(C2) 5. Explain the observation method in Psychology (C2)	4
Unit 2:		
Perception	1. Define Perception (C1) 2. Describe the various principles of Perceptual groupings (C2)	4

Content	Competencies	Number of Hours
	3. Illustrate the Gestalt laws of perception (C2) 4. Define Perceptual constancy and explain its types(C2) 5. What are Monocular and Binocular cues in Perception (C1) 7. Explain types of motion perception (C2)	
Unit 3:		
Learning	1. Define Learning (C1) 2. Explain Pavlov's Classical Conditioning(C2) 3. Explain the applications of Classical Conditioning(C2) 4. What is Operant Conditioning. (C1) 5. Define reinforcement and punishment (C1) 6. Compare the types of reinforcement and Punishment(C2) 7. Explain with examples the schedules of Reinforcement (C2) 8. Explain the applications of Operant Conditioning(C2) 9. Explain observation learning with its classic experiment (C2) 10. Explain the processes in observation learning (C2)	3
Unit 4:		
Memory	1. Define Memory (C1) 2. Explain the processes that underlie memory (C2) 3. Define forgetting (C1) 4. Illustrate forgetting curve (C2) 5. Explain the various strategies to improve memory (C2)	2
Unit-5:		
Thinking & Problem solving	1. Define thinking (C1) 2. What are the components of thinking (C1) 3. Define concepts(C1) 4. Compare the different types of concept (C2) 5. Define creative thinking and enumerate the steps in creative thinking (C1) 6. What are the different strategies used to solve problems (C1) (Trial & error, Heuristics, Algorithm)	3
Unit-6:		
Intelligence	1. Define Intelligence (C1) 2. Summarise the various theories of Intelligence (C2) (Two factor, Crystallised and Fluid, Multiple intelligence)	3

Content	Competencies	Number of Hours
	3. List the different types of Intelligence tests (C1) 4. Define Emotional Intelligence (C1) 5. What are the different components of emotional intelligence? (C1)	
Unit-7:		
Motivation & Conflict	1. Define Motivation (C1) 2. Explain the biological theories of Motivation (C2) (Drive reduction theory, Optimal arousal theory, Instinct theory) 3. Explain the Psychological theories of Motivation (C2) (Maslow's hierarchy theory) 4. Define Conflict (C1) 5. Explain the types of Conflict with examples (C2) (Approach- Approach conflict, Avoidance- Avoidance conflict, Approach- Avoidance conflict and Double Approach- Avoidance conflict)	3
Unit-8:		
Emotion	1. Define Emotion (C1) 2. List the characteristics of Emotion (C1) 3. What are the functions of emotions (C1) 4. Explain the various theories of Emotion (C2)(James-Lange, Cannon- Bard, Schachter- Singer)	2
Unit-9:		
Personality	1. Define Personality(C1) 2. Explain the Psychodynamic theory of Personality (C2) 3. Explain the trait approach to Personality (C2) 4. Explain Rogers' humanistic approach in understanding Personality (C2) 5. Explain the various assessment methods in studying Personality (C2)	6

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	30	-
Assessment	-	-
Total	30	30
Assessment Methods:		
Formative:	Summative:	
Quiz	Mid Semester/Sessional Exam (Theory)	
	End semester exam (Theory)	

Mapping of Assessment with COs:			
Nature of Assessment	CO1	CO2	CO3
Quiz	x	x	x
Mid Semester/Sessional examination	x	x	
End semester examination	x	x	x
Feedback Process:	End-Semester Feedback		
Main Reference:	1. Baron, R. A., Byrne, D., & Mankowitz, B. H. (1977). Psychology: Understanding behaviour. Philadelphia: W.B. Saunders Co.		
	2. Feldman, R. S. (1993). Understanding psychology. New York: McGraw-Hill.		
Additional References	1. Myers, D. G. (2005). <i>Exploring psychology</i> . New York, NY: Worth 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	Medical Nutrition Therapy - II							
Course Code	CND2401							
Academic Year	Second							
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	Outline disease and its pathophysiology, characteristics of interactions between drugs and food nutrients (C2).							
CO2	Identify nutritional needs in clinical setting, interactions between drugs, food nutrients (C3).							
CO3	Analyze medical nutrition therapy management, interactions between drugs, food nutrients and nutritional status(C4).							
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: Renal disease		
Epidemiology, pathophysiology causes & dietary management	<ul style="list-style-type: none"> • Explain physiology & function of normal kidney a brief review(C2) • Identify diseases of the kidney and its classification(C3) • Analyse the dietary management of renal disease(C4) <ol style="list-style-type: none"> 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 	9

Content	Competencies	Number of Hours
	<p>principles of protein nutrition in renal failure and uremia.</p> <p>4. Acute renal failure – causes, dietary management fluid, sodium and potassium balance, protein and energy requirements</p> <p>5. Chronic renal failure medical treatment,</p> <p>6. Renal transplants. Dialysis and types hemodialysis, peritoneal dialysis & continuous ambulatory peritoneal dialysis (capd). Dietary management in conservative treatment, dialysis and after renal transplantation.</p> <p>7. Use of sodium and potassium exchange lists in renal (diet planning)</p> <p>8. Chronic renal failure in patients with diabetes mellitus</p> <p>9. Chronic renal failure in children</p> <p>10. Nephrolithiases – etiology, types of stones, nutritional care, alkaline-ash diets</p>	
Unit 2: Gout		
Causes & dietary management	<ul style="list-style-type: none"> Identify nature and occurrence of uric acid, causes, symptoms(C3) Analyze the dietary management of gout(C4) 	3
Unit 3: Gastro Intestinal Diseases		
Diet therapy in gastrointestinal disturbances	<ul style="list-style-type: none"> Explain epidemiology, pathophysiology causes & diarrhoea, constipation, peptic ulcer, gastritis, inflammatory bowel disease(C2) analyze dietary management of diarrhoea, constipation, peptic ulcer, gastritis, inflammatory bowel disease (C4) Identify the major functions of the normal liver(C3) Analyze the appropriate diet therapy for treating liver diseases and state the rationale for its use in treating hepatitis, cirrhosis, hepatic coma and liver failure and liver transplant(C4) 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) Analyze and give examples of the diet therapy used for gallbladder disease(C4) Identify the major causes of pancreatitis (C3) Relate the association between pancreatitis and 	21

