



**AMRITA**

**VISHWA VIDYAPEETHAM**

श्रद्धावान् लभते ज्ञानम्  
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT, 1956

# CURRICULUM

## M.Sc Clinical Nutrition And Dietetics

**AMRITA SCHOOL OF MEDICINE  
CENTRE FOR ALLIED HEALTH SCIENCES**



0484 285 8201



acaahs@ahs.aims.amrita.edu



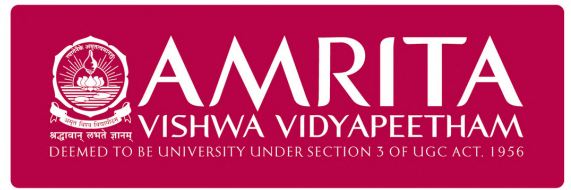
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# OUR CHANCELLOR



**Life and living are not the same. For living, we may need a job, money, a home, a car and other creature comforts. However, these alone fail to make life complete. For that, we need love, compassion, tenderness – a heart that knows and responds to the pain of others. We need broadmindedness and maturity in thought and action."**

**"Satguru Mata Amritanandamayi Devi"**



# AMRITA VISHWA VIDYAPEETHAM

Amrita Vishwa Vidyapeetham is a multi-disciplinary, research-intensive, private university, educating a vibrant student population of over 24,000 by 1700+ strong faculty. Accredited with the highest possible 'A++' grade by NAAC, Amrita offers more than 250 UG, PG, and Ph.D. programs in Engineering, Management, and Medical Sciences including Ayurveda, Life Sciences, Physical Sciences, Agriculture Sciences, Arts & Humanities, and Social & Behavioral Sciences.

With its extensive network of eight campuses spread across Amaravati, Amritapuri, Bengaluru, Chennai, Coimbatore, Kochi, Mysuru, and NCR Delhi (Faridabad), Amrita University stands as one of India's preeminent private educational institutions. Encompassing an expansive area of over 1200 acres, these campuses offer an impressive built-up space of more than 100 lakh square feet. Renowned for its commitment to academic excellence, Amrita University consistently ranks among the top-tier private universities in the nation, solidifying its reputation as a beacon of quality education.

Amrita has emerged as the seventh best university in the National Institutional Ranking Framework (NIRF) Rankings 2023. Amrita School of Medicine, Kochi has been ranked 6th Best in Medicine in NIRF Rankings 2023.

In THE University Impact Rankings 2023, a pioneering initiative to recognise universities around the world for their social and economic impact for sustainable future, Amrita has been ranked among the Top 50 in the world.

Amrita is emerging as one of the fastest-growing institutions of higher learning in India as we have established 180+ collaborations with top 500 world-ranked universities in a short span of 18 years.

World-renowned humanitarian leader, Sri Mata Amritanandamayi Devi, AMMA, is the founding Chancellor and guiding light of Amrita Vishwa Vidyapeetham.

# Amrita Hospital

Our students are groomed in the exceptional milieu of Amrita Hospital, a globally renowned healthcare institution. Within the walls of Amrita Hospital, healing transcends the conventional boundaries of mere physical recovery.

Guided by the visionary ideals of Sri Mata Amritanandamayi Devi (Amma), Amrita Hospital envisions healthcare as an inclusive realm, accessible to all, irrespective of background or financial standing. Established in 1998 in the tranquil state of Kerala, Amrita Hospital has evolved into a sanctuary of hope and compassion, catering to those seeking medical solace.

Nestled amidst the serene landscapes of Kerala, Amrita Hospital stands as a beacon of healthcare excellence. The institution prides itself on its state-of-the-art facilities and the utilization of advanced medical treatments, all geared towards providing optimal care to its patients. However, what sets Amrita Hospital apart is its unyielding commitment to treating each individual with the utmost respect, empathy, and kindness.

As a training ground for Allied Health Sciences students, the Amrita Centre for Allied Health Sciences extends the values and ethos of Amrita Hospital. Students not only receive a world-class education but are also immersed in an environment that prioritizes holistic patient care. Our curriculum is designed to instill a sense of compassion and commitment to excellence, aligning with the principles that define Amrita Hospital.

In this professional setting, students engage with cutting-edge healthcare practices while imbibing the compassionate approach that defines the institution. The Amrita Centre for Allied Health Sciences aims to produce professionals who not only possess technical proficiency but also embody the values of respect, empathy, and kindness in their service to the healthcare industry. With our roots in the compassionate vision of Amma, we are dedicated to shaping the future leaders of allied health sciences, instilling in them the spirit of healthcare that goes beyond the ordinary, reaching for excellence in every facet of their profession.

Bed Capacity

**1300+**

Treated Patients

**10M+**

Medical Equipment

**128+**



# Amrita Center for Allied Health Sciences

The healthcare landscape in our country is confronted with various challenges, foremost among them being the acute shortage of skilled manpower. Addressing this scarcity is pivotal for achieving the overarching goal of Universal Health Coverage. Allied health professionals play a crucial role in filling this gap by contributing to preventive, diagnostic, curative, therapeutic, and rehabilitative interventions. Collaborating within interdisciplinary healthcare teams, which include physicians, nurses, and public health officials, they strive to promote, protect, treat, and manage individuals' physical, mental, social, emotional, and environmental health, fostering holistic well-being.

Defined and interpreted differently across the globe, allied health professionals serve as indispensable support pillars within the healthcare framework. At Amrita Centre for Allied Health Sciences, we have a rich legacy of nurturing these professionals, imparting the latest advancements in medical and surgical practices. For over 22 years, we have been at the forefront of training allied health professionals from across the nation and beyond.

Distinguished by our extensive student body and diverse program offerings, we stand as one of the largest allied health training centers in the country. With 17 undergraduate and 21 postgraduate programs, our curriculum emphasizes hands-on training, commencing from the second year. This practical experience is facilitated by seasoned medical practitioners and well-trained allied health faculty members, ensuring students receive comprehensive exposure to real-world healthcare scenarios.

Our students benefit from immersion in clinical settings, particularly through attachments to our affiliated teaching hospital, Amrita Hospital. This hands-on training equips them with the practical skills and competencies required for professional practice. As testament to our commitment to excellence, we boast a 100% placement rate, with our alumni making significant contributions to healthcare globally.

At Amrita Centre for Allied Health Sciences, we take pride in our legacy of excellence, innovation, and service to society. Through our rigorous academic programs and practical training initiatives, we continue to shape the future of allied health professionals, empowering them to make a meaningful impact in healthcare worldwide.



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# Part I

## Rules and Regulations

## I.1 Postgraduate Programmes (Master of Sciences)

<b>I.1. Details of Postgraduate Courses:</b>			
<b>Sl. No.</b>	<b>Course</b>	<b>Duration</b>	<b>Conditions of Eligibility for admission to the course</b>
1	Medical Laboratory Technology (MLT)	2 Years	Pass in B.Sc MLT (4-year regular programs only)
2	Neuro-Electro Physiology		B.Sc Neuro-Electro Physiology
3	De-glutology & Swallowing Disorders		B.ASLP
4	Respiratory Therapy		B.Sc Respiratory Therapy
5	M.Sc Diabetes Sciences		B.Sc Diabetes Sciences
6	M.Sc Cardiovascular Technology		B.Sc Cardiovascular Technology
7	M.Sc Emergency Medical Technology		B.Sc Emergency Medical Technology, B.Sc Respiratory Therapy, B.Sc Physician Assistant, B.Sc Anaesthesia Technology
8	Master of Physician Associate – Medical Oncology		B.Sc Physician Assistant
9	M.Sc Clinical Nutrition and Dietetics		B. Sc in Food and Nutrition / Human Nutrition / Applied Nutrition / Nutrition and Dietetics / Home Science Clinical Nutrition and Dietetics / Food Science and Quality Control / Food Service Management and Dietetics / B.Sc in Life Sciences – (Food Science Only) / B.Sc Family & Community Science / B.Voc. in Sports Nutrition and Physiotherapy / PG Diploma in Nutrition and Dietetics / PG Diploma in Clinical Nutrition
10	Master of Physician Associate – CVTS		B.Sc Physician Assistant
11	M.Sc Dialysis Therapy		B.Sc Dialysis Therapy



## **I.2. Medium of Instruction:**

English shall be the medium of instruction for all subjects of study and for examinations.

