Manav Rachna International Institute of Research And Studies
(Deemed to be University under section 3 of the UGC Act, 1956)

SCHOOL OF ALLIED HEALTH SCIENCES

DEPARTMENT OF NUTRITION AND DIETETICS

Curriculum
And
Scheme of Examination

M.Sc.- Nutrition and Dietetics
Batch: 2023-25

FOREWORD

This is to certify that this booklet contains the entire Curriculum and Scheme of Examination of **Master of Nutrition and Dietetics** being offered at **Faculty of Allied Health Sciences** of this University. This has been duly vetted and finally approved by the Academic Council of the University vide its **29th meeting** held on **05-07-2019 and subsequently 34th meeting held on 08-09-2020** and changes, if any deemed appropriate, shall be duly incorporated after the necessary approval by the Academic Council.

This Curriculum and Scheme of Examination of **Master of Nutrition and Dietetics** shall be implemented w.e.f. AY 2019-20.

Prof. (Dr.) Naresh Grover
Dean-Academics, MRIIRS

Date:

Preamble

The changing dynamics of the contemporary competitive world translates into extensive competition. In order to succeed in the environment, every individual is endeavoring to equip with all the latest skills and techniques, thereby putting extensive stress on his mind and body. Thus, the need to have a physically & mentally balanced body needs no amplification. The need of hour is to discern and give extra impetus to the field of 'Nutrition and Dietetics'. M.Sc (Nutrition & Dietetics) is an elaborated extension of the analytical; research based continued study carried out in B.Sc (Nutrition & Dietetics). The course envisions fostering scientific temper among the disciples.

The Master's Degree comprises of relevant subjects of the field as per the norms and guidelines so as to develop and tinker the minds of its partisans. Notwithstanding, modifications in scheme and syllabus are also carried out time to time as needed to keep abreast with latest advancement in the field. The programme objectives and programme specific objectives are in synchronization with PEOs with core values of customer focus, integrity, innovation, social responsibility, and diversity and a dedication to evidence-based research and practice. The curriculum is aimed at providing updated knowledge, technical skills and research aptitude to students.

Since the subject has grown tremendously, there is a need to specialize within the subject and train students specifically for the job market. In view of this, it was found necessary to introduce a specialization in the existing course of Nutrition and Dietetics. Students opting for this stream can branch out in the III semester into four streams viz. Clinical Nutrition, Food Science and Technology, Sports Nutrition and Public Health Nutrition. In I and II semesters, all courses will be same for all the streams. There are some common papers in III semesters also. The courses include earning of minimum 80 credits during the 2-year duration of the programme in 4 semesters. The total credits required to be earned are further divided as Compulsory Courses and Elective Courses. The total 64 credits required to be earned under Compulsory Courses and 16 credits under "Elective Courses. The choice of elective courses is open ended can be chosen as by the Department as well as offered by other Departments of the University. The course also pays attention to holistic approach and offers various opportunities to students to participate and to complete 25xN point from Manav Rachna Life Skill Programme. The research project is offered in fourth and fifth semester which enables student to study, inculcate and produce results in favour to society with flourishing the research skills with collaboration the inter-professional team.

The curriculum exhibits the requisite balance among the fundamental, core and elective subjects. This is to create a student talent pool that can serve the technological needs of the national and

global industry. Many courses are focused on global development needs such as Nutrition in Intensive Care, Technical Seminar, Dissertation etc. Also subjects like Institutional Food Service Management, Nutrition for Elderly, Nutrition in Health and Disease and Management of Nutrition Related Disorders etc. are offered to enhance the basic dietetics skills of students as per national and regional needs.

The curriculum includes courses focusing on employability, entrepreneurship and skill development, which map strongly with the POs defining demonstration of technical knowledge and engagement in independent and life-long learning. Examples of such courses are Nutritional Biochemistry, Statistical Methods for Applied Sciences, Techniques in Food Analysis and Nutrition in Health and Disease. And various lab courses based on numerous dimensions of Dietetics.

Certain courses are meant to create awareness about the environment and sustainability and inculcate professional ethics like Manav Rachna Life Skills etc. Also various activities are organized to inculcate human values and respect for the other genders.

The curriculum of the programme is updated and for those inputs have been included for industry experts, stake holders including student, parents and alumni of the department. Time to time feedback facility provides scope for improvement in curriculum as per the need of the hour.

Structure of Programme Implementation. The subjects focusing on regional, national and global development, focusing on Entrepenureship, Employability and Skill development and focusing on Professional ethics, Environment and sustainability, Gender Equality and Human values are enlisted in Appendix A, B and C respectively.

CONTENTS

VISION

The Department of Nutrition and Dietetics is committed to provide a central focus of research in nutrition science and also to enhance the quality of nutrition through integrated teaching and research.

MISSION

- To provide students with a scholastic programme that covers the breadth of knowledge in nutrition, provides opportunities for research, and offers practical experiences and training.
- To integrate the biological, behavioral, socioeconomic and environmental factors related to food and nutrient intakes and needs across the lifespan.
- To interpret and evaluate nutrition standards and analyze nutritional assessment data to make evidence-based decisions.
- To strengthen linkage with international organizations, government agencies, extension location in the field of nutrition and health.
- To use critical thinking skills to locate, interpret, and evaluate research findings and professional literature to explain implications and limitations.