Content	Competencies	Number of Hours
	gallbladder disease(C1) • Analyze the diet therapy for pancreatitis (C4)	
Unit 4: Respiratory diseases		
Diet therapy in COPD, tuberculosis	• Explain epidemiology, pathophysiology and causes of COPD, tuberculosis (C2) • Analyze the dietary management of COPD, tuberculosis (C4)	8
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) • Analyze the dietary management of phenylketonuria, galctosemia fructosuria(C4) 1. Requirements 2. Restrictions 3. Appropriate supplements	9
Unit 6: Interactions between Drugs, Food Nutrients and Nutritional Status		
Interactions between drugs, food nutrients and nutritional status	• Explain drug and nutrient interaction (C2) • Identify the effect on ingestion, digestion, absorption and metabolism of nutrients, (C3) • Analyze the effect on nutritional status, organ function, drug dosage and efficacy, drug abuse and drug resistance(C4)	10

Learning Strategies, Contact Hours and Out of class engagement

Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	-
Seminar	12	-
Assignment	3	-
Total	60	60

Assessment Methods:
Formative:

Unit Test

Assignments/Presentations

Summative:

Mid Semester Exam

End Semester Exam

Mapping of Assessment with COs:

Nature of Assessment	CO1	CO2	CO3
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:	<ol style="list-style-type: none"> 1. Anita, F.P. (2010). Clinical Dietetics and Nutrition (4th ed.). Pharmamed 2. Krause and Mahan (2008). Food Nutrition, Diet Therapy (12th ed.). Published by WB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	1. Shubhangini A Joshi (2002): Nutrition and Dietetics 2nd 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	Food Quality Control							
Course Code	CND2402							
Academic Year	Second							
Semester	IV							
Number of Credits	4							
Course Prerequisite	Basic knowledge of food groups							
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 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	What is the hazard of the food chain to ensure food safety(C1)							
CO2	Identify the adulteration in food samples (C3)							
CO3	Explain the sensory and objective evaluation, application of food quality and food safety system (C2)							
CO4	Extend the chemical and microbiological quality of food samples (C2)							
CO5	Interpret 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	<ul style="list-style-type: none"> • 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) 	12

Content	Competencies	Number of Hours
control, process control, finished product control and inspection.	<ul style="list-style-type: none"> Extend the purpose of inspection (C2) List the stages of inspection (C1) Identify the methods of inspection (C3) Identify the drawbacks of inspection (C3) 	
Unit 2: Food additives, fortification and enrichment		
<p>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</p>	<ul style="list-style-type: none"> Define food additives (C1) Illustrate importance, principles and objectives for food additives (C2) Define food preservatives (C1) Explain principal preservatives in current use (C2) Define colour additives (C1) Explain natural colour, synthetic colours and non-certified colours (C2) Identify flavouring agents (C3) Explain natural and synthetic colours (C2) Define food fortification and enrichment (C1) Identify the role and objective of food fortification (C3) 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) 	17
Unit 3: Sensory evaluation of food quality		
<p>Sensory characteristics of food, types of tests. Objective evaluation: types of tests, texture evaluation. Conducting sensory tests and preparation of evaluation card</p>	<ul style="list-style-type: none"> Define sensory evaluation (C1) Explain the sensory characteristics of food (C2) Find the types of sensory tests (C1) Extend the preparation of evaluation card for sensory tests (C2) Identify objective evaluation (C3) Find the tests used for objective evaluation (C1) Identify the instruments used for texture evaluation (C3) 	12
Unit 4: Adulteration of food		
<p>Definition, types. contamination of food</p>	<ul style="list-style-type: none"> Define food adulteration (C1) Extend the types of adulterants (C2) 	11

Content	Competencies	Number of Hours
by incidental adulteration by microorganisms, packing materials and other sources. Tests to detect common adulterants	<ul style="list-style-type: none"> • Explain intentional and incidental adulterants (C2) • Identify the different test to detect common adulterants (C3) 	
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	<ul style="list-style-type: none"> • Find the national and international food standards (C1) • Extend the importance, principles and determination of CCP (C2) • Identify the problems in implementing HACCP (C3) • Explain the importance of total quality management, good manufacturing practice and good laboratory practices (C2) 	8

Learning Strategies, Contact Hours and Out of class engagement:					
Learning Strategies	Contact Hours	Out of class engagement			
Lecture	45	-			
Seminar	13	-			
Small group discussion (SGD)	-	-			
Self-directed learning (SDL)	-	-			
Assignment	2				
Total	60	60			
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:	<ol style="list-style-type: none">1. Martin EH (1986) Standard methods for the examination of dairy products2. Bhartiya C (2010). Managing food quality. Surendrapublishing
Additional References	<ol style="list-style-type: none">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		Clinical Practice in Medical Nutrition Therapy II						
Course Code		CND2403						
Academic Year		Second						
Semester		IV						
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	Application of clinical practice in diet therapy such as nutrition assessment, intervention, and education to patients (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-diarrhea, 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) <ul style="list-style-type: none"> • Modification of nutrients. • Principles of diet • Dietary management 	150

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	-	-
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	90	-
Practical	60	-
Revision	-	-
Assignment	-	-
Total	150	150
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	
Mid Semester Examination	-	
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 (12th ed.). Published by WB Saunders Company 3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.	
Additional References	1. Shubhangini A Joshi (2002): Nutrition and Dietetics 2nd 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		Nutrition for Special Children						
Course Code		CND2404						
Academic Year		Second						
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	Identify and apply nutrition concept to improve overall health (C3)							
CO4	Analyze recommendation for improving nutritional status of special children (C4)							
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 <ul style="list-style-type: none"> • Nutritional ABCD • Practices and issues of feeding toddlers and young children • Meal planning, food Safety, nutrition education. • Use of right feeding equipment. 	<ul style="list-style-type: none"> • What are the anthropometry measurements, biochemical methods of nutritional status, clinical assessment of nutritional deficiencies and diet recommendation? (C1) • Interpret the medical condition and nutrition management (C2) • Identify the different feeding practices and challenges in feeding the children with neurodisabilities (C3) • Analyze the right feeding equipment and nutritional management (C4) 	45

Learning Strategies, Contact Hours and Out of class engagement:				
Learning Strategies	Contact Hours	Out of class engagement		
Lecture	45	-		
Seminar	-	-		
Small group discussion (SGD)	-	-		
Self-directed learning (SDL)	-	-		
Problem Based Learning (PBL)	-	-		
Case Based Learning (CBL)	-	-		
Clinic	-	-		
Practical	-	-		
Revision	-	-		
Assignment	-	-		
Total	45	45		
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 ageinternational Publ., New Delhi			
Additional References	1. Krause and Mahan (2008). Food Nutrition, Diet Therapy(12thed.). Published byWB Saunders Company			