## **I.3. Eligibility:**

Essential qualifications for eligibility are mentioned under clause I.1

## **II. General Rules:**

Admissions to the courses will be governed by the conditions laid down by the University from time to time and as published in the Regulations for admissions each year.

### **II.1. Duration of the Program**

1. The program shall be of 4 semesters and should be completed within four years from the date of admission.
2. One academic year consists of two semesters, and each semester shall extend over a minimum period of sixteen weeks excluding examination days. The semesters shall be spread out as follows:  
  
Odd semesters – 1, 3, August – January  
  
Even semesters – 2, 4, February – July
3. There shall be examinations at the end of each semester, followed by a vacation of minimum of one week at the end of odd and even semesters.
4. Number of working days in a semester shall not be more than 100 days.

### **II.2. Discontinuation of Studies**

Rules for discontinuation of studies during the program period will be those decided by the Chairman /Admissions, Amrita School of Medicine, and Published in the "Rules and Regulations" every year.

### **II.3. Educational Methodology**

Learning occurs by attending didactic lectures, as part of regular work, from co-workers and senior faculty, through training offered in the workplace, through reading or other forms of self-study, using materials available through work, using materials obtained through a professional association or union, using materials obtained on student's own initiative, during working hours at no cost to the student.

### **II.4. Academic Calendar**

Program will follow a semester scheme as per details mentioned under:

#### **FIRST SEMESTER**

Commencement of classes – August  
Sessional exam – October

Pre-University Examination	- 01 January – 15 January
University exam (with practical)	– 15 January - 30 January

## SECOND SEMESTER

Commencement of classes	– February
Sessional exam	– May
Pre-University Exam	- 01 July – 15 July
University exam (with practical)	– 15 July – 30 July

## THIRD SEMESTER

Commencement of classes	– August
Sessional exam	– October
Pre-University Examination	- 01 January – 15 January
University exam (with practical)	– 15 January - 30 January

## FOURTH SEMESTER

Commencement of classes	– February
Sessional exam	– May
Pre-University Exam	- 01 July – 15 July
University exam (with practical)	– 15 July – 30 July

## **III. Examination Regulations:**

### **III.1. Attendance:**

**75% of attendance (physical presence) is mandatory.** Medical leave or other types of sanctioned leaves will not be counted as physical presence. Attendance will be counted from the date of commencement of the session to the last day of the final examination in each subject.

### **III.2. Internal Assessment:**

For all semesters at least two sessional examinations should be conducted in each subject. The last internal assessment examination will be the Pre-University examination which shall

follow the pattern of the University Examination. Average of two examinations shall be taken to calculate the internal assessment.

1. A candidate should secure a minimum of 50% marks in the internal assessment in each subject (separately in theory and practical) to be eligible to appear for the University examination.
2. Each student should maintain a logbook and record the procedures they do and the work patterns they are undergoing. It shall be based on periodical assessment, evaluation of student assignment, preparation for seminar, clinical case presentation, assessment of candidate's performance in the sessional examinations, routine clinical works, logbook, and record keeping etc.
3. Pre-University examinations (model examination) shall be held two to three weeks prior to the University Examination. The final internal assessment report shall be made available to the Principal ten days prior to the commencement of the University examination.

### **III.3. University Examinations:**

- i. University Examination shall be conducted at the end of every semester. A candidate who satisfies the requirement of attendance and internal assessment marks, as stipulated by the University, shall be eligible to appear for the University Examination.
- ii. One semester will be six months including the days of the University Examination. Academic Year will be counted from the date of commencement of classes which will include the inauguration day.
- iii. The minimum pass mark for internal assessment is 50% and for the University Examination is 50%. The student should score a total of 50% (adding the internal and external examination (University Examination)) to pass in each subject (separately for theory and practical)
- iv. If a candidate fails in either theory or practical paper, he/she has to re-appear for both the papers (theory and practical)
- v. The maximum number of attempts permitted for each paper is five (4) including the first attempt.
- vi. The maximum period to complete the course shall not exceed six years from the date of enrollment for the course.
- vii. The number of candidates for practical examination should be maximum 12 to 15 per day.
- viii. One internal and one external examiner will jointly conduct the theory evaluation and practical examination for each student during the final semester.

### **III.4. Eligibility to appear University Examination:**

A student who has secured 50% marks for Internal Assessment is qualified to appear for University Examination provided he/she satisfies percentage of attendance requirement as already mentioned at the III (1).

### **III.5. Valuation of Theory – Revaluation Papers:**

1. Valuation work will be undertaken by the examiners in the premises of the Examination Control Division in the Health Sciences Campus.
2. Failed candidates will have the option of revaluation for all the University examinations. Fees for revaluation will be decided by the Principal from time to time.
3. Application for revaluation should be submitted within ten days (or the time as decided by the Principal) from date of result of examination declared and it should be submitted to the office with payment of fees as decided by the Principal.

### **III.6. Supplementary Examinations:**

Every regular University examination will be followed by a supplementary examination which will normally be held within four to six months from the date of completion of the regular examination.

As stipulated under clause No. III.2 under Internal Assessment, HOD will hold an internal examination two to three weeks prior to the date of the University Examination. Marks secured in the said examination, or the ones secured in the internal examination held prior to the earlier University Examination whichever is more only will be taken for the purpose of internal assessment. HODs will send such details to the Principal at least ten days prior to the date of commencement of University examination.

Same attendance and internal marks of the main examination will be considered for the supplementary examination, unless the HOD furnishes fresh internal marks and attendance after conducting fresh examination.

Students of supplementary batches are expected to prepare themselves for the University Examinations. No extra coaching is expected to be provided by the Institution. In case at any time the Institution has to provide extra coaching, students will be required to pay fees as fixed by the Principal for the said coaching.

### **III.7. Academic Progression:**

No student shall be admitted to any examination unless they fulfil the norms outlined in the Academic Progression rules as follows:

- A student is eligible to carry forward all courses from the I, II, III, and IV semesters.
- A student can only appear for the fourth (final) semester University examination if they clear all subjects from the I, II, III, examinations.
- Upon successful completion of the courses from the I to IV semesters within the stipulated time period, a student is eligible to receive their CGPA.
- The maximum attempts permitted for any course in any semester are limited to four.
- If any student wishes to continue in clinical posting/training after completing two years of studentship and is not eligible to appear for the fourth semester University examination, the student must pay one year tuition fees along with the hostel fees.

## IV. Criteria for Pass in University Examination - Regulations:

### IV.1. Eligibility criteria for pass in University Examination:

In each of the subjects, a candidate must obtain 50% in aggregate for a pass and the details are as follows:

- A separate minimum of 50% for Internal Assessment.
- 50% in Theory & 50% in Viva.
- A separate minimum of 50% in aggregate for Practical / Clinics (University Examinations).
- Overall, 50% is the minimum pass in subject aggregate (University Theory + Viva + Practical + Internal Assessment)

## V. Credit System

The term credit is used to describe the quantum of syllabus for various programs in terms and hours of study. It indicates differential weightage given according to the contents and duration of the courses in the curriculum design.

Credits will be assigned based on the Lectures (L) / Tutorials (T) / Clinical Postings (CR) / Practical Work (P) / Research Work (RP).

**L** - One credit for one-hour lecture per week (1 credit = 15 hours)

**T** - One credit for one-hour practical per week (1 credit = 15 hours)

**P** - One credit for every two hours of laboratory or practical per week (1 credit = 30 hours)

**CT** - One credit for three hours of clinics per week (1 credit = 45 hours)

**RP** - One credit for two hours of dissertation or Project work per week - max credit 20-25 (1 credit = 30 hours)

<b>Duration</b>	<b>Lecture (L)</b>	<b>Tutorial (T)</b>	<b>Practical (P)</b>	<b>Clinical Training / Rotation (CL)</b>	<b>Research Project (RP)</b>
<b>Credits</b>	1 Credit	1 Credit	1 Credit	1 Credit	1 Credit
<b>Hours / Week</b>	1 Hour	1 Hours	2 hours	3 Hours	2 hours
<b>Hours / Semester</b>	15 Hours	15 Hours	30 Hours	45 Hours	30 Hours

## VI.2. Grading System

### VI.2.a Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table – XII.

Table – 1 : Letter grades and grade points equivalent to Percentage of marks and performances

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
90.00 – 100.00	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

### VI.2.b. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> and C<sub>5</sub> and the student's grade points in these courses are G<sub>1</sub>, G<sub>2</sub>, G<sub>3</sub>, G<sub>4</sub> and G<sub>5</sub>, respectively, and then students' SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and AB grade awarded in that semester. For example, if a learner has a F or AB grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4* \text{ZERO} + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

### VI.2.c. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the IV semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all IV semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the failure grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4}{C_1 + C_2 + C_3 + C_4}$$

where  $C_1, C_2, C_3, \dots$  is the total number of credits for semester I, II, III, .... and  $S_1, S_2, S_3, \dots$  is the SGPA of semester I, II, III, ....