ABOUT THE DEPARTMENT

Nutrition and Dietetics department was established in the year 2006 under Faculty of FIT (Faridabad Institute of Technology) which was later merged under Faculty of Applied Sciences. It is an integrated and a professional program preparing students to work in various disciplines of Nutritional Sciences, explore how it affects the health of the individual and the nation and also to discover how diet can be used in the treatment of communicable and non-communicable disease. It is a health-related career which involves translating the sciences of nutrition and food to promote good health. It is a vital and growing profession with ample career opportunities. The internship/training program with various hospitals, food industries, research labs, sports organizations etc provide opportunities to practice and master the core competencies to place its students in covetable jobs. The Master's program in this discipline, introduced in 2009 aims at developing research skills and abilities in nutritional issues of contemporary interest.

The highlights of this course at Faculty of Applied Science is focused on teaching, strong research and outreach in Clinical Nutrition, Sports Nutrition, Food Science and Technology, and Public Health Nutrition. The Department offers a plethora of Academic and Co-curricular activities at various platforms be it a school, community or corporate like NTPC, ONGC, IBM that shapes students' careers and make them distinct from others in their chosen field of specialization. The Programme has been designed to build and enhance skills of the students to meet industry requirements. The Department pays special attention to Industry-University Collaboration to leverage student's placements, Joint R&D Projects with various National and International Organizations.

Master of Science (Nutrition and Dietetics)

Program Education Objectives:

PEO 1 Graduates are prepared to be employed in hospital/health industries by providing expected domain knowledge.

PEO 2 Shape future researchers to address complex nutritional problems and resolve issues pertinent to mankind

PEO 3 Graduates are motivated in career and entrepreneurial skill development to become global leaders.

PEO 4 Produce lifelong learner graduates who are able to incorporate a new evidence based technology and knowledge into practice.

Program Outcomes

The learning outcomes-based curriculum framework is based on the premise that every student is unique. Each student has his/her own characteristics in terms of previous learning levels and experiences, life experiences, learning styles and approaches to future career-related actions. The quality, depth and breadth of the learning experiences made available to the
students while at the college/University help develop their characteristic attributes. The postgraduate attributes reflect both disciplinary knowledge and understanding and generic/global skills and competencies that all students in different academic fields of study should acquire/attain and demonstrate. Some of the desirable attributes which a postgraduate
student should demonstrate will include the following:

-3-

PO1.**Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2.**Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by

connecting people, ideas, books, media and technology.

PO3. **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6. **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

PO7. **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PO 8: **Scientific Reasoning using Quantitative/Qualitative Data**: Demonstrate the ability to understand cause-and-effect relationships, define problems, apply scientific principles, analyze, interpret and draw conclusions from quantitative/qualitative data, and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO 9: **Reflective Thinking:** Demonstrate critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. -4-

PO 10: **Information/Digital Literacy:** Demonstrate capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources and to use appropriate software for analysis of data.

Program Specific Outcomes

PSO 1: Understand the concepts of clinical nutrition, food science and technology, sports nutrition and public health nutrition.

PSO 2: Apply theoretical concepts in laboratory setting as per standard methods in the above mentioned areas.

PSO 3: Understand the applications of nutritional sciences in dietary interventions in the field of clinical and sport sciences, communication for health promotion, food service management, food science and processing.

PSO 4: Acquire skills to undertake systematic research in the areas of Nutrition and Dietetics.

Mapping of PEOs with POs and PSOs

Articulation Matrix (Mapping is labeled as strongly with 3, moderately with 2 and low with 1)

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PSO-1	PSO-2	PSO-3	PSO-4
PEO-1	3	3	3	2	3	2	3	3	2	2	3	3	3	3
PEO-2	3	2	2	2	2	3	3	3	3	2	3	3	3	3
PEO-3	3	3	3	3	3	3	3	3	3	2	3	3	3	3
PEO-4	3	2	3	2	2	3	3	3	3	2	3	3	3	3

Semester and CBCS System

Credit based system of study and student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grade obtained by the student, grade point average is calculated

(a) Course credits assignment

Each course has a certain number of credits assigned to it depending upon its duration in periods for lecture, tutorial and laboratory/clinical practice in a week. A few courses/activities are without credit (s) and are referred to as Audit Pass Courses (APC) but are mandatory to pass as a partial fulfillment of award of degree.

(b) Earning of credits

At the end of every course, a letter "Grade" shall be awarded in each course for which a student has registered. On obtaining a minimum Pass Grade, student shall accumulate the course credits as Earned Credits. A student's performance shall be measured by the number of credits that he/she has earned and by the weighted grade point average. Grades obtained in the audit courses shall not be counted for computation of grade point average, however shall be mandatory to pass as a partial fulfillment of award of degree.

Choice Based Credit System

For Award of Degree of a programme M.Sc. Nutrition and Dietetics, he/she has to earn minimum 80 credits during the 2 year duration of the programme in 4 semesters.

The total credits required to be earned have been further classified under two baskets of courses: "Compulsory Courses Basket", and "Elective Courses Basket". The total 64 credits required to be earned under "Compulsory Courses Basket" and 16 credits under "Elective Courses Basket".

All courses under "Compulsory Courses Basket", are required to be qualified and cleared/pass by each and every students enrolled under the programme and are semester-wise listed in the study scheme along with credits assigned to each course.

Under Elective Courses Basket, there will be three types of courses:

- Semester-wise courses offered by the department itself
- Open/Inter-disciplinary courses offered at the Institute/University level notified from the office of Dean-Academics.

- Massive Open Online Courses (MOOCs) available on SWAYAM Platform or any other platform as recommended by UGC/AICTE and notified from the office of Dean-Academics.