Content	Competencies	Number of Hours
entrepreneur.	<ul style="list-style-type: none"> Identify FSSAI guidelines for a food start-up(C3) 	
Unit 3: Nutrition Based Enterprise		
Knowledge regarding steps to be undertaken for setting up a nutrition based food business	<ul style="list-style-type: none"> Explain qualities/ traits of an entrepreneur(C2) Identify entrepreneurship skills, creation of different visions emerging central and secondary visions(C3) Illustrate entrepreneurial motivation(C2) <ul style="list-style-type: none"> -The motivating factors -Entrepreneurial ambitions -Compelling factors -Facilitating factors and achievement motivation Explain the process of entrepreneurship development(C2) <ul style="list-style-type: none"> -Stages tasks to be performed. -The learning required to perform the tasks. Illustrate the development of the business plan <ul style="list-style-type: none"> -Idea generation and validating the idea. -Statement of objectives and description of product/service -Clients and scope Identify the market research and analysis, location choices, operations plan, analysis of risks, organization of the management team and distribution of tasks. Overall schedule of activities leading to start up and the finance management(C2) Explain negotiations with the family friends, relatives, shareholders and financial institutions Angel' money(C2) Infer on developing leadership among women entrepreneurs and networking amongst entrepreneurs(C2). Explain the development of innovative nutritious products(C2) Summarize the computation of nutritive value of the product(C2) Explain the development of business plan for a nutritious food(C2) Illustrate resource management(C2) 	27

Learning Strategies, Contact Hours and Out of class engagement:			
Learning Strategies	Contact Hours	Out of class engagement	
Lecture	45	-	
Seminar	-	-	
Small group discussion (SGD)	-	-	
Self-directed learning (SDL)	-	-	
Problem Based Learning (PBL)	-	-	
Case Based Learning (CBL)	-	-	
Clinic	-	-	
Practical	-	-	
Revision	-	-	
Assignment	-	-	
Total	45	45	
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. Entrepreneurship Development & Small Business Enterprises, Poornima M Charantimath, Pearson Education. 2. Entrepreneurship New Venture creation David H.Holt Prentice Hall.		

SEMESTER - V

COURSE CODE	:	COURSE TITLE
CND3301	:	Nutrition in Critical Care
CND3302	:	Clinical Nutrition through Life Cycle - I
CND3303	:	Dietetics and Counselling
CND3304	:	Therapeutic Practice in Critical Care Nutrition & Life Cycle - I
*** **	:	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		CND3301						
Academic Year		Third						
Semester		V Semester						
Number of Credits		4						
Course Prerequisite		Basic knowledge of medical nutrition therapy						
Course Synopsis		<p>This module provides</p> <ol style="list-style-type: none"> 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 complications	<ul style="list-style-type: none"> • Explain the concept of assessment of nutritional status – Subjective Global Assessment (SGA), Malnutrition Universal Screening Tool (MUST), Mini Nutrition Assessment (MNA), Nutritional Risk Screening (NRS), Malnutrition Screening Tool (MST) (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) 	20
Unit 2: Nutrition Support in Critically ill Patients		
Surgical conditions, burns and palliative care	<ul style="list-style-type: none"> • 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) • Identify the severity of a burn by its degree (C3) • 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 optimizing nutrition in palliative care (C2) 	25
Unit 3: Basic Sports Nutrition		
<ol style="list-style-type: none"> 1. Definition of <ul style="list-style-type: none"> • Physical activity • Exercise • Physical fitness • Sports physiology • Sports nutrition 2. Benefits of physical activity and exercise. 3. Classification of sports activities. 	<ul style="list-style-type: none"> • 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 sports activities (C2) 	15

Content	Competencies	Number of Hours
4. Nutritional requirements of sports person. 5. Pre- event meal.	<ul style="list-style-type: none"> Explain the pre-competition meal (C2) 	

Learning Strategies, Contact Hours and Out of class engagement:					
Learning Strategies	Contact Hours	Out of class engagement			
Lecture	45	-			
Seminar	12	-			
Small group discussion (SGD)	-	-			
Self-directed learning (SDL)	-	-			
Problem Based Learning (PBL)	-	-			
Case Based Learning (CBL)	-	-			
Clinic	-	-			
Practical	-	-			
Revision	-	-			
Assignment	3	-			
Total	60	60			
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 (12th ed.). Published by WB Saunders Company				

	3. Srilakshmi B (2011). Dietetics (6th ed.). Wiley Eastern Limited.
Additional References	<ol style="list-style-type: none">1. Sports and Fitness Nutrition – Robert Wildmon and Berry Miller2. Practical Application in Sports Nutrition – Heather Hedrick Fink, Lisa Burgoon, Alan Mikesky.3. Nutrition for Sports and Exercise – Jacqueline Berming and Suzame Nelson4. 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	CND3302							
Academic Year	Third							
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 evolve 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	Explain how nutrition affects growth and development and the physiological basis of nutritional requirements throughout the life span (C2)							
CO2	Identify eating patterns, nutritional problems and selected chronic diseases characteristic of age groups throughout the life span (C3)							
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: a) physiology	<ul style="list-style-type: none"> • Explain the physiological changes during pregnancy (C2) • Illustrate preconceptual nutrition (C2) • Illustrate the nutritional requirement during pregnancy (C2) • Identify dietary modification during pregnancy (C2) • Extend the general dietary problems during pregnancy (C2) • Infer on the weight gain during pregnancy (C2) • Explain the complications during 	23



Content	Competencies	Number of Hours
b) nutritional requirements, breast feeding an infant.	<p>pregnancy (C2)</p> <ul style="list-style-type: none"> List the general dietary guidelines for pregnancy (C1) Explain the role of hormones (C2) List the factors affecting the volume and composition of breast milk (C1) Illustrate the nutritional requirement during lactation (C2) Illustrate the food requirement and general dietary guidelines for lactating mothers (C2) 	
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)	<ul style="list-style-type: none"> Explain the growth and development during infancy (C2) 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) Summarize the feeding problems (C2) Define 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) 	22
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	<ul style="list-style-type: none"> Explain the nutritional requirements of preschool children (C2) Extend the factors affecting nutritional status of preschool children (C2) Identify the food requirements of preschool children (C3) 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) Summarize the food requirements of 	15

Content	Competencies	Number of Hours
	school children (C2) <ul style="list-style-type: none"> Extend the feeding problems of school children (C2) Explain the packed lunches and school lunch programmes (C2) 	