### VI.2.d. Declaration of class

The class shall be awarded based on CGPA follows:

First Class with Distinction	= CGPA of 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99

## VII. General considerations and teaching / learning approach:

There must be enough opportunities to be provided for self-learning. The methods and techniques that would ensure this must become a part of teaching-learning process.

Proper records of the work should be maintained which will form the basis for the student's assessment and should be available to any agency who is required to do statutory inspection of the school of the program.

## VIII. Project:

Each student should submit a project in consultation with HOD and guidance under Project Guide, 3 months prior to their final year university exam. The student will be eligible to appear for the final semester examination only after submission of the project.

## **IX. Maintenance of Logbook**

- Every student shall maintain a record of skills he/she has acquired during the training period certified by the various Heads of Departments/Program Coordinator under whom he/she has undergone training.
- In addition, the Head of the Department shall involve their postgraduate students in Seminars, Journal Club, Group Discussions and participation in Clinical meetings.
- The Head of the Departments/Program coordinator shall scrutinize the logbook in every week/month.
- At the end of the program, the student should summarize the contents and get the logbook certified by the Head of the Department and Principal.

The logbook should be submitted at the time of practical examination for the scrutiny of the Board of Examiners.



# Part II

## Syllabus

# CURRICULUM

## First Semester

L - Lecture, T - Tutorial, P/CL - Practical / Clinics, RP - Research Project

Course Code	Course Title	Hours / Week				Total Credits	Hours / Semester			
		L	T	P/CL	Total		L	T	P/CL	Total
MCND101	Medical Nutrition Therapy	4	-	-	4	4	60	-	-	60
MCND102	Nutritional Biochemistry-I	2	-	-	2	2	30	-	-	30
MCND103	Research Methodology and Biostatistics	2	-	-	2	2	30	-	-	30
MCND104	Pharmacology	4	-	-	4	4	60	-	-	60
22AVP103	*MA OM Mastery Over Mind	2	-	-	2	2	30	-	-	30
MCND105	CND Clinics - I	-	4	18	22	10	-	60	270	330
		<b>14</b>	<b>4</b>	<b>18</b>	<b>36</b>	<b>24</b>	<b>210</b>	<b>60</b>	<b>270</b>	<b>540</b>

## Second Semester

Course Code	Course Title	Hours / Week				Total Credits	Hours / Semester			
		L	T	P/CL	Total		L	T	P/CL	Total
MCND201	Critical Care Nutrition	4	1	-	5	5	60	15	-	75
MCND202	Applied Nutrition	4	1	-	5	5	60	15	-	75
MCND203	Nutritional Biochemistry-II	2	-	-	2	2	30	-	-	30
MCND204	CND Clinics - II	-	-	24	24	8	-	-	360	360
		<b>10</b>	<b>2</b>	<b>24</b>	<b>36</b>	<b>20</b>	<b>150</b>	<b>30</b>	<b>360</b>	<b>540</b>

## Third Semester

Course Code	Course Title	Hours / Week				Total Credits	Hours / Semester			
		L	T	P/CL	Total		L	T	P/CL	Total
MCND301	Advanced Nutrition	4	-	-	4	4	60	-	-	60
MCND302	Nutrient Analysis	-	-	2	2	1	-	-	30	30
MCND303	Public Health Nutrition	2	2	-	4	4	30	30	-	60
MCND304	Research Internship	-	-	-	-	NA	-	-	-	-
MCND305	CND Clinics III	-	-	30	30	10	-	-	450	450
MCNDEL306	Elective paper - I Nutrigenetics and Precision Nutrition	2	-	-	2	2	30	-	-	30
<b>Total</b>		<b>8</b>	<b>2</b>	<b>32</b>	<b>42</b>	<b>21</b>	<b>120</b>	<b>30</b>	<b>480</b>	<b>630</b>

## Fourth Semester

Course Code	Course Title	Hours/Week					Credits	Hours/Semester				
		L	T	P/CL	RP	Total		L	T	P/CL	RP	Total
MCND401	Dissertation	-	-	-	3	3	3	-	-		45	45
MCND402	CND Clinics IV	-	2	42	-	44	16	-	30	630		660
MCNDEL403	Elective Paper-II Sports Nutrition	1	-	-	-	1	1	15	-			15
<b>Total</b>		<b>1</b>	<b>2</b>	<b>42</b>	<b>3</b>	<b>48</b>	<b>20</b>	<b>15</b>	<b>30</b>	<b>630</b>	<b>45</b>	<b>720</b>

## Overall Credit Distribution

Semester	Credits	Lecture	Tutorial	Practical / Clinical Training	Research Project	Total Hours
<b>First Semester</b>	24	210	60	270	-	540
<b>Second Semester</b>	20	150	30	360	-	540
<b>Third Semester</b>	21	120	30	480	-	630
<b>Fourth Semester</b>	20	15	30	630	45	720
<b>Total</b>	<b>85</b>	<b>405</b>	<b>150</b>	<b>1740</b>	<b>45</b>	<b>1785</b>

## SEMESTER I

### Medical Nutrition Therapy (MCND101)

Credits: 4

Total hours: 60

- 1. Medical Nutrition Therapy for Anaemia: Iron – related blood disorders**
  - Iron deficiency anaemia; Hemochromatosis; Iron toxicity. **Megaloblastic Anaemias** - Pernicious and other Vitamin B12 deficiency anaemias; Folic acid deficiency anaemia. **Other Nutritional Anaemias** - Copper deficiency anaemia; Anaemia of protein-energy malnutrition; Sideroblastic(pyridoxine-responsive) anaemia. **Non-nutritional Anaemias** - Sports anaemia(hypochromic microcytic transient anaemia); Anaemia of pregnancy; Anaemia of inflammation, infection or malignancy; Sickle cell anaemia; Thalassemias
- 2. Medical Nutrition Therapy for gastrointestinal disorders** - Disorders of the oesophagus; Disorders of the stomach; Common Intestinal problems; Diseases of the small intestine; Intestinal Brush-Border Enzyme deficiencies; Inflammatory Bowel Diseases; Disorders of the large intestine.
- 3. Medical Nutrition Therapy for pancreatic and liver disorders** - Physiology and functions of the liver; Laboratory assessment of liver function; Diseases of the liver; Physiology and functions of the gall bladder; Diseases of the gall bladder; Physiology and functions of the exocrine pancreas
- 4. Medical Nutrition Therapy for cardiovascular disorders** - Prevalence and incidence; Pathophysiology and etiology; Atherosclerosis; Dietary lipids and coronary heart disease; Plasma lipoproteins; Lipoprotein metabolism; Dietary factors and coronary heart disease; Diet and hypertension; Diet and stroke; Diet and peripheral vascular disease; Diet and chronic heart failure; Micronutrients and cardiovascular disease
- 5. Medical Nutrition Therapy for pulmonary disorders** - Relationships between nutrition and the pulmonary system; Overview of medical nutrition therapy in pulmonary disease; Aspiration; Asthma; Chronic obstructive

pulmonary disease; Cystic fibrosis; Lung cancer; Pneumonia; Respiratory failure; Tuberculosis.