Each course shall have credits assigned to it. Student shall be required to register courses every semester for as many courses/credits specified under "Elective Courses Basket" depending upon his/her interest, capability/pace of learning and availability of time slot (without any clash in time table) so as to earn all required total credits under the "Elective Courses Basket" during the entire programme duration.

However, for registration of courses (including courses under "Compulsory Courses Basket", "Elective Courses Basket" and Previous Semester Courses (wherein he/she was declared in-eligible on the basis of attendance or he/she could not clear the course within permissible given chances), if any the maximum limit in a semester shall be 30 credits.

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
STUDY SCHEME
PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-I

Course Type	Course Code	Course Name	Pre-requisite Course, if any		Periods/ Week			Marks			Duration of Exam (Hrs)	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Ability Enhancement Courses	CDC-ND-511	Professional Communication-I			2	0	2	50	50	100	1.5	Audit Pass
Foundation	MND-DS-101	Nutritional Biochemistry			3	0	3	100	100	200	3	3
	MND-DS-151	Nutritional Biochemistry (Practical)			0	2	2	50	50	100	2	1
	MND-DS-102	Human Physiology			3	0	3	100	100	200	3	3
	MND-DS-152	Human Physiology (Practical)			0	2	2	50	50	100	2	1
CORE	MND-DS-103	Human Nutrition Requirement			4	0	4	100	100	200	3	4
	MND-DS-153	Human Nutrition Requirement (Practical)			0	2	2	50	50	100	2	1
	MND-DS-104	Food Science & Processing Technology			3	0	3	100	100	200	3	3
	MND-DS-154	Food Science & Processing Technology(Practical)			0	2	2	50	50	100	2	1
Total					13	8	21	600	600	1200	20	**17**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-105	Healthcare Management			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit

PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-II

Course Type	Course Code	Course Name	Pre-requisite Course, if any		Periods/Week			Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Value Added	MND-201	Manav Rachna Life Skills –I	**Audit Pass Course**									
Ability Enhancement Courses	CDC-ND-512	Professional Competency Enhancement-I			2	0	2	50	50	100	1.5	Audit Pass
Core	MND-DS-201	Statistical Methods for Applied Sciences			3	0	3	100	100	200	3	3
	MND-DS-202	Techniques in Food Analysis			3	0	3	100	100	200	3	3
	MND-DS-252	Techniques in Food Analysis (Practical)			0	2	2	50	50	100	2	1
	MND-DS-203	Institutional Food Service Management			3	0	3	100	100	200	3	3
	MND-DS-253	Institutional Food Service Management (Practical)			0	2	2	50	50	100	2	1
	MND-DS-204	Nutrition in Health and Disease			3	0	3	100	100	200	3	3
	MND-DS-254	Nutrition in Health and Disease (Practical)			0	2	2	50	50	100	2	1
Discipline Specific	MND-DS-205	Nutraceutical and Functional Foods			2	0	2	100	100	200	3	2
	MND-DS-206	Nutrition for elderly										
	MND-DS-255	Nutraceutical and Functional Foods (Practical)			0	2	2	50	50	100	2	1
	MND-DS-256	Nutrition for Elderly (Practical)										
Total					**15**	**8**	**23**	**700**	**700**	**1400**	**23**	**18**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-207	Scientific Writing and Communication Skills			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester.**

The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit
Regarding Discipline Specific theory subjects, correspondent practical should be opted.
Student has to complete 25xN point from Manav Rachna Life Skill Programme

PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-III

Group A – Clinical Nutrition

Course Type	Course Code	Course Name	Pre-requisite Course, if any		Periods/Week			Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Ability Enhancement Courses	CDC-ND-611	Placement Preparatory Programme			2	0	2	50	50	100	1.5	Audit Pass
Core (CN)	MNDC-DS-301	Advanced Clinical Nutrition			4	0	4	100	100	200	3	4
	MNDC-DS-351	Advanced Clinical Nutrition (Practical)			0	2	2	50	50	100	2	1
	MNDC-DS-302	Nutrition in Intensive Care			4	0	4	100	100	200	3	4
	MNDC-DS-352	Nutrition in Intensive Care (Practical)			0	2	2	50	50	100	2	1
	MNDC-DS-303	Management of Nutrition Related Disorders			3	0	3	100	100	200	3	3
	MNDC-DS-353	Management of Nutrition Related Disorders(Practical)			0	2	2	50	50	100	2	1
	MND-DS-354	Technical Seminar			0	2	2	50	-	50	2	1
	MND-DS-355	Research Proposal Development			0	4	4	100	-	100	3	2
Discipline Specific	MND-DS-306	Advanced Nutritional Sciences			2	0	2	100	100	200	3	2
	MND-DS-307	Fortification of Food										
	MND-DS-308	Epidemiology and Public Health										
	MND-DS-309	Sports Supplements and Doping										
TOTAL					**13**	**12**	**25**	**100**	**550**	**1250**	**23**	**19**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-310	Nutrition for Parathletes			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester.**