Learning Strategies, Contact Hours and Out of class engagement:				
Learning Strategies	Contact Hours	Out of class engagement		
Lecture	45	-		
Seminar	12	-		
Small group discussion (SGD)	-	-		
Self-directed learning (SDL)	-	-		
Problem Based Learning (PBL)	-	-		
Case Based Learning (CBL)	-	-		
Clinic	-	-		
Practical	-	-		
Revision	-	-		
Assignment	3	-		
Total	60	60		
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 (12th ed.). Published by WB Saunders

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

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	CND3303							
Academic Year	Third							
Semester	V							
Number of Credits	3							
Course Prerequisite	Basic principles related to behavior change and client interactions.							
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)							
CO3	Identify the techniques involved in diet counselling, stages and process of intervention and models that can be used for counselling(C3)							
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				

Course Content and Outcomes:

Content	Competencies	Number of Hours
Unit 1: Dietetics and Counselling		
Practical consideration in giving dietary advice and counselling –	<ul style="list-style-type: none"> Relate factors affecting individual food choice. (C2) Illustrate communication of dietary advice. (C2) Explain the consideration of behavior modification(C2) Explain motivation in dietary advice. (C2) 	15
Unit 2: Counselling and educating patient		
Counselling and educating patient	<ul style="list-style-type: none"> Define nutrition counselling(C1) What is nutrition education? (C1) Compare nutrition education and nutrition counselling(C2) Explain aim, objective and purpose of nutritional counselling(C2) 	15

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> Identify the steps and values in nutritional counselling(C3) Explain the key skills of counselor(C2) Explain the role of nutrition counsellor (C2) Illustrate the responsibilities of the nutrition counsellor(C2) Compare Practitioner v/s client managed care(C2) Summarize the barriers of counseling in clinical practice(C2) 	
Unit 3: Teaching aids used by dieticians		
Teaching aids used by dieticians	<ul style="list-style-type: none"> Explain teaching aids-Charts, leaflets, posters(C2) Identify teaching materials used by dieticians for patients(C3) 	15

Learning Strategies, Contact Hours and Out of class engagement:

Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	-
Assignment	-	-
Total	45	45

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
End Semester Exam	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

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	CND3304							
Academic Year	Third							
Semester	V							
Number of Credits	6							
Course Prerequisite	Basic knowledge of nutrients and food groups							
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 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 (P3)							
CO2	Demonstrate the ability to determine nutrient requirements across the lifespan (P2)							
CO3	Demonstrate working knowledge of the influence of age, growth, and normal development on nutritional requirements (P2)							
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	<ul style="list-style-type: none"> • Planning and preparation of the diet for critically ill patients (surgical, burns, palliative care, enteral and parenteral care) (P3) 	100
Unit 2: Diet for Pregnant, lactating Woman, toddler, preschool and school going		
Planning a day's diet for pregnant, lactating woman, toddler and preschool	<ul style="list-style-type: none"> • Planning and preparing a day's diet for pregnant, lactating, women, toddler, preschool and school going(P3) 	108

Content	Competencies	Number of Hours
Unit 3: Complimentary Feeds		
Preparing complimentary feeds for infants-weaning foods	<ul style="list-style-type: none"> Demonstrate common complimentary feeds for infants (P2) 	32

Learning Strategies, Contact Hours and Out of class engagement:

Learning Strategies	Contact Hours	Out of class engagement
Lecture	-	-
Seminar	-	-
Clinic	180	-
Practical	60	-
Revision	-	-
Assignment	-	-
Total	240	240

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

SEMESTER - VI

COURSE CODE	:	COURSE TITLE
CND3401	:	Clinical Nutrition through Life Cycle - II
CND3402	:	Food Preservation
CND3403	:	Community Nutrition
CND3404	:	Therapeutic Practice in Nutrition through Life Cycle - II
CND3405	:	Clinical Practice in Community Nutrition
	:	Program Elective - II
CND3406	:	Nutritional Consideration during Disasters
CND3407	:	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	CND3401							
Academic Year	Third							
Semester	VI							
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 that evolve 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	Explain how nutrition affects growth and development and the physiological basis of nutritional requirements throughout the life span (C2)							
CO2	Identify eating patterns, nutritional problems and selected chronic diseases characteristic of age groups throughout the life span (C3)							
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.	<ul style="list-style-type: none"> • Define the adolescence (C1) • Explain the growth, development and physiological changes during adolescence (C2) • Illustrate the nutritional requirements during adolescence (C2) • Summarize the food habits during adolescence (C2) • Identify the health and eating related behavior during adolescence (C3) • Extend the nutritional problems (C2) 	17

Content	Competencies	Number of Hours
Unit 2: Nutrition in adults		
a) Nutrient needs modifications for different activity levels and different income groups	<ul style="list-style-type: none"> • Explain the physical development (C2) • Identify the nutritional requirements for adults (C3) • Explain the modification of nutrients for different level and different income groups (C2) • Define food security (C1) • Extend the low-cost balanced diets (C2) • List the dietary guidelines to reduce the cost of a meal (C1) 	16
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.	<ul style="list-style-type: none"> • Explain the process of ageing (C2) • Explain the nutritional requirements during old age (C2) • Extend the food requirements (C2) • Illustrate the nutrition related problems of old age (C2) • Identify the degenerative diseases (C3) • 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) 	12

Learning Strategies, Contact Hours and Out of class engagement

Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	-
Assignment	-	-
Total	45	45

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:	<ol style="list-style-type: none"> 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 (12th ed.). Published by WB Saunders Company 4. Shils ME, Olson JA, Shike M, Ross AC, Cabellaro B and Cousins RJ (2006). Modern Nutrition in Health and Disease (10th ed.). Lippincott, Williams and Wilkins publications
Additional References	<ol style="list-style-type: none"> 1. Gordon M Ward law (1999) Perspectives in Nutrition 4th ed. WCB/Mcgraw Hill. International edition 2. Shubhangini A Joshi (2002): Nutrition and Dietetics 2nd 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	CND3402
Academic Year	Third
Semester	VI
Number of Credits	3
Course Prerequisite	Basic knowledge of food groups
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 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	Explain the importance of food preservation (C2)
CO3	Explain the principles of food preservation(C2)
CO4	Identify the key basic methods of food preservation(C3)
CO5	Demonstrate recipes for preservation of simple food items (P2)

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	<ul style="list-style-type: none"> • Explain the prevention or delay of microbial decomposition (C2) 	3