6. **Medical Nutrition Therapy for renal disorders:** Physiology and function of the kidneys; renal disease; Glomerular diseases; Diseases of the tubules and interstitium; Progressive nature of renal disease; End-stage renal disease; Nephrolithiasis.
7. **Medical Nutrition Therapy for endocrine disorders** – Pathophysiology, diagnostic and screening criteria, management of diabetes mellitus, diabetes and age-related issues, implementing nutrition, self-management, acute complications, long-term complications, preventing diabetes, hypoglycemia of non-diabetic origin.
8. **Nutritional care for weight management:** body weight components, regulation of body weight; weight management throughout life; weight imbalance: overweight and obesity; management of obesity in adults; common problems encountered in obesity management; weight management in children; weight imbalance: excessive leanness.
9. **Medical Nutrition Therapy for febrile and surgical conditions:** Fevers of short duration, chronic fevers and infections, pre-operative and post-operative nutrition.
10. **Nutritional aspects of disease affecting the skeleton** – Overview of mineral ion homeostasis and bone metabolism; age-appropriate biochemical reference ranges; pharmaceutical agents commonly used in bone disease; rickets/osteomalacia; mineral ion homeostasis in preterm infants; corticosteroid-induced bone disease; osteoporosis associated with chronic disease; anorexia nervosa; senile osteoporosis.
11. **Medical Nutrition therapy for metabolic disorders** – Newborn screening; goals of medical nutrition therapy; disorders of amino acid metabolism; disorders of organic acid metabolism; disorders of urea cycle metabolism; disorders of carbohydrate metabolism; glycogen storage diseases; disorders of fatty acid oxidation; role of nutritionist in medical nutrition therapy for metabolic disorders

12. **Medical Nutrition Therapy for neurological disorders:** Neurologic disease classification, nervous system wiring and lesions, medical nutrition therapy, problems with procurement of food, nutritional deficiencies, or excesses.

### Reference Books:

1. Shils, Olson, Shike and Ross (1999). "*Modern Nutrition in Health and Disease*", 9<sup>th</sup> edition, Williams & Wilkins
2. Marcia Nahikian Nelms and Sara Long, "*Medical Nutrition Therapy (Case study)*"; 2004, 2nd ed, Thomson Wadsworth Publications.
3. Whitney EN and Rolfes SR. "*Understanding Nutrition*", 10th ed. West Publishing Co., 2004.
4. Marcia Nelms, Kathryn Sucher, "*Nutrition Therapy and Pathophysiology*", 2007
5. Gottschlich M – "*The science and practice of nutrition support*"
6. Staci Nix, "*William's Basic Nutrition and Diet Therapy*", 12th ed, Mosby 2005.
7. Mahan and Escott- Stump, "*Krause's Food, Nutrition and Diet Therapy*", 12th ed WB Saunders.
8. Laura E Matarese – "*Contemporary Nutrition Practice*" 2003, 2nd edition Saunders Publications
9. Srivastava, RK, "*Current Nutritional Therapy Guidelines in Clinical Practice*", 2008
10. Grodner, "*Foundations and Clinical Applications of Nutrition*", 2000.
11. Gibney M, "*Clinical Nutrition*" Blackwell Publishing", 2005

## **Nutritional Biochemistry-I (MCND102)**

**Credits:2**

**Total hours: 30**

### **1. CELL**

- Eukaryotic cell (Diagram, organelles with their functions)
- Plasma membrane –Fluid mosaic model

### **2. CARBOHYDRATES**

- Classification with examples – monosaccharides, disaccharides, polysaccharides
- Diabetes mellitus- Types, symptoms and complications, Glycosuria
- Hormonal regulation of blood glucose
- Glucose tolerance test (indication, Contraindication, patient preparation, procedure)
- Digestion of Carbohydrates

### **3. PROTEINS**

- Amino acids – Essential and non-essential amino acids
- Classification of proteins (Based on functions with example)
- Plasma proteins and their functions
- Immunoglobulins
- Digestion of proteins

### **4. LIPID**

- Fatty acid –Classification based on nutritional importance and nature of the hydrocarbon chain with example
- Triacylglycerol – Definition, types and significance
- Phospholipids – Definition, types, properties and functions.
- Cholesterol – Clinical significance and important compounds formed.

### **5. VITAMINS**

- Sources, RDA, biochemical functions and Deficiency manifestations of

- Fat-soluble vitamins – A, D, E, K
- Water-soluble vitamins – B Complex Vitamin and Vitamin C

## **6. MINERALS**

- Sources, Requirements absorption, biochemical role, deficiency and toxicity.
- Ca & Phosphorus - the role of PTH, 1.23 DHCC & Calcitonin
- Trace elements- Zn, F, I, Se, Fe, Cu.

## **7. ENZYMES**

- Classification with examples
- Factors affecting enzyme activity
- Inhibition of Enzymes (Competitive, non-competitive and allosteric)
- Iso-enzymes,
- Clinical enzymes in diseases – CK, ALP, ALT, AST, GGT, Amylase

## **8. HEMOGLOBIN**

- Synthesis and degradation
- Hyperbilirubinemias – Congenital and acquired

## **9. NUCLEIC ACID CHEMISTRY**

- Purine and pyrimidine bases,
- DNA and RNA
- Gout

### **Reference Books:**

1. Textbook of Biochemistry – DM Vasudevan, Sreekumari
2. Lippincott's Illustrated Review – Biochemistry
3. Harper's illustrated Biochemistry – 26th edition
4. Nutritional Biochemistry and Metabolism, 2nd edition ,Satyanarayanan U



## Research methodology and Biostatistics (MCND103)

Credits- 2

Total hours - 30

**1. Introduction to research and types of research:** Meaning of research, objectives of research, significance of research, research process, criteria of research

**2. Defining research problem:** Selection of the problem, necessity of defining the problem, techniques in selecting a problem, examples

**3. Research design:** Meaning of design, need for a research design, different research designs, basics of experimental designs, developing research plan, strengths and weakness, experimental, quasi experimental and correlational

**4. Sampling Design:** Sample and universe, sampling, different methods of sampling, selection of a random sample, census and survey

**5. Measurement and scaling techniques:** Measurement in research, measurement tools, scaling and scaling techniques

**6. Data collection:** Methods of data collection, questionnaires/schedule, selection of appropriate method for data collection, guidelines for constructing questionnaire, guidelines for interviewing, sample questionnaires

**7. Data Analysis:** Introduction to data analysis, demo with SPSS software

**8. Dissertation/Report writing:** Technique of interpretation, report writing/dissertation writing, how to critique an article

### Biostatistics/Statistics

**1. Introduction:** Basic concepts (data, sources of data, variable), objectives, role of biostatistics/statistics, summary

**2. Descriptive Statistics:** Ordered array, frequency distribution, measures of central tendency, measures of dispersion, summary

**3. Basic probability concepts:** Introduction, elementary properties of probability, probability distributions(binomial, poisson, normal distribution) applications

**4. Sampling:** Sampling distributions, sample means and difference between two means, sample proportion and difference between two sample proportion, sampling, sampling methods (SRS, Sys, SrRs, cluster sampling), sample size and sample calculation

**5. Testing of hypothesis and estimation:** Testing of hypothesis, Type I and Type II error (critical region and power of the test), applications of testing of hypothesis, confidence interval for population mean, confidence interval for population proportion.

**6. Analysis of variance (ANOVA):** I-Introduction, CRD, RBD, LSD, factorial experiment, Summary

**7. Correlation and Regression:** Introduction, correlation, correlation co-efficient, Regression(model) using the regression equation, Summary

**8. Non-parametric tests:** Introduction, sign test, Wilcoxon signed rank test, median test, Mann-Whitney test and rank correlation, summary

**9. Multiple regression and correlation; Logistic regression; ANCOVA:** Introduction, Methods and application

**10. Vital Statistics:** Introduction, death rates and ratios, measures of fertility, measures of morbidity, measures of mortality, indicators of levels of health

### Reference Books:

- 1.Kothari CR, "Research Methodology, Methods and Techniques", Wiley Eastern Ltd, New Delhi, 2004.
- 2.Gupta. S.P., "Statistical Methods", Sultan Chand & sons, New Delhi, 2002.