The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit

PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-III

Group B – Food Science and Technology

Course Type	Course Code	Course Name	Pre-requisite Course, if any		Periods/Week			Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Ability Enhancement Courses	CDC-ND-611	Placement Preparatory Programme			2	0	2	50	50	100	1.5	Audit Pass
Core (FST)	MNDF-DS-301	Advanced Food Science & Chemistry			4	0	4	100	100	200	3	4
	MNDF-DS-351	Advanced Food Science & Chemistry (Practical)			0	2	2	50	50	100	2	1
	MNDF-DS-302	Biotechnology of Food			4	0	4	100	100	200	3	4
	MNDF-DS-352	Biotechnology of Food(Practical)			0	2	2	50	50	100	2	1
	MNDF-DS-303	Microbiology of Food			3	0	3	100	100	200	3	3
	MNDF-DS-353	Microbiology of Food (Practical)			0	2	2	50	50	100	2	1
	MND-DS-354	Technical Seminar			0	2	2	50	-	50	2	1
	MND-DS-355	Research Proposal Development			0	4	4	100	-	100	3	2
Discipline Specific	MND-DS-306	Advanced Nutritional Sciences			2	0	2	100	100	200	3	2
	MND-DS-307	Fortification of Food										
	MND-DS-308	Epidemiology and Public Health										
	MND-DS-309	Sports Supplements and Doping										
TOTAL					**13**	**12**	**25**	**700**	**550**	**1250**	**23**	**19**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-10	Nutrition for Parathletes			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit

PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-III

Group C – Sports Nutrition

Course Type	Course Code	Course Name	Pre-requisite Course, if any		Periods/Week			Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Ability Enhancement Courses	CDC-ND-611	Placement Preparatory Programme			2	0	2	50	50	100	1.5	Audit Pass
Core (SN)	MNDS-DS-301A	Exercise Physiology & Metabolism			4	0	4	100	100	200	3	4
	MNDS-DS-351A	Exercise Physiology & Metabolism (Practical)			0	2	2	50	50	100	2	1
	MNDS-DS-302A	Sports Specific Nutrition			4	0	4	100	100	200	3	4
	MNDS-DS-352A	Sports Specific Nutrition (Practical)			0	2	2	50	50	100	2	1
	MNDS-DS-303A	Exercise and Sports Nutrition			3	0	3	100	100	200	3	3
	MNDS-DS-353A	Exercise and Sports Nutrition (Practical)			0	2	2	50	50	100	2	1
	MND-DS-354	Technical Seminar			0	2	2	50	-	50	2	1
	MND-DS-355	Research Proposal Development			0	4	4	100	-	100	3	2
Discipline Specific	MND-DS-306	Advanced Nutritional Sciences			2	0	2	100	100	200	3	2
	MND-DS-307	Fortification of Food										
	MND-DS-308	Epidemiology and Public Health										
	MND-DS-309A	Sports Supplements and Doping										
TOTAL					**13**	**12**	**25**	**700**	**550**	**1250**	**23**	**19**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-310	Nutrition for Parathletes			2	0	2	100	100	200	3	2
	MND-DS-311	Nutrigenomics and Nutrigenetics			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit

PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-III

Group D – Public Health Nutrition

Course Type	Course Code	Course Name	Pre-requisite Course, if any		Periods/Week			Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Ability Enhancement Courses	CDC-ND-611	Placement Preparatory Programme			2	0	2	50	50	100	1.5	Audit Pass
Core (CN)	MNDP-DS-301	Food and Nutrition Security			4	0	4	100	100	200	3	4
	MNDP-DS-351	Food and Nutrition Security (Practical)			0	2	2	50	50	100	2	1
	MNDP-DS-302	Health Promotion and Nutrition communication			4	0	4	100	100	200	3	4
	MNDP-DS-352	Health Promotion and Nutrition communication (Practical)			0	2	2	50	50	100	2	1
	MNDP-DS-303	Aspects of Public Health Nutrition			3	0	3	100	100	200	3	3
	MNDP-DS-353	Aspects of Public Health Nutrition (Practical)			0	2	2	50	50	100	2	1
	MND-DS-354	Technical Seminar			0	2	2	50	-	50	2	1
	MND-DS-355	Research Proposal Development			0	4	4	100	-	100	3	2
Discipline Specific	MND-DS-306	Advanced Nutritional Sciences			2	0	2	100	100	200	3	2
	MND-DS-307	Fortification of Food										
	MND-DS-308	Epidemiology and Public Health										
	MND-DS-309	Sports Supplements and Doping										
TOTAL					**13**	**12**	**25**	**700**	**550**	**1250**	**23**	**19**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-310	Nutrition for Parathletes			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit

PROGRAM: M.Sc (Nutrition and Dietetics) - SEMESTER-IV

Group A – Clinical Nutrition

Course Type	Course Code	Course Name	Pre-requisite Course, if any					Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Core	MNDC-DS-401	Nutrition in Emergency			4	0	4	100	100	200	3	4
	MND-DS--451	Dissertation			0	12	12	100	100	200	3	6
Total					**4**	**12**	**16**	**200**	**200**	**400**	**6**	**10**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-402	Nutrition and Health Promotion			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Group B – Food Science and Technology

Course Type	Course Code	Course Name	Pre-requisite Course, if any					Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Core	MNDF-DS-401	Food Processing and Microbiology			4	0	4	100	100	200	3	4
	MND-DS--451	Dissertation			0	12	12	100	100	200	3	6
Total					**4**	**12**	**16**	**200**	**200**	**400**	**6**	**10**
ELECTIVE COURSES*												
Discipline Specific	MNC-DS-402	Nutrition and Health Promotion			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Group C – Sports Nutrition

Course Type	Course Code	Course Name	Pre-requisite Course, if any					Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Core	MNDS-DS-401	Recent Trends in Sports Nutrition			4	0	4	100	100	200	3	4
	MND-DS--451	Dissertation			0	12	12	100	100	200	3	6
Total					**4**	**12**	**16**	**200**	**200**	**400**	**6**	**10**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-402	Nutrition and Health Promotion			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Group D – Public Health Nutrition

Course Type	Course Code	Course Name	Pre-requisite Course, if any					Marks			Duration of Exam	Credits
			Title	Code	L	P	Total	Continuous Evaluation	End Semester examination	Total		
COMPULSORY COURSES												
Core	MNDP-DS-401	Public Health and Malnutrition			4	0	4	100	100	200	3	4
	MND-DS--451	Dissertation			0	12	12	100	100	200	3	6
Total					**4**	**12**	**16**	**200**	**200**	**400**	**6**	**10**
ELECTIVE COURSES*												
Discipline Specific	MND-DS-402	Nutrition and Health Promotion			2	0	2	100	100	200	3	2

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

Note: 1 Theory/Tutorial Hour = 1 credit, 2 Practical /Seminar Hours= 1 credit

Note: To earn total 80 credits, the student needs to score 16 credits from open elective basket offered across the university. The students can choose from Open elective basket offered by the Department as well as offered by other Departments of the University.