Content	Competencies	Number of Hours
of food preservation	<ul style="list-style-type: none"> • Explain by killing the microorganisms (C2) • Illustrate the prevention or delay of self-decomposition of the food(C2) • 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.	<ul style="list-style-type: none"> • Identify the bacteriostatic method of preservation(C3) • Explain the dehydration principle of preservation(C2) • Explain regarding the dehydrated foods (C2) 	6
Unit 3: Preservation by Preservatives		
Principles, types of preservatives, action on foods	<ul style="list-style-type: none"> • Explain the role of preservatives(c2) • Compare the types of preservatives (C2) • Illustrate the action of preservative on foods(C2) 	5
Unit 4: Preservation by Osmotic Pressure		
Principles and method of preservation	<ul style="list-style-type: none"> • Explain preservation by high concentration of sugar /salt(C2) • Explain preservation by low concentration of sugar /salt(C2) 	6
Unit 5: Preservation by Irradiation		
Principles and method of preservation	<ul style="list-style-type: none"> • Explain preservation by electromagnetic irradiation (C2) • Identify preservation by ultra violet rays (C3) 	3
Unit 6: Introduction to Food Packaging		
Introduction to food packaging	<ul style="list-style-type: none"> • Identify the objectives and functions of food packaging(C3) • Explain the requirements for effective food packaging(C2) • Illustrate the types of packaging materials and general properties of packaging material(C2) 	7
Practical		
Unit 1: Preparation of the selected recipes		
Preparation of the selected recipes	<ul style="list-style-type: none"> • Demonstrate the plan and preparation of jellies, jams, squashes, pickles and dehydrated vegetables (P2) 	10
Unit 2: Preparation of the selected recipes for preservation		
Preparation of the selected recipes for preservation	<ul style="list-style-type: none"> • Demonstrate the plan and preparation of tutti frutti, ketchups & sauces, chutneys, chutney powder, frozen fruits and vegetables (P2) 	12

Content	Competencies	Number of Hours
Unit 3: Visit to food industry		
Visit to food industry	Survey of the food industry (P4)	8

Learning Strategies, Contact Hours and Out of class engagement:					
Learning Strategies	Contact Hours	Out of class engagement			
Lecture	30	-			
Seminar	-	-			
Small group discussion (SGD)	-	-			
Self-directed learning (SDL)	-	-			
Case Based Learning (CBL)	-	-			
Clinic	-	-			
Practical	30	-			
Revision	-	-			
Assignment	-	-			
Total	60	60			
Assessment Methods:					
Formative:			Summative:		
Unit Test			Mid Semester Exam		
Viva			End Semester Exam (Theory)		
Clinical/Practical Logbook/ RecordBook					
Mapping of Assessment with COs:					
Nature of Assessment	CO1	CO2	CO3	CO4	CO5
Mid Semester Examination	x	x	x	x	-
Any other WPBA	x	x	x	-	x
Clinical/Practical Logbook/ RecordBook	x	x	x	-	x
End Semester Exam	x	x	x	x	-
Feedback Process:	Mid-Semester Feedback				
	End-Semester Feedback				
Main Reference:	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		Community Nutrition						
Course Code		CND3403						
Academic Year		Third						
Semester		VI						
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	Identify and understand nutrition problems and practices in the community(C3)							
CO2	Explain skills needed to deliver nutrition services and methods of accessing community nutrition resources and information(C2)							
CO3	Explain the food assistance programs and role of the public health nutritionist working with these programs(C2)							
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 ofHours
Unit 1: Nutrition and health in National development		
Introduction to nutrition and health in national development	<ul style="list-style-type: none"> Explain concept and scope of community nutrition(C2) Explain the food availability and factors affecting food availability and intake(C2) Explain food security and adequacy of diets(C2) 	6

Content	Competencies	Number of Hours
Unit 2: Concept of community nutrition and malnutrition		
Nutritional problems of communities and implications for public health. Common nutritional problems in India. Incidence – National, regional. nutritional and non-nutritional signs, symptoms, effect of deficiency and treatment	<ul style="list-style-type: none"> • Explain 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 girl child (including adolescents) (C2) • Identify nutritional and non-nutritional signs, symptoms, effect of deficiency and treatment (C3) • List the health agencies (FAO, WHO, ICMR, ICDS, ICAR, CSIR, ANP, VHA, NIN and CFTRI) and Role of voluntary health organization in the improvement of Community health (C1) 	12
Unit 3: Methods of assessing nutritional status		
Assessment of nutritional status	<ul style="list-style-type: none"> • List the methods of assessing nutritional status (C1) <ol style="list-style-type: none"> 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. 	9
Unit 4: Improvement of nutrition of a community		
Nutrition policy of India and plan of action.	<ul style="list-style-type: none"> • List different modern methods of improving nutritional quality of food, food fortification, enrichment and nutrient supplementations (C1) 	9
Unit 5: Community nutrition program planning		
Health and nutrition education – steps in planning, implementation, and evaluations. Use of educational aids – visual, audio, audio-visual, traditional media etc.	<ul style="list-style-type: none"> • Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the programme (C3) 	9

Learning Strategies, Contact Hours and Out of class engagement				
Learning Strategies	Contact Hours	Out of class engagement		
Lecture	45	-		
Assignment	-	-		
Clinics	-	-		
Revision	-	-		
Total	45	45		
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	Therapeutic Practice in Nutrition through Life Cycle - II							
Course Code	CND3404							
Academic Year	Third							
Semester	VI							
Number of Credits	4							
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 (P2)							
CO2	Demonstrate working knowledge of the influence of age, growth, and normal development on nutritional requirements (P2)							
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 an adolescent		
Diet for an adolescent	<ul style="list-style-type: none"> Demonstrate the plan and preparation of a day's diet for an adolescent girl (P2) Demonstrate the plan and preparation of a day's diet for an adolescent boy (P2) 	55
Unit 2: Diet for an adult and senior citizen		
Diet for an adult and senior citizen	<ul style="list-style-type: none"> Demonstrate planning and preparation of a day's diet for an adult man (sedentary/moderate/ heavy worker) (P2) Demonstrate the plan and preparation of a day's diet for an adult woman (sedentary/moderate/ heavy worker) (P2) Demonstrate the plan and preparation of a day's diet for a senior citizen (P2) 	110

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	-	-
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	135	-
Practical	30	-
Revision	-	-
Assignment	-	-
Total	165	165
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	-	-
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, NewDelhi 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	Clinical Practice in Community Nutrition
Course Code	CND3405
Academic Year	Third
Semester	VI
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 (P3)
Mapping of Course Outcomes (COs) to Program Outcomes (POs):	
COs	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8
CO1	