## Pharmacology (MCND104)

**Credits-4**

**Total hours-60**

- 1. General Pharmacology** – Evaluation of drugs in man, drug prescribing and drug interactions Sedatives, hypnotics and pharmacotherapy of insomnia.
- 2. Drugs effective in convulsive disorders-** Opioid analgesics. Analgesic – antipyretics and non-steroidal anti-inflammatory drugs. Psychopharmacology
- 3. Drug therapy of parkinsonism and other degenerative disorders of the brain-**Local anesthetics, Adrenergic and adrenergic blocking drugs. Histamine and anti histamic drugs
- 4.** Pharmacotherapy of cough
- 5.** Pharmacotherapy of bronchial asthma and rhinitis
- 6.**Digitalis and pharmacotherapy of cardiac failure
- 7.**Vasodilator drugs and pharmacotherapy of angina pectoris
- 8.**Pharmacotherapy of hypertension
- 9.**Drugs and blood coagulation
- 10.**Drugs effective in iron deficiency and other related anemias
- 11.** Diuretics
- 12.**Emetics, drug therapy of vomiting, vertigo and diarrhea
- 13.**Pharmacotherapy of constipation
- 14.**Pharmacotherapy of peptic ulcer
- 15.** Sulfonamides, Trimethoprim, cortimoxazole, nitrofurans and quinolones

- 16.** Penicillins and antibiotics effective mainly against gram positive organisms
- 17.** Amonoglycosides and other antibiotics effective mainly against gram negative organisms
- 18.** Antibiotics effective against both gram positive and gram negative organisms
- 19.** General principles of chemotherapy of infections
- 20.** Chemotherapy of urinary tract infections
- 21.** Antiseptics, disinfectants and insecticides
- 22.** Thyroid and antithyroid drugs
- 23.** Insulin and antidiabetic drugs
- 24.** Adrenal cortical steroids
- 25.** Vitamins and antioxidants
- 26.** Drugs, pregnancy and the newborn

#### **Reference Books:**

1. Essentials of Medical Pharmacology, Tripathi
2. Basics and Clinical Pharmacology, Katzung

## MA OM (Mastery Over Mind) (22AVP103)

**Credits-2**

**Total hours:30**

### **1.Describe Meditation and Understand its Benefits (CO1)**

A: Importance of meditation. How does meditation help to overcome obstacles in life (Pre-recorded video with Swami Shubhamritananda Puri)

Reading 1: Why Meditate? (Swami Shubamritanandaji)

Reading 2: 'Stillness of the Mind' Chapter 17 in Amritam Gamaya (2022). Mata Amritanandamayi Mission Trust.

Additional Reading: Abhyasa Yoga: The Yoga of Practice. (Br. Achyutamrita Chaitanya)

B: Understand how meditation works. Understand how meditation helps in improving physical and mental health. Understand how meditation helps in the development of personality (Pre-recorded video with Dr. Ram Manohar)

Reading 1: Allen, Cynthia (2020) The Potential Health Benefits of Meditation

Additional Reading: Sharma, Hari (2022) Meditation: Process and Effects

### **2.Causes of Stress and How Meditation Improves Well-being (CO2)**

A: Learn how to prepare for meditation. Understand the aids that can help in effectively practicing meditation. Understand the role of sleep, physical activity, and a balanced diet in supporting meditation. (Pre-recorded video with Dr. Ram Manohar)

B: Causes of Stress. The problem of not being relaxed. Effects of stress on health. How meditation helps to relieve stress. Basics of stress management at home and the workplace. (Pre-recorded video with Prof Udhaykumar)

Reading 1: Mayo Clinic Staff (2022, April 29). Meditation: A Simple, Fast Way to Reduce Stress. MayoClinic. <https://www.mayoclinic.org/tests-procedures/meditation/indepth/meditation/art-20045858> (PDF provided)

Reading 2: 'Efficient Action.' Chapter 28 in Amritam Gamaya (2022).

### **3.The Science of Meditation (C03)**

A: A preliminary understanding of the Science of meditation. What can modern science tell us about this tradition-based method? (Pre-recorded video with Dr. Shyam Diwakar)

B: How meditation helps humanity according to what we know from scientific research (Pre-recorded video with Dr. Shyam Diwakar)

Reading 1: Does Meditation Aid Brain and Mental Health (Dr Shyam Diwakar)

Reading 2: 'Science and Spirituality.' Chapter 85 in Amritam Gamaya (2022). Mata Amritanandamayi Mission Trust.

### **4. Practicing MA OM Meditation in Daily Life (C04)**

Guided Meditation Sessions following scripts provided (Level One to Level Five)

Reading 1: MA OM and White Flower Meditation: A Brief Note (Swami Atmananda Puri)

Reading 2: 'Live in the Present Moment.' Chapter 71 in Amritam Gamaya (2022). Mata Amritanandamayi Mission Trust.

### **5.Improving Communication and Relationships (C05)**

How meditation and mindfulness influence interpersonal communication. The role of meditation in improving relationship quality in the family, at the university and in the workplace. (Pre-recorded video with Dr Shobhana Madhavan)

Reading 1: Seppala E (2022, June 30th) 5 Unexpected Ways Meditation Improves Relationships a Lot. Psychology Today.

<https://www.psychologytoday.com/intl/blog/feeling-it/202206/5-unexpected-ways-meditation-improves-relationships-lot>

Reading 2: 'Attitude.' Chapter 53 in Amritam Gamaya (2022). Mata Amritanandamayi Mission Trust.

## **6. Meditation and Compassion-driven Action (CO6)**

Understand how meditation can help to motivate compassion-driven action. (Pre-recorded video with Dr Shobhana Madhavan)

Reading 1: Schindler, S., & Friese, M. (2022). The relation of mindfulness and prosocial behavior: What do we (not) know?. *Current Opinion in Psychology*, 44, 151-156.

Reading 2: 'Sympathy and Compassion.' Chapter 100 in Amritam Gamaya (2022). Mata Amritanandamayi Mission Trust

## SEMESTER-II

### Critical Care Nutrition (MCND201)

**Credits- 5**

**Total hours:75**

**1.**Nutritional screening and nutritional status assessment of the critically ill. Nutritional support systems and other life-saving measures for the critically ill.

**2.Nutritional Support**-Introduction, Meeting the nutritional needs, Oral feeding and oral nutritional supplements. Enteral and parenteral nutrition support. Rationale and Criteria for Appropriate Nutrition Support

**3.Enteral Nutrition**-Indications and contraindications, Enteral access, Enteral formula composition, Tube feeding delivery systems, Tube feeding administration methods, Complications and monitoring

#### **4.Parenteral Nutrition-**

i. Patient selection, ii. Parenteral access, iii. Parenteral nutrition solutions, iv. Physical characteristics of parenteral formulas v. Commercially available protein sources, vi. Commercially available fat sources, vii. Methods of administration, viii. Complications and monitoring, ix. Refeeding syndrome

#### **5.Transitional Feeding**

i. Parenteral to enteral feeding, ii. Parenteral to oral feeding, iii. Enteral to oral feeding, iv.Oral supplements

**6.**Role of immuno enhancers, conditionally essential nutrients, immune suppressants, and special diets in critical care.

**7.Patho-physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like** - Stress, trauma, sepsis, burns. CV complications and surgery. ESRD, dialysis, transplant. Multiple organ failure. Cancer, AIDS, GI tract



surgery, GER (Gastro-esophageal reflux) and complications, Hepatic failure and transplants, Neurosurgery

**8.**Complications of Nutritional Support Systems including Refeeding Syndrome

**9.** Rehabilitations diets – stages.

**10.** Diet related ethical issues in the terminally ill.

### **Reference Books:**

**1.** Gottschlich M – *"The science and practice of nutrition support"*

**2.** Laura E Mataresse – *"Contemporary Nutrition Practice"* 2003, 2nd edition Saunders Publications

**3.** Rombeau JL Caldwell DM, *"Text book of Enteral and Parenteral Nutrition"*

**4.** Rombeau JL Caldwell DM, *"Clinical Nutrition Enteral and Tube Feeding"* 2nd ed WBSaunders 1990.

## Applied Nutrition (MCND202)

**Credits- 5**

**Total hours :75**

### **1.Nutrition during different stages of life**

Nutrition during Pregnancy: Physiology of pregnancy, nutritional requirements and dietary guidelines, effect of Nutritional Status on pregnancy outcome, nutrition-related disruptions in fertility (under and over nutrition), nutrition related complications, complications of pregnancy, HIV/AIDS during pregnancy – Dietary concerns

**Nutrition during lactation:** Physiology of Lactation, Human milk composition, Nutritional requirements & dietary guidelines, Benefits of Breast Feeding, Galactogouges, Lactation Management in Normal & Special conditions,

**Nutrition in infancy:** Physiological development, Motor, Cognitive development, Energy and nutrient needs, feeding in early and late infancy, Common nutrition problems, Feeding Preterm and low birth weight infants,

**Nutrition in Toddlerhood and Preschool, Childhood & Preadolescent:** Growth and development, Nutritional requirements, Nutrition for children with special health care needs, feeding problems, Nutritional concerns and prevention of nutrition related disorders i. Obesity – underweight, ii. Deficiency condition, iii. Allergies, eating disorders