FIRST SEMESTER

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-101: Nutritional Biochemistry (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T: 0 P: 0	3	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Foundation

Course Outcomes: The student will be able:

MND-DS-101.1. To describe nutritional aspect of different bio molecules of food, and its requirements.
MND-DS-101.2. To interpret the biochemical basis for nutrition and health.
MND-DS-101.3. To illustrate inter-relationships between various metabolic pathways.
MND-DS-101.4. To justify the mechanisms adopted by the human body for regulation of metabolic pathways.

PART – A

UNIT 1: Biological Oxidation

1.1 Oxidation and reduction at cellular level, enzymes involved in redox reactions in biological systems
1.2 Redox potential and direction of flow of electrons in biological system
1.3 Role of dehydrogenases and the importance of NAD- and riboflavin-linked dehydrogenases in metabolic pathways such as glycolysis, the citric acid cycle, and the respiratory chain
1.4 Types of phosphorylation (Substrate and Oxidative phosphorylation) and mitochondrial respiratory chain

UNIT 2: Carbohydrate metabolism and its regulation

2.1 Regulation of glycolysis
2.2 Importance of TCA cycle with its regulatory steps
2.3 Reciprocal relationship between glycogenesis and glycogenolysis
2.4 Regulation of Gluconeogenesis
2.5 Pentose phosphate pathway with its regulation

UNIT 3: Lipid metabolism and its regulation

3.1 Biosynthesis of fatty acids and its regulation
3.2 Synthesis of triacylglycerol and other biologically important lipids.
3.3 Cholesterol metabolism with its regulation
3.4 Importance and metabolism of lipoprotein.

PART - B

UNIT 4: Hormones

4.1 Mechanism of action of Insulin
4.2 Mechanism of action of glucagon

UNIT 5: Nucleic acid metabolism and its regulation

5.1 Nucleotides and nucleic acids- biosynthesis of nucleotides by de novo and salvage pathways.
5.2 Degradation of nucleotides and production of urea and uric acid, GOUT.
5.3 Lesch Nyhan syndrome

Unit 6: DNA Replication

6.1 DNA Replication
6.2 DNA Repair
6.3 Mutation

Reference Readings:

1. D.L. Nelson and M.M. Cox, 2000, Lehninger's Principles of Biochemistry, 3rd Ed., Wort publishers, New York, NY.
2. R. L. Pike and M. L. Brown, 2000, An Integrated Approach; Nutrition, 2nd Ed., John Wiley & Sons.
3. S.K. Sawhney and R. Singh, 2014, Introductory Practical Biochemistry, 2nd Ed., Narsoha publishing house.
4. S.P. Singh, 2008, Viva in Biochemistry, 4th Ed., CBS Publishers, 239-240.
5. E.S.West, W.R. Todd, H.S. Nelson and T.T. Vanbrugger, 2000, Textbook of Biochemistry, 1st Ed., Oxford and IBH Publishing Corp. London.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-101)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-101.1	3	1	1	1	2	3	3	3	-	-	3	2	-	1
MND-DS-101.2	3	2	1	1	2	3	3	3	-	-	3	3	-	3
MND-DS-101.3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
MND-DS-101.4	3	1	2	1	2	3	3	3	2	2	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-151: Nutritional Biochemistry (Practical)

Periods/week	Credits	Max. Marks : 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Foundation

Course Outcomes: The students will be able:

MND-DS-151.1. To explain the principles of biochemical methods used for the analysis of food and biological samples.

MND-DS-151.2. To understand the properties of carbohydrates, proteins, lipids, cholesterol, DNA, RNA, glycoproteins and glycolipids and their importance in biological systems.

MND-DS-151.3. To perform biochemical analysis with accuracy and reproducibility.

MND-DS-151.4. To relate the lab results with nutritional significance of food.

Practicals

1. Titrimetric:
   - Determination of strength of acid and alkali solution.
   - Preparation of buffers and determination of their pH by the use of indicators and pH meters.
   - Estimation of calcium and sodium in food.
   - Estimation of protein by micro-Kjeldhal method.
2. Enzyme assay: Alkaline phosphatase, Transaminases
3. Estimation of amount of glucose
4. Estimation of amount of cholesterol
5. Estimation of ascorbic acid

Reference Readings:

1. R. L. Pike and M. L. Brown, 2000, An Integrated Approach; Nutrition, 2nd Ed., John Wiley & Sons.
2. S.K. Sawhney and R. Singh, 2014, Introductory Practical Biochemistry, 2nd Ed., Narsoha publishing house.
3. S.P. Singh, 2008, Viva in Biochemistry, 4th Ed., CBS Publishers, 239-240.
4. E.S. West, W.R. Todd, H.S. Nelson and T.T. Vanbrugger, 2000, Textbook of Biochemistry, 1st Ed., Oxford and IBH Publishing Corp. London.