Content	Competencies	Number of Hours
Unit 1: Diet and nutrition surveys		
Diet and nutrition surveys: (Identified field area in the specific families)	<ul style="list-style-type: none"> • Identification of vulnerable and risk groups(P3) • Applying different anthropometric measurement in children(P3) • Survey for breast-feeding and weaning practices of specific groups (P4) 	65
Unit 2: Preparation of visual aids		
Preparation of visual aids	<ul style="list-style-type: none"> • Demonstrate using visual aids for educating importance of nutrition in community(P2) 	20
Unit 3: Field visit		
Field visit to community	<ul style="list-style-type: none"> • Survey the working of nutrition and health oriented programmes(P4) • Identify hospitals based nutritional deficiencies(P3) 	65

Learning Strategies, Contact Hours and Out of class engagement:		
Learning Strategies	Contact Hours	Out of class engagement
Lecture	-	-
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	90	-
Practical	60	-
Revision	-	-
Assignment	-	-
Total	150	150
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	x	
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	CND3406							
Academic Year	Third							
Semester	VI							
Number of Credits	3							
Course Prerequisite	Basic knowledge of nutrients and food groups							
Course Synopsis	<p>This module provides</p> <ol style="list-style-type: none"> 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	Extend the best practices during nutritional management of major emergencies(C2)							
CO3	Identify the nutritional response, general feeding and selective feeding programs and various forms of malnutrition and micronutrient deficiencies that occur during emergencies (C3)							
CO4	Explain the links between nutrition, health, food security and livelihoods in emergencies(C2)							
CO5	Explain the roles and responsibilities of government, UN agencies and other organizations during an emergency and the mechanisms for coordination of nutrition-related activities(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: Food Handling in Emergencies		
Different disasters, their trends and consequences on displaced people	<ul style="list-style-type: none"> • Explain the disasters affecting the status of food and nutrition(C2) • Identify the steps to follow in order to ensure an effective food aid program(C3) • Illustrate the priorities of a food aid program during disasters. (C2) • Explain the proper management of food supplies(C2) 	16
Unit 2: Feeding the Victims of Disaster		
Ensuring an appropriate diet given at all circumstances.	<ul style="list-style-type: none"> • Infer on food aid rations to be calculated and 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) 	17
Unit 3 Nutrition and Military performance		
Introduction to military rations	<ul style="list-style-type: none"> • 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) • Identify the dietary guidelines for military operations in a high-altitude environment (C3) 	12

Learning Strategies, Contact Hours and Out of class engagement:

Learning Strategies	Contact Hours	Out of class engagement
Lecture	45	-
Total	45	45

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. World Health Organization, UNHCR, World Food Programme & United Nations Children’s Fund (UNICEF). (2004). Food and nutrition need 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		CND3407						
Academic Year		Third						
Semester		VI						
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 influencing factors of food choices and eating behavior (C2)							
CO2	Explain mindful eating, physical hunger emotional hunger, recovery & its stages(C2)							
CO3	Applications of dietary management on factors influencing food choices 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: Social and psychological factors influencing food choice		
Social and psychological factors influencing food choice	<ul style="list-style-type: none"> 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 <ol style="list-style-type: none"> Food choices across the life span. Food product development and marketing ideas based on factors affecting choice of foods 	13
Unit 3: Role of stress and disease condition in food and nutrition choice		
Role of stress in choosing foods and behaviour	<ul style="list-style-type: none"> Explain the role of stress in choosing foods Identify behaviour modification strategies to influence food and nutrition choices in disease 	14

Content	Competencies	Number of Hours
modification strategies to influence food and nutrition choices in disease conditions	conditions -Obesity, diabetes, allergies, cancer(C3)	
Unit -3- Mindful eating		
Mindful eating, physical hunger vs. emotional hunger, mindful eating practice, recovery & its stages,	<ul style="list-style-type: none"> • Define mindful eating, getting to know each other activity, mindful eating experience (C1) • Explain physical hunger vs. emotional hunger, the hunger scale & steps to eating a meal mindfully, mindful eating practice(C2) • Illustrate mealtime contemplation promoting gratitude, mindful eating practice, recovery & its stages, mindful eating promoting recovery discussion, where we eat and with whom we eat (C2) • Explain foods & drinks for our health & recovery: simple nutrition guidelines (myplate.gov and healthy eating plate) (C2) • Explain foods & drinks for our health & recovery: guidelines from nutrition labels & portion sizes (C2) • Explain when we eat and how often we eat, breakfast as the most important meal of the day (opportunity for eating whole grains, low/non-fat dairy or soy, & fruit), strategies to eat 3 meals daily (C2) • Explain challenges to mindful eating: internal influences or biochemistry of eating, strategies to outwit our appetite(C2) • Identify challenges to mindful eating: our eating habits, how & what we eat now, strategies to change our eating habits(C3) • Explain why deprivation diets don't work, mindful eating strategies to prevent overeating, following the middle path(C2) 	18



Learning Strategies, Contact Hours and Out of class engagement:			
Learning Strategies	Contact Hours	Out of class engagement	
Lecture	45	-	
Seminar	-	-	
Small group discussion (SGD)	-	-	
Self-directed learning (SDL)	-	-	
Problem Based Learning (PBL)	-	-	
Case Based Learning (CBL)	-	-	
Clinic	-	-	
Practical	-	-	
Revision	-	-	
Assignment	-	-	
Total	45	45	
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							
Semester	VII & VIII							
Number of Credits	Duration (1 year / 48 hours per week / 8 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 provides 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	Analyze and develop the ability to work independently and as a team member to perform critical thinking and problem-solving skills in different domains (P5)							
CO5	Design, evaluate and implement new methods or protocols in different cases (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 (P6)							
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	<ul style="list-style-type: none"> 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 maintenance of the patient's case file and how the details are entered/registered in it (P1) 	20
Unit 2: Food Service Area		
Food service area	<ul style="list-style-type: none"> 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) 	20
Unit 3: Medicine		
Medicine	<ul style="list-style-type: none"> Illustrate the assessment of nutritional status among patients (P2) Apply and interpret dietary interventions in any disease condition of the patients (P3) Develop the dietary counseling given to the patients (P6) Interpret and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P5) 	240
Unit 4: Nephrology & Urology		
Nephrology & Urology	<ul style="list-style-type: none"> Illustrate the assessment of nutritional status among patients (P2) Interpret and apply dietary interventions in any disease condition of the patients (P5) Develop the dietary counseling given to the patients (P6) Illustrate and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P2) 	240
Unit 5: Cardiology		
Cardiology	<ul style="list-style-type: none"> Illustrate the assessment of nutritional status among patients (P2) Apply and interpret dietary interventions in any disease condition of the patients (P3) Develop the dietary counseling given to the patients (P6) Interpret and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P5) 	240