**Nutrition in adolescence:** Growth and development, Physiological and Psychological changes, Nutritional requirements of adolescents, Health and eating related behavior

**Nutrition in Adult and Elderly:** Nutrition and work efficiency. Menopausal and post-menopausal women, hormonal changes, nutritional requirement of the adult, Common health problems in old age, Problems of feeding during old age, Nutritional consideration & Menu planning for adult and old age

**2.Nutrition in special conditions:** Nutritional requirements for extreme environments, Nutritional requirements for space missions

### **3.Role of Functional foods in Health & Disease**

History, Definition, Classification, Sources, Physiological effects - effects on human health and potential applications in risk reduction of diseases of the following:

- Prebiotics
- Probiotics
- Symbiotic
- Non-digestible carbohydrates/oligosaccharides: Dietary fibre, Resistant starch, Gums
- Other Food Components ▪ Polyphenols: Flavonoids, catechins, isoflavones, tannins
- Phytoestrogens and Phytosterols
- Pigments: Lycopene, Curcumin

#### **Reference Books:**

- 1.Groff JL and Gropper SS: "*Advanced Nutrition and Human Metabolism*", 3<sup>rd</sup>ed. Wadsworth Thomson Learning
2. Mahan and Escott- Stump, "*Krause's Food, Nutrition and Diet Therapy*", 12th ed.WB Saunders.
3. Alpers DH, Stenson FW, Bier MD – "*Manual of Nutritional Therapeutics*" 4th edition. Lippincott Williams and Wilkins, 2002
- 4.Mitchell, "*Nutrition Across Life span*" 1997

## Nutritional Biochemistry-II (MCND203)

**Credits-2**

**Total hours-30**

### **1. CARBOHYDRATE METABOLISM:**

Glycolysis, Cori's Cycle, Oxidation of pyruvates. Citric Acid Cycle, Hexose Mono Phosphate Shunt Pathway, Gluconeogenesis, Glycogenolysis, Fructose Metabolism, Galactose Metabolism, Hormonal regulation of Blood Glucose, Hyperglycemia & Diabetes Mellitus, Diabetic Ketoacidosis, Glycosuria, Hypoglycaemia, fructosuria, galactosemia & Glycosylated Haemoglobin. Investigation of disorders of carbohydrate metabolism: glucose, Glucose tolerance tests & other tolerance tests.

### **2.METABOLISM OF PROTEINS & AMINO ACIDS:**

Metabolism of individual amino acids, Catabolism of Amino Acids, Formation of Ammonia, Transamination and Oxidative deamination. Urea Cycle. Formation of Creatine and Creatinine. One is carbon metabolism, which converts amino acids to specialized products. Disorders of Amino Acid Metabolism, Cystinuria, Homocystinuria, Cystathionuria, Phenylketonuria, Alkaptonuria, and Albinism. Maple Syrup Urine diseases, Hartnups's diseases.

### **3.METABOLISM OF LIPIDS:**

Oxidation of fatty acids, Biosynthesis of fatty acids, Ketogenesis. Biosynthesis of Triglycerides, Phospholipids & Sphingolipids. Biosynthesis of cholesterol & Bile Acids, Plasma Lipoproteins, Apo lipoproteins & Lipoprotein metabolism. Obesity, Fatty Liver, Lipotropic factors and ketosis. PUFA, Lipid per oxidation & Eicosanoids- Prostaglandins & Leukotrienes

### **4.RENAL FUNCTION TESTS**

Glomerular function and measurements, clearance tests, Tubular function tests,

### **5.LIVER FUNCTION TESTS:**

Disease of the Liver-Jaundice, acute and chronic hepatitis, Cirrhosis, Cholestasis etc.

## **6.MOLECULAR BIOLOGY**

DNA replication, DNA Polymerase, Cell cycle, DNA repair. Transcription, inhibition of transcription, genetic code, post-transcriptional processing, reverse transcriptase. Protein biosynthesis, post-translational processing, inhibitors of protein synthesis.

## **7.MOLECULAR TECHNIQUE**

Recombinant DNA technology - Restriction endonuclease, DNA ligase, vectors, chimeric molecules, cloning, gene library, in situ hybridization, blot techniques and applications, RFLP, Gene Therapy, PCR,

## **8.ACID-BASE BALANCE**

Body buffer system. Respiratory regulation of PH, renal regulation of PH. Disturbance in acid base balance, Anion gap, metabolic acidosis, metabolic alkalosis, Respiratory acidosis, Respiratory alkalosis

### **Reference Books:**

1. Textbook of Biochemistry – DM Vasudevan, Sreekumari
2. Lippincott's Illustrated Review – Biochemistry
3. Harper's illustrated Biochemistry – 26th edition
4. Nutritional Biochemistry and Metabolism, 2nd edition, Satyanarayanan U

**SEMESTER III**  
**Advanced Nutrition (MCND301)**

**Credits-4**

**Total hours: 60**

**1. Energy:** Energy content of foods. Physiological fuel value – review. Measurement of energy expenditure: BMR, RMR, Thermic effect of feeding and physical activity, methods of measurement. Estimating energy requirements of individuals and groups. Regulation of energy metabolism: control of food intake, digestion, absorption and body weight.

**2. Carbohydrates:** Types, classification, digestion and transport – review, dietary fibre, fructo-oligosaccharides, resistant starch – chemical composition and physiological effects. Glycemic index of foods. Sweeteners – nutritive and non-nutritive.

**3. Proteins:** Classification, digestion, absorption and transport – review. Metabolism of proteins: Role of muscle, liver and gastro intestinal tract. Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Therapeutic applications of specific amino acids: Branched chain, glutamine, arginine, homocysteine, cysteine, taurine.

**4. Lipids:** Classification, digestion, absorption, transport – review. Functions of EFA. Role of n-3, n-6 fatty acids in health and disease. Requirements of total fat and fatty acids. Trans fatty acids. Prostaglandins.

**5. Water:** Regulation of intra and extra cellular volume. Osmolality, water balance and its regulation.

**6. Minerals:** ◦ Macro minerals: calcium, phosphorus, magnesium, sodium, potassium and chloride. Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride. Trace minerals: selenium, cobalt, chromium, vanadium, silicon, boron, nickel

**7. Vitamins:** Historical background, structure, food sources, absorption and transport, metabolism, biochemical function, assessment of status. Interactions with

other nutrients. Physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect to the following.

### Reference Books:

1. Shils, Olson, Shike and Ross (1999). Modern Nutrition in Health and Disease, 9th edition, Williams & Wilkins
2. Groff JL and Gropper SS: Advanced Nutrition and Human Metabolism, 3rd ed. Wadsworth Thomson Learning
3. Whitney EN and Rolfes SR. Understanding Nutrition, 10th ed. West Publishing Co., 2004.
4. Robinson CH, et al Normal and Therapeutic Nutrition, 17th ed, Macmilan Publishing Co, New York
5. Baamji M, Prahlad N, Vinodini R (1998), Textbook of Human Nutrition, Oxford & IBH Pub Co. New Delhi
6. Staci Nix, William's Basic Nutrition and Diet Therapy, 12th ed, Mosby 2005.
7. Mahan and Escott- Stump, Krause's Food, Nutrition and Diet Therapy, 12th ed WB Saunders.
8. Michael Zimmermann, "Micronutrients in the Prevention and Therapy of Disease" 9th ed, 2000

## **NUTRIENT ANALYSIS PRACTICAL (MCND302)**

**Credits- 1**

**Total hours:30**

### **1. Carbohydrates Determination of:**

- a) Carbohydrate profile: Total sugars, reducing sugars and non-reducing sugars.
- b) Fibre profile.

### **2. Proteins:**

- a) Identification of amino acids by paper and thin layer chromatography.
- b) Determination of proteins by Micro Kjeldahl and Biuret methods.
- c) Any one enzyme assay in food samples (PPO, SOD, CAT).

### **3. Lipids Estimation of fat by Soxhlet extraction method.**

**4. Vitamins-** Determination of thiamine/ riboflavin (fluorimetric) and vitamin C (colorimetric).

### **5. Minerals Determination of:**

- a) Total ash
- b) Calcium, Iron, Magnesium, Phosphorus, Potassium and Zinc.