Distribution of Continuous Evaluation Table:

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-151)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-151.1	3	1	1	1	2	3	3	3	-	-	3	-	-	3
MND-DS-151.2	3	2	1	1	2	3	3	3	-	-	3	-	-	3
MND-DS-151.3	3	2	1	1	2	3	3	3	3	-	3	2	3	3
MND-DS-151.4	3	1	2	1	2	3	3	3	2	2	3	-	-	3

MND-DS-102: Human Physiology (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T:0 P:0	3	Continuous evaluation : 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Foundation

Course Outcomes: Students will be able:
MND-DS-102.1. To describe the structural anatomy of various human body organs.
MND-DS-102.2. To associate the structural anatomy with functions of body organs
MND-DS-102.3. To analyze the reason behind the grounding of nutrition science in physiology.
MND-DS-102.4.To evaluate the effect of alterations in structure on the functions of organs

PART – A

UNIT 1: General Physiology and Blood
1.1 Principals of Homeostasis
1.2 Structure and Function of a cell
1.3 Transport mechanisms across cell membranes – Diffusion osmosis, active transport processes, vascular transport processes and transcellular communication.
1.4 Intercellular communications
1.5 Fluid compartments of the body
1.6 Composition and functions of blood with volume and physical properties
1.7 RBC: formation, functions, anemias & jaundice, WBC: formation, functions, variation and leukemias,Platelets: functions, variations, formation
1.8 Blood groups
1.9 Structure and functions of haemoglobin
1.10 Platelets and Blood coagulation
1.11 Plasma proteins and their functions

UNIT 2: Physiology of Digestive System
2.1 Physiology of different organs of digestive system: mouth and oesophagus, stomach, pancreas, liver and gall bladder, small and large intestine
2.2 Digestion and absorption of nutrients.
2.3 Gastrointestinal secretions & their regulation

UNIT 3: Physiology of nervous system
3.1 Structural organization of different parts of brain and spinal cord.
3.2 Reflex action – definition, reflex arc, classification and properties of nerves.
3.3 Central and peripheral nervous system, Autonomic nervous system: features and actions of parasympathetic & sympathetic nervous system.
3.4 Hypothalamus–structure and topographical representation.
3.5 The electroencephalogram, cerebrospinal fluid.

PART – B

UNIT 4: Physiology of Respiratory System

4.1 Physiology of organs involved in respiration
4.2 Mechanism and factors affecting respiration
4.3 Lung volumes and capacities
4.4 Transport of respiratory gases
4.5 Regulation of respiration-neural regulation, voluntary control and chemical regulation

UNIT 5: Physiology of cardio-vascular system
5.1 Basic properties and physiology of heart
5.2 Cardiac cycle- definition, phases of cardiac cycle
5.3 Cardiac output- definition, normal value, determinants.
5.4 Stroke volume, heart rate
5.5 Blood pressure-definition, normal values, factors affecting blood pressure
5.6 Basic idea of ECG

UNIT 6: **Physiology of Excretory System**
6.1 Physiology of kidney and urine formation
6.2 Glomerular filtration rate, clearance, Tubular function
6.3 Water excretion, concentration of urine-regulation of Na+, Cl-, K+ excretion

Reference Readings:

1. C. C. Chatterjee, 1992, Human Physiology, Vol I and II, 11th Edition, Medical Allied Agency, Calcutta.
2. A.C. Guyton and J. B. Hall, 1996, Textbook of Medical Physiology, 9th Edition, W. B. Saunders Company, Prime Books (Pvt) Ltd., Bangalore.
3. A.K. Jain, 2005, Textbook of Physiology, 3 rd Edition, Avichal Publishing Company.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-102)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-102.1	1	1	1	1	2	2	2	3	3	1	3	3	1	2
MND-DS-102.2	3	1	1	2	2	3	1	2	2	2	3	3	1	1
MND-DS-102.3	3	1	1	1	2	2	2	2	3	3	3	3	1	1
MND-DS-102.4	3	1	1	1	1	2	2	2	2	3	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS -152: Human Physiology (Practical)

Periods/week	Credits	Max. Marks: 100
L:0 T:0 P: 2	1	Continuous evaluation : 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Foundation

Course Outcomes: The students will be able:

MND-DS-152.1. To describe the principles of various physical parameters of human body.
MND-DS-152.2. To understand the working of equipments and instruments used in physiology lab.
MND-DS-152.3. To apply various parameters for diagnosis of illness.
MND-DS-152.4. To analyze the results of lab investigations with nutritional deficiencies.

Practical:
1. Introduction to the microscope and Laboratory
2. Collection of Blood Sample
3. Estimation of haemoglobin by cyanmet haemoglobin method.
4. Determination of clotting and bleeding time
5. Determination of RBC and WBC count
6. Determination of blood group and Rh factor
7. Measurement of BP, Pulse rate - before and after exercise
8. Demonstration/ visit to hospital for ECG, Dialysis
9. PCV - determination
10. Assessment of lung capacity - Demonstration / visit to hospital.
11. Analysis of Lab reports and planning of Diets.

Reference Readings:

1. A.C. Guyton and J. B. Hall, 1996, Textbook of Medical Physiology,. 9th Edition, W. B. Saunders Company, Prime Books (Pvt) Ltd., Bangalore.
2. A.K. Jain, 2005, Textbook of Physiology, 3 rd Edition, Avichal Publishing Company.
3. J. Sapiro, 2015, Human Physiology Lab Mannual, E-book, 4th Edition .