Content	Competencies	Number of Hours
Unit 6: Gastroenterology		
Gastroenterology	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 7: Oncology		
Oncology	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 8: Neurology		
Neurology	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 9: Obstetrics and Gynecology		
Obstetrics and Gynecology	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 10: Pediatrics		
Pediatrics	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any 	240

Content	Competencies	Number of Hours
	<ul style="list-style-type: none"> disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	
Unit 11: Surgery		
Surgery	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 12: Intensive care unit		
Intensive care unit	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 13: Multi-specialty clinics		
Multi-specialty clinics	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral and parenteral nutrition is provided, its administration and formulation (P3) 	240
Unit 14: Optional		
Any department in which intern needs further training. Other departments not listed above such	<ul style="list-style-type: none"> • Illustrate the assessment of nutritional status among patients (P2) • Interpret and apply dietary interventions in any disease condition of the patients (P5) • Develop the dietary counselling given to the patients (P6) • Identify and relate the condition in which enteral 	240

Content	Competencies	Number of Hours
as psychiatry, rehabilitation and dialysis	and parenteral nutrition is provided, its administration and formulation (P3)	
Learning Strategies: Small group discussion (SGD), Problem Based Learning (PBL), Case Based Learning (CBL), Clinics, Seminars.		
<p>Formative assessment: Quiz, Viva, Clinical assessment (OSCE, OSPE, WBPA), Clinical Log Book</p> <p>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</p> <ul style="list-style-type: none"> • 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. Mapping of Program outcomes (POs) and Course outcomes (COs)

Sem.	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
I	ANA1303	Anatomy	3	CO1 CO2 CO3 CO4							
I	PHY1303	Physiology	2	CO1 CO2 CO3 CO4							
I	CSK1501	Communication Skills	2		CO3	CO4		CO1 CO2		CO1 CO2 CO3 CO4	
I	EIC1501	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	CND1301	Fundamentals of Food and Nutrition - I	4	CO1 CO2 CO3							
I	CND1302	Fundamentals of Food and Nutrition Practical- I	7	CO1 CO2	CO2				CO1		
II	BIC1401	Biochemistry	3	CO1 CO2 CO3 CO4							
II	CND1401	Fundamentals of Food and Nutrition - II	4	CO1 CO2 CO3							
II	CND1402	Food Science - I	4	CO1 CO2 CO3	CO2 CO3				CO1		
II	CND1403	Fundamentals of Food and Nutrition Practical - II	5		CO1				CO1		
II	CND1404	Analysis in Food Science -I	4	CO1 CO2 CO3	CO1 CO4				CO2 CO3 CO4		
III	MCB2303	Microbiology	3	CO1 CO2 CO3 CO4							
III	CND2301	Medical Nutrition Therapy - I	4	CO1 CO3	CO2		CO1		CO2		
III	CND2302	Food Science - II	2	CO1 CO2 CO3	CO2 CO3				CO1		

Sem.	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
III	CND2303	Clinical Practice in Medical Nutrition Therapy - I	4		CO1				CO1		
III	CND2304	Analysis in Food Science -II	4	CO1 CO2 CO3	CO1 CO4				CO2 CO3 CO4		
III	****	Open elective -I	3	<i>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</i>							
IV	BST3401	Biostatistics & Research Methodology	3	CO1 CO2 CO3 CO4	CO2 CO3				CO4	CO1	
IV	GPY2401	General Psychology	2	CO1 CO2 CO3					CO1	CO2 CO3	
IV	CND2401	Medical Nutrition Therapy -II	4	CO1 CO2 CO3					CO1 CO2 CO3		
IV	CND2402	Food Quality Control	4	CO1 CO2 CO3 CO4 CO5					CO1 CO2 CO5		
IV	CND2403	Clinical Practice in Medical Nutrition Therapy - II	4	CO1	CO1						
IV	CND2404	Nutrition for Special Children	3	CO1 CO3 CO4	CO3 CO4		CO2		CO2		
IV	CND2405	Nutrition and Entrepreneurship	3	CO1 CO2 CO3			CO1		CO2		
V	CND3301	Nutrition in Critical Care	4	CO1 CO3 CO4 CO5	CO2 CO4				CO1 CO2 CO3 CO5		
V	CND3302	Clinical Nutrition through Life Cycle - I	4	CO1 CO2 CO3 CO4	CO1				CO2 CO4		
V	CND3303	Dietetics and Counselling	3	CO1 CO3	CO2		CO1 CO3				
V	CND3304	Therapeutic Practice in Critical Care Nutrition & Life Cycle - I	6	CO1 CO2 CO3	CO1 CO2 CO3						

Sem.	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
V	*** ****	Open elective - II	3	<i>Open elective is credited, choice-based and is graded assatisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department</i>							
VI	CND340 1	Clinical Nutrition through Life Cycle - II	3	CO1 CO2 CO3 CO4	CO1				CO2 CO4		
VI	CND340 2	Food Preservation	3	CO1 CO2 CO3 CO4 CO5	CO1 CO4				CO3 CO5		
VI	CND340 3	Community Nutrition	3	CO1 CO3	CO2 CO3 CO4			CO2	CO4		
VI	CND340 4	Therapeutic Practice in Nutrition through Life Cycle - II	4	CO1 CO2	CO1 CO2						
VI	CND340 5	Clinical Practice in Community Nutrition	4		CO1			CO1			
VI	CND340 6	Nutritional Consideration During Disasters	3	CO1 CO2 CO3 CO4 CO5	CO1 CO4		CO5		CO2 CO3		
VI	CND340 7	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. UG Program regulation

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 16 weeks of academic delivery excluding examination days, semester breaks, declared holidays and extracurricular events.
- 1.4. Medium of instruction shall be in English

2. Credit Distribution

- 2.1 Each semester would consist minimum of 20 credits.
- 2.2 The credit distribution hours for Lecture, Tutorial, Practical, and Clinics are as follows:
Lecture / Tutorial: 1 credit = 15 hrs
Practical: 1 credit = 30 hours
Clinical: 1 credit = 45 hours
- 2.3 A semester has courses structured as theory, practical, laboratory and clinics. Each course is of minimum 2 credits.
- 2.5 Internship duration is as per the course regulation.
- 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

Program	IAC Weightage (%)	ESE Weightage (%)
RCI Approved Programs	20	80
	25	75
	50	50
	100	Nil
	Nil	100
Other Programs	30	70
	50	50
	100	Nil

- 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, the deemed to be university, 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 / institution 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 Students, Parents/ guardians can access the attendance status online (Student Life Cycle Management) periodically.