### **6. Non-nutrients and phytochemicals**

I. Isolation and identification of  $\beta$  carotene by column chromatography.

II. Determination of:

- a) Oxalates, phytates and saponins.
- b) Total phenolics and flavonoids.

### **7. Determination of moisture by hot air/vacuum oven method.**

### **8. Advanced analytical techniques:**

- a) Trace minerals by atomic absorption spectrometry (demonstration).
- b) Demonstration/ determination of pesticides in foods by ELISA/HPLC.
- c) Demonstration/ determination of fatty acids in foods by gas chromatography.
- d) Demonstration/ determination of any one phytochemical in foods by HPLC.



## Public Health Nutrition (MCND303)

**Credits-4**

**Total hours:60**

**1.Public Health Nutrition – An Overview**-Concept and importance of public health nutrition. Public health issues and problems, Health care system in India, Role of public nutritionist in health care delivery

**2.Public Health Problems** - Prevalence and management, Non-Communicable diseases- Obesity, Cardio-vascular diseases, Diabetes, Cancer and their preventive measures, **Nutrient deficiencies** – PEM, severe acute malnutrition, anemia, Vitamin D, Folic acid, IDD

**3.Assessment of nutritional status in community Settings**-Methods of nutritional assessment - ABCD technique, Dietary assessment – family diet survey, assessment of dietary intake of individuals, qualitative diet surveys, institutional diet surveys, food balance sheet

**4. Strategies to combat Public Health Problems**-Improving food and nutrition security - Green White and Blue revolution, Nutrition education - Principles of planning –, where, when, whom, Kitchen garden, food fortification, food enrichment, PDS, PHC

### **5.Nutrition Intervention programmes**

National Nutrition Policy Preschool feeding programme, ICDS, MDM, SNP, WNP, ANP, BNP, NNAPP, FNB, NIDDCP, National Program for Prevention of Blindness due to Vitamin A Deficiency

### **6.Strategies to combat malnutrition**

International organizations concerned with food and nutrition: FAO, WHO, UNICEF, CARE, AFPRO, CWS, CRS World Bank and others.National organizations concerned with Food and Nutrition: ICMR, ICAR, CHEB, CSWB, SSWB

**Economics of Nutrition:** Malnutrition and its economic consequences; Economics in Nutrition – Food security, food production and food pricing

## Reference Books:

1. Gulani, K.K. 2005. Community Health Nursing. 1st Edition. Kumar Publishing House. New Delhi. Pp – 662 to 664.
2. Gupta M.C., Mahajan B.K. 2003. Textbook of Preventive and Social Medicine. Third Edition. Jaypee Brothers Medical Publishers. New Delhi. India. Pp- 355-357.
3. Kishore J. 2007. National Health Programmes of India. 7th Edition Century Publication. New Delhi.Pp- 340-361.
4. Oxford textbook of Public Health Ed. Roger Detels, James McEwen, Robert Beaglehole, and Heizo Tanaka Oxford University Press (OUP) 4th Edition: 2002.
5. Public Health at the Crossroads – Achievements and Prospects. Robert Beaglehole and Ruth Bonita 2nd Edition Cambridge University Press
6. Maxcy-Rosenau-Last Public Health & Preventive Medicine, Fourteenth Edition Ed Robert Wallace, MD, et al.
7. Epidemiology and Management for Health Care: Sathe, P.V. Sathe, A.P., Popular Prakashan, Mumbai, 1991
8. International Public Health: Diseases, Programs, Systems, and Policies by Michael Merson, Robert E Black, Anne J Mills - Jones and Bartlett Publishers
9. Preventive and Social Medicine, K Park, Bansaridas Bhanot Publishing House

Elective Paper I

### **Nutrigenetics and Precision Nutrition (MCNDEL305)**

**Credits-2**

**Total hours-30**

## Module Objectives

The module deals with human nutrition during the life cycle in health and disease and links this to nutrigenetics, nutrigenomics, and personalised nutrition. By the end of the module, it is expected that students will be able to: have an understanding of clinical, biochemical and molecular genetic basis of complex diseases such as metabolic (obesity and diabetes) and cardiovascular disease- related traits and topical issues in nutritional sciences which have made major advancements over

the decade including the areas of genetic and nutritional epidemiology, gene-diet and gene-physical activity interactions, epigenetics and personalised nutrition.

### **Modules learning outcomes.**

On completion of the module, the student should

- ✓ Understand the basics of molecular genetics and genetic epidemiology of multifactorial diseases.
- ✓ Understand the methods employed to identify human genes involved in metabolic and cardiovascular disease outcomes.
- ✓ Have developed an understanding of the impact of lifestyle factors (diet, exercise, biological rhythms) on the association between genotype and disease.
- ✓ Have developed an understanding of the concept of personalised nutrition.

Additional outcomes:

Development of a number of key skills such as critical evaluation, and use of on-line databases and communicating evidence-based advice to different audiences.

### **Module content**

- ✓ Basics of molecular genetics and genetic epidemiology of multifactorial diseases.
- ✓ Insight into the contribution of genetic variation to disease risk and methods employed to identify human genes involved in metabolic and cardiovascular disease outcomes.
- ✓ An in-depth understanding of the biochemical and clinical aspects of human genetic diseases.
- ✓ An understanding of the impact of lifestyle factors, in particular diet, on the association between genotype and disease.
- ✓ Concepts of gene-lifestyle interactions.
- ✓ Concept of personalised and precision nutrition

### **Lecture topics**

- Gene regulation (2 hours)
- Genetic epidemiology (2 hours)
- Genome-wide scans (2 hours)
- Mendelian Randomization and causal inference (2 hours)
- Population genetics (1 hour)
- Biochemical genetics – monogenic diseases (1 hour)
- Introduction to Nutrigenetics and Nutrigenomics (2 hours)
- Role of Omics in Precision Nutrition (1 hour)

- Role of Epigenetics and gut microbiome research in personalised nutrition (1 hour)
- Introduction to Personalised and Precision Nutrition (1 hour)
- Personalised nutrition debate (3 hours)
- Nutrigenetic statistical analysis using SPSS statistics software (12 hours)

## SEMESTER-IV

### ELECTIVE PAPER-II

#### Sports Nutrition (MCNDEL403)

**Credit- 1**

**Total hours: 15**

- **Introduction to physical activity and exercise** – types, Body system involved in exercise Cardio respiratory, muscular and energy system. Definition of fitness. Substrate utilization during work.
- **Physical fitness assessment**- cardio respiratory fitness, assessment of body composition, muscular fitness assessment, flexibility assessment.
- **Diet in exercise** - Carbohydrates for exercise, carbohydrate loading, ergogenic aspects, carbohydrate based dietary supplements.
- Role of protein, electrolytes changes in exercise, electrolytes & temperature regulation. Fluid & Electrolyte losses, fluid and electrolyte replacement. Role of vitamins and minerals during exercise, vitamin and mineral supplements for exercise
- Yoga and Fitness, effect of yoga on immune system, endocrine system, nervous system, digestive system and muscular system, Health benefits of yoga.
- **Kinanthropometry:** Assessment - Kinanthropometry: Definition; Introduction; Body size and proportion; Somatotyping; Circumferences; Skinfold measurement sites and determining body composition; Applications. Role of National agencies towards improvements of sports performance.