Distribution of Continuous Evaluation Table:

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Assessment Tools:
Practical Record
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-152)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-152.1	2	1	1	2	2	2	2	2	2	1	3	3	1	2
MND-DS-152.2	1	1	1	2	2	2	2	1	1	-	3	3	1	1
MND-DS-152.3	3	2	2	2	2	1	2	2	2	2	3	3	3	3
MND-DS-152.4	3	1	1	2	2	2	1	1	2	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UG C Act 1956)

MND-DS-103: HUMAN NUTRITIONAL REQUIREMENTS (Theory)

Periods/week	Credits	Max. Marks : 200
L: 4 T: 0 P: 0	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Core

Course Outcomes: The students will be able:
MND-DS-103.1. To describe the basics of nutritional requirements for human body.
MND-DS-103.2. To analyze in depth concepts of various macro and micro nutrients
MND-DS-103.3. To decide food components suitable for different physiological conditions other than essential nutrients
MND-DS-103.4. To evaluate the principles meal planning and RDA for all the physiological conditions.

UNIT 1: Understanding Nutrition
1.1 Concept of Nutritional Requirements and related definitions
1.2 Methods for studying the nutrient requirements
1.3 National and International recommendations for nutrient requirements

UNIT 2: Human Energy Requirements and Carbohydrate requirement
2.1 Energy Requirement
2.1.1 Definitions, Components of Energy Requirements
2.1.2 Factors affecting energy requirements and expenditure
2.1.3 Methods of estimating Energy expenditure and requirements
2.2 Carbohydrate requirement
2.2.1 Classification, Food Sources, Functions, Digestion Absorption and Nutritional requirements of carbohydrates, Dietary fibre, resistant starch, Fructo Oligosaccharides

UNIT 3: Protein, Lipids and Water requirements
3.1 Protein
3.1.1 Classification, Food Sources, Functions, Digestion Absorption of Proteins
3.1.2 Methods of determination of Proteins and Amino Acid content in Food
3.1.3 Improvement of quality of protein in the diet
3.1.4 Methods of estimating and assessing protein requirement at different stages of life cycle
3.1.5 Nutritional Requirements and RDA of proteins
3.2 Lipids
3.2.1 Classification, Food Sources, Functions, Digestion , Absorption, Transport , Storage and Nutritional requirements of Lipids
3.3 Water
3.3.1 Functions, Compartments of body water, factors influencing water distribution, water balance, requirements of water

UNIT 4: Fat and Water soluble vitamins requirements
4.1 Fat soluble vitamins: Introduction
4.1.1 Classification, Food Sources, Functions, Digestion , Absorption, Transport , Storage and Nutritional requirements of Vitamin A, D,E,K

4.2 Water soluble vitamins: Introduction
4.2.1 Classification, Food Sources, Functions, Digestion , Absorption, Transport , Storage and Nutritional requirements of Vitamin B complex and C

UNIT 5: Macro and Micro- mineral requirement
5.1 Macro and Micro-minerals: Introduction
5.1.1 Classification, Food Sources, Functions and Nutritional requirements of Calcium, Phosphorus,
5.2 Sodium, Potassium
5.2.1 Classification, Food Sources, Functions and Nutritional requirements of Iron, Zinc, Iodine and Fluorine

UNIT 6: Menu planning and RDA
6.1 Meal planning and RDA of All Physiological age groups
6.2 Nutritional Requirements of Special conditions: High and Low Altitude, Cold and polar and hot environment, Space missions

Reference Readings:
1. B. Srilakshmi, 2007, Dietetics. New Age International Publishers.
2. A. H. Guthrie, 1986, Introductory Nutrition, 6th Ed, The C. V. Mesby Company.
3. C. et al., Gopalan, 2004, Nutritive value of Indian Foods, Indian Council of Medical Research.
4. C. H. Robinson, M. R. Lawler, W. L. CheiToweth and A. E. Garwick, 2010, Normal and Therapeutic Nutrition, 17th Ed. Mac Millan Publishing Co.
5. FAO/WHO/UNO., Technical Report Series, 724 ,1985, Energy and Protein Requirement, Geneva.
6. WHO Technical Reports Series for different Nutrients.
7. Mann and Truswell, 2011, Essentials of Human Nutrition, Oxford University press.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-103)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-103.1	2	1	1	3	2	3	3	3	3	1	3	2	2	1
MND-DS-103.2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
MND-DS-103.3	1	1	1	2	1	1	3	2	2	1	3	3	3	1
MND-DS-103.4	3	3	3	3	2	3	2	3	2	2	3	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-153: HUMAN NUTRITIONAL REQUIREMENTS (Practical)

Periods/week	Credits	Max. Marks : 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Core

Course Outcomes: The students will be able:

MND-DS-153.1. To learn different methods of estimating nutrient requirements
MND-DS-153.2. To calculate nutrients requirement of different age groups
MND-DS-153.3. To evaluate the protein quality of different dishes
MND-DS-153.4. To design the diet plans for different vulnerable groups

PRACTICAL:

1. Calculation of Energy balance
2. To calculate BMR using different formulas
3. Calculation of percent energy supplied by carbohydrate in the diet
4. Calculation of chemical score using PAAP, SAAP reference protein
5. Calculation of chemical score and NDP cal% of dishes
6. Evaluation of protein quality of dishes
7. Meal management of Vulnerable groups: Infancy ,Preschooler, Pregnancy/Lactation, Elderly

Reference Readings:

1. B. Srilakshmi, 2007, Dietetics, New Age International Publishers.
2. Indian Council of Medical Research, 2011, Nutrient Requirements and Recommended-Dietary Allowance for Indians, New Delhi.