4.5 Students having attendance shortage in any course (theory & practical) will not be permitted to appear for the End-semester exam (ESE) of the respective course unless the attendance is compensated as per the institutional guidelines.

5. Evaluation / Examination

5.1 The final evaluation for each course shall be based on Internal Assessment Component (IAC) and the End-semester examination (ESE) as per the weightage indicated for respective courses.

5.2 Internal Assessment Component (IAC) shall be calculated based on the performance of the student in mid semester exam or sessional exam/s, and continuous assessment (class participation, assignments, seminars or any other component as applicable to a course).

5.3 For courses such as Communication skills, Open electives, Indian constitution, Environmental sciences or courses as specified in curriculum of respective program, only internal assessment is conducted.

5.4 At the end of each semester, a regular End Semester Examination (ESE) for the odd and even semesters will be conducted in November-December/ May-June cycle respectively.

5.5 A one week of preparatory leave will be given to students before they appear for the regular end semester examination.

5.6 A student should obtain minimum of 40% Internal Assessment Component (IA) to be eligible for End Semester Examination. Failure to secure 40%, he/she will be not appearing for the regular End Semester Examination (ESE). However, he/she will be permitted to write during the supplementary exam as per institutional guidelines.

5.7 The duration of End Semester Examination for a 2 credit course would be 2 hours (50 marks) and for a course with 3 or more credits, 3 hours (100 marks).

5.8 For pre / para clinical course and program elective, irrespective of credit (2 or 3), the ESE is conducted out of 50 and normalized to 100 including internal assessment.

5.9 For those students who failed to earn credit for a course during regular End Semester Examination, an additional supplementary / make up exam is conducted within 2 weeks of declaration of end semester result.

- 5.10 In order to facilitate for improvement of Internal assessment for failed candidates, an internal assessment exam will be conducted immediately after the declaration of end semester (ESE) results. This examination will be conducted as per the university guidelines.
- 5.11 A regular student is eligible to appear for two attempts per cycle of each semester (End semester and supplementary exams).
- 5.12 For a student who has completed the mandated academic requirements / final year, but has pending courses from any of semesters, he / she can take the examination of courses irrespective of odd / even exam cycle. The additional odd / even semester exam as applicable is scheduled between the regular and supplementary exam.

6. Minimum Requirements for Pass

6.1 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

- 6.2. A pass in a ESE will be reflected as grades. Candidate shall be declared to have passed in any course, when he/she obtains not less than **“E” grade**.
- 6.3 However, when a student appears for supplementary examination, the maximum grade awarded is **“C” grade** or below irrespective of their performance.
- 6.4. **Pass criteria for courses with End Semester Examination:** For theory / practical course, a candidate should secure a minimum of 40% in ESE and an overall 50% including IAC to be declared as pass.
- 6.5. **Pass criteria for courses with Internal Assessment Component:** The students should obtain 50% IAC to be declared as pass in a given semester.

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, **1st Year CGPA** = $\frac{(8.35 \times 20) + (7 \times 25)}{20 + 25} = 7.6$

8. Carry over rule / Progression Criteria to higher semesters

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

8.1. First to second year (progression to third semester): A minimum of 65% of the credits at the end of the first year (includes first and second semester credits)

8.2. Second to third year (progression to fifth semester): A cumulative minimum of 75% of the credits at the end of the second year (includes first, second, third and fourth semester credits)

8.3. Third year to fourth year (progression to seventh semester), applicable for 4½ year programs – BPT, BOT, BPO: A cumulative minimum of 85% of the credits at the end of the third year (includes first, second, third, fourth, fifth and sixth semester credits).

8.4. Student will be eligible for internship only after successful completion of the entire course work, i.e. earn 100% credits of the program

9. Program Exit / Probation Criteria

9.1 First year students who have failed to secure a minimum credit (as specified in progression criteria / carry over rule section), 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 examination of the respective examination cycle only (during December / May) in order to acquire the credits for promotion to higher semester. In the event of failure to acquire the required credits even by the end of second year (65%), he / she has to **exit the program**. This exit policy from the program is applicable only for first year students failing to acquire the required credits even after the probation period.

9.2 From second year onwards, in the event of failing to acquire required credits (75% or 85% of the respective year), the students will be on academic probation. During that period, he / she will not be permitted to attend the classes of higher semester and have to appear only for examination (during December / May) of the failed courses in order to acquire the required



credits for progression. From second year onwards, even though a student has failed to acquire the minimum credits, he/she will not be required to exit from program.

9.3 However, the student must complete all the course work requirements and credits by a **maximum of double the program duration**.

9.3.1 For the program duration of 3+1 years' program, all the academic course work needs to be completed within the duration of 8 years.

9.3.2 For the program duration of 4 years 6 months' program, all the academic course work needs to be completed within the duration of 9 years.

10. Semester Break

10.1 Students will have a semester break following their odd and even end-semester examinations as per the academic calendar.

11. Internship

11.1 Internship will be for a duration of 6 months or 1 year as per the respective program regulation

11.2 Any components/ activities that need to be evaluated as part of internship without reflecting it in the CGPA.

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

11.4 An internship certificate with details of activities (including externship), clinical /relevant areas of postings with hours and research project will be issued to a candidate on completion of the Internship. The certificate must be authenticated by the HOD/Coordinator and HOI.


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


Head of the Department

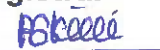
Coordinator of the Program
Clinical Nutrition and Dietetics
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MAHE, Manipal - 576 104

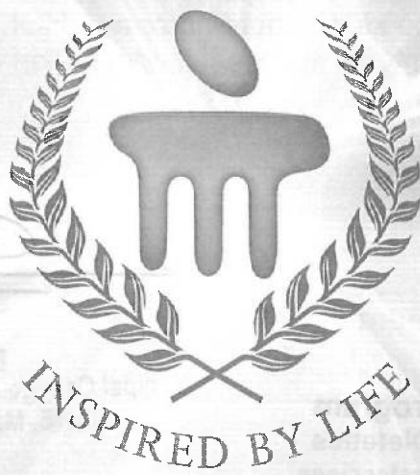

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