#### Reference Books:

1. Roberta LarsonDuyff. John Wiley & Sons, Inc, American Dietetic Association, complete food and Nutrition guide, 2nd edition 2002,
2. Nutrition for health fitness & sport Melvin H. Williams. 5th edition – 1999.
3. Udaiveer, Nutrition & Food, Anmol Publication Pvt. Ltd, New Delhi, 2005.
4. Guyton & Hall, Text book of Medical Physiology, 11th edition, 2006.
5. Gordon M. Wardlaw, Anne M. Smith contemporary Nutrition, Mc Graw – Hill International Edition, 2006.
6. Wc13 Mcgraw– Hill. Vishwannath M. Sardesai, Introduction to clinical Nutrition, Marcel Dekker, Inc New York, 2003

## PATTERN OF QUESTION PAPERS

Question Format	Marks	No. of Questions	Mark Distribution	Total Mark
Essay	20 Marks	1 out of 2 Questions	20 Marks	<b>80 Marks</b>
Short Notes	6 Marks	10 out of 12 Questions	60 Marks	

## SCHEME OF EXAMINATION

### First Semester

Paper	Course Code	Name of the Paper	Internal Assessment Marks	External University Theory Written	University Practical / Viva	Total
Paper I	MCND101	Medical Nutrition Therapy	20	80	-	100
Paper II	MCND102	Nutritional Biochemistry - I	20	80	-	100
Paper III	MCND103	Research Methodology and Biostatistics	20	80	-	100
Paper IV	MCND104	Pharmacology	20	80	-	100
Paper V	22AVP103	MAOM - Mastery Over Mind	50	-	-	50
Paper VI	MCND402	CND Clinics - I	-	-	50	50
<b>Total</b>			<b>130</b>	<b>320</b>	<b>50</b>	<b>500</b>

### Second Semester

Paper	Course Code	Name of the Paper	Internal Assessment Marks	External University Theory Written	University Practical / Viva	Total
Paper VII	MCND201	Critical Care Nutrition	20	80	-	100
Paper VIII	MCND202	Applied Nutrition	20	80	-	100
Paper IX	MCND203	Nutritional Biochemistry - II	20	80	-	100
Paper XI	MCND402	CND Clinics - II	-	-	50	50
<b>Total</b>			<b>60</b>	<b>240</b>	<b>50</b>	<b>350</b>

### Third Semester

Paper	Course Code	Name of the Paper	Internal Assessment Marks	External University Theory Written	University Practical / Viva	Total
Paper XII	MCND301	Advanced Nutrition	20	80	-	100
Paper XIII	MCND302	Nutrient Analysis (Practical)	20	-	80	100
Paper XIV	MCND303	Public Health Nutrition	20	80	-	100
Paper XV	MCND304	Research Internship	50	-	-	50
Paper XVII	MCND402	CND Clinics - III	-	-	50	50
Paper XVIII	MCNDEL305	Elective paper - I Nutrigenetics and Precision Nutrition	50	-	-	50
<b>Total</b>			<b>160</b>	<b>160</b>	<b>130</b>	<b>450</b>

### Fourth Semester

Paper	Course Code	Name of the Paper	Internal Assessment Marks	External University Theory Written	University Practical / Viva	Total
Paper XIX	MCND401	Dissertation	50	-	100	150
Paper XX	MCND402	Clinical Rotation	-	-	100	100
Paper XXI	MCNDEL403	Elective Paper - II Sports Nutrition	50	-	-	50
<b>Total</b>			<b>100</b>	<b>-</b>	<b>200</b>	<b>300</b>

## Timetable

### Semester I (9 am – 4 pm)

Day	9-10 am	10-12 am	11-12 pm	12-1 pm	1-2 pm	2-3 pm	3-4 pm
Monday	Clinics			Lunch	MNT	Biochemistry	Biostatistics
Tuesday	MAOM	Clinics			Clinics	Case Discussion	
Wednesday	Clinics				MNT	Biochemistry	Biostatistics
Thursday	MAOM	Clinics			MNT	Pharmacology	Pharmacology
Friday	Clinics				MNT	Pharmacology	Pharmacology
Saturday	Clinics				Clinics	Case Discussion	

### Semester II (9 am – 4 pm)

Day	9 am - 1 pm	1-2 pm	2-3 pm	3-4 pm
Monday	Clinics	Lunch	Applied Nutrition	Biochemistry
Tuesday	Clinics		Critical Care	Applied Nutrition
Wednesday	Clinics		Applied Nutrition	Critical Care
Thursday	Clinics		Critical Care	Applied Nutrition
Friday	Clinics		Critical Care	Biochemistry
Saturday	Clinics		Applied Nutrition	Critical Care

### Semester III (8 am – 4 pm)

Day	8 am – 1 pm	1-2 pm	2-3 pm	3-4 pm
Monday	Clinics	Lunch	Nutrient Analysis - Practical	
Tuesday	Clinics		Advanced Nutrition	Public Health
Wednesday	Clinics		Public Health Nutrition	Advanced Nutrition
Thursday	Clinics		Advanced Nutrition	Public Health
Friday	Clinics		Public Health Nutrition	Advanced Nutrition
Saturday	Clinics		Nutrigenetics	

### Semester IV (8 am - 5 pm)

Day	8 am – 1 pm	1-2 pm	2-3 pm	3-4 pm	4-5 pm
Monday	Clinics	Lunch	Clinics		
Tuesday	Clinics		Clinics		
Wednesday	Clinics		Dissertation		
Thursday	Clinics		Clinics		
Friday	Clinics		Clinics		Sports Nutrition
Saturday	Clinics		Clinics	Case Presentation	



## **MODEL QUESTION PAPER**

### **AMRITA SCHOOL OF MEDICINE**

Amrita Centre for Allied Health Sciences

#### **Final Year M.Sc Clinical Nutrition and Dietetics**

**Maximum Marks: 80**

**Time: 3 Hours**

#### **Medical Nutrition Therapy**

Leave first page blank for marks distribution.  
Draw neat and Labelled diagrams whenever necessary.

#### **I. Essay: (Any One)**

**(20 × 1 = 20 Marks)**

**A)** A 56 year old male patient was admitted in the hospital with c/o prolonged fever and chronic cough with sputum, chest pain and shortness of breath. The patient had a history of fatigue, lethargy, and 6 kg weight loss within the past 2 months. Significant findings are blood pressure- 127/65 mmHg, heart rate 8/minute, respiratory rate 18/minute and temperature 98.6°. Prescribed medications include INH, Rifampicin, Pyrazinamide, and ethambutol. Over-the-counter medications include vitamin B6, iron and vitamin C supplementation. He says he has no appetite, and he is eating very little and he admits to recent weight loss.

- a) Define the condition with pathophysiology.
- b) What is the medical nutrition therapy for the condition and write down the dietary guidelines for this patient.
- c) Plan a diet for the same with calculation and necessary justification

**(5 + 5 + 10 = 20 Marks)**

**B)** Mr. C is 20-year-old male. The patient was apparently asymptomatic 4 days before admission to hospital then came with a history of bloody stools, diarrhoea, abdominal pain, vomiting and low-grade fever for 4 days. His Pulse rate is 90/minute, BP-110/70 and temperature - 100<sup>0</sup> C, Na 133meq/l, Hb 8mg/dl. Colonoscopy reveals Erythema with erosions noted in rectum and loss of vascular pattern. The prescribed medications include anti-TNF, infliximab, cyclosporine, and amino salicylates.

- a) Identify the condition and write down the major risk factors.
- b) What will be the nutritional care plan with nutritional goals for this patient.

c) Give a diet plan with calculation with necessary justification.

**(2 + 8 + 10 = 20 Marks)**

**II. Short Notes: (Any Ten)**

1. What is Diverticular disease? Discuss its aetiology, clinical manifestation, and dietary management.
2. What do you mean by acute pancreatitis and chronic pancreatitis? Discuss the nutritional management of both the cases.
3. What is cholecystitis, cholelithiasis and cholecystectomy?
4. Discuss the nutrition therapy for an adult suffering from liver cirrhosis.
5. "Anaemia is multifactorial"- Explain how pernicious anaemia is related to vitamin B12 deficiency? Discuss any four factors leading towards iron deficiency anaemia.
6. Classify diarrhoea. What is the importance of electrolyte balance and how can it be maintained?
7. Write short notes on MNT in COPD.
8. Discuss the role of diet in prevention of heart disease. Plan a day's menu for a patient suffering from hypertension.
9. What are the risk factors for the development of kidney stones? Discuss in brief the different types of kidney stones. What should be the dietary modifications for the treatment of kidney stone disease.
10. Define dialysis? Differentiate between haemodialysis and peritoneal dialysis. Discuss the nutritional requirement during dialysis.
11. Write a short note on fluid diet.
12. What is dyspepsia? Give reasons for indigestion and dietary advice to overcome this.

**(10 X 6 = 60 Marks)**

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# AMRITA CENTRE FOR ALLIED HEALTH SCIENCES

## Address:

Amrita Centre for Allied Health Sciences  
Second Floor, Chaithram Building  
Amrita Institute of Medical Sciences  
AIMS Ponekkara PO  
Kochi-682041

**Email Address:** [acaahs@ahs.aims.amrita.edu](mailto:acaahs@ahs.aims.amrita.edu)

**Principal Office:** 0484 285 8131

**ACAHS Office:** 0484 285 8201

**Academic Office:** 0484 285 8375

**Boys Hostel:** 0484 285 7444

**Girls Hostel:** 0484 285 7572