Distribution of Continuous Evaluation Table:

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-153)	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-153.1	2	1	1	1	1	2	3	2	2	2	3	3	3	3
MND-DS-153.2	3	2	3	2	2	3	3	3	3	1	3	3	3	3
MND-DS-153.3	3	3	3	1	1	2	3	3	3	1	3	3	3	3
MND-DS-153.4	3	3	3	1	1	2	3	3	3	3	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-104: Food Science & Processing Technology (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T:0 P:0	3	Continuous evaluation : 100
Duration of Examination: 3 Hours		End Semester Exam :100

Course Type: Program Core

Course Outcomes: The students will be able to:
MND-DS-104.1. To explain the physical and chemical properties of the food constituents.
MND-DS-104.2. To summarize the chemical reactions and physical changes which occur during the production, processing, storage and handling of foods.
MND-DS-104.3. To analyze the recent advancement and research in the field of Food Science.
MND-DS-104.4. To demonstrate the quality and safety of food.

PART A

Unit 1: Introduction-Food Science as discipline
1.1 Preparation for a career in Food Science
1.2 Activities of Food Scientists.
1.3 Components of the food industry
1.4 Allied Industries
1.5 International activities
1.6 Responsiveness to change
1.7 Inter related operations

Unit 2: Cereals, pulses, oil seeds, vegetables and fruits
2.1 Structure, composition & nutritive value
2.2 Buying and handling, processing
2.3 Preservation, storage and role in cookery.
2.4 Enzymatic and non-enzymatic browning reactions.

Unit 3: Milk and Milk products
3.1 Composition & nutritive value
3.2 Physical properties
3.3 Effect of heat acids
3.4 Enzymes and salt
3.5 Processing of milk products and milk substitutes
3.6 Role of milk and milk products in cookery
3.7 Buying and handling
3.8 Processing
3.9 Preservation and storage
3.10 Role in cookery

PART B

Unit 4: Meat, Poultry and Egg
4.1 Composition &nutritive value
4.2 Physical properties
4.3 Buying and handling
4.4 Processing
4.5 Preservation and storage
4.6 Role in cookery

Unit 5: Fats & oils, beverages, sugar and related products
5.1 Classification, Composition & nutritive and value
5.2 Composition, processing and refining of fats
5.3 Emulsions, rancidity and role of fats and oils in cookery.
5.4 Processing of beverages
5.5 Role of sugar in cookery
5.6 Artificial sweeteners.

Unit 6: Sensory Evaluation
6.1 Introduction
6.2 Methods and Application

Reference Readings:

1. M. Mc. Williams, 1997, Foods: Experimental Perspectives, Merrill, 3rd Edition, Prentice Hall, New Jersey.
2. Y. Pomeranz, 1991, Functional Properties of Food Constituents. Academic Press, INC.
3. N.N Potter and J.H. Hotchkiss, Food Science, CBS Publishers and & Distributors, New Delhi.
4. B. Srilakshmi, 1996, Food Science, New Age International (P) Ltd.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-104)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-	2	-	1	3	-	3	-	3	3	1	3	2	-	1
MND-DS-	1	1	1	2	1	3	1	2	1	1	3	2	2	2
MND-DS-	3	2	2	2	1	1	1	2	1	1	2	2	2	3
MND-DS-	1	-	2	1	-	3	-	1	1	-	1	1	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-154: Food Science & Processing Technology (Practical)

Periods/week	Credits	Max. Marks: 100
L:0 T:0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Core

Course Outcomes The students will be able:
MND-DS-154.1. To explain the properties of various food ingredients and the effect of cooking on them
MND-DS-154.2. To identify various adulterants commonly found in food products.
MND-DS-154.3. To differentiate between different processing techniques wrt quality characteristics of food.
MND-DS-154.4. To apply knowledge in food industry.

Practical:
1. Conduct objective and sensory test of recipes and compare.
2. Collect different food samples and analyze the adulterants in them.
3. Prepare recipes where gelatinization, dexterinisation, gluten formation, gel formation takes place.
4. Study the factors affecting coagulation of milk proteins.
5. Prepare recipes where egg acts as binding agent emulsifying agent, thickening agent.
6. Find the smoking point of any oil.
7. Prepare recipes where crystallization, caramalisation, one thread sugar consistency and three thread sugar consistency takes place

Reference Readings:

1. N.N Potter and J.H. Hotchkiss, Food Science. CBS Publishers and & Distributors, New Delhi
2. B. Srilakshmi, 1996, Food Science, New Age International (P) Ltd.

Distribution of Continuous Evaluation Table:

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-154)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 04
MND-DS-154.1	1	1	1	1	2	1	1	1	2	1	3	3	2	2
MND-DS-154.2	2	2	1	1	3	1	1	1	2	2	3	3	2	1
MND-DS-154.3	3	2	1	1	3	3	3	3	3	1	3	3	2	1
MND-DS-154.4	3	2	3	2	3	3	3	3	3	1	3	3	2	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
MND-DS-105 Healthcare Management (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T:0 P:0	2	Continuous evaluation : 100
Duration of Examination: 3 Hours		End Semester Exam :100

Course Outcomes: The students will be able:
MND-DS-105.1. To understand the concepts of management in providing health care services.
MND-DS-105.2. To demonstrate different modern management techniques in managing health care services in the country
MND-DS-105.3. To apply the management education in the field of health service industry.

MND-DS-105.4. To analyze relevant skills and attitudes in the day to day running of the hospital

PART A

Unit 1: Principles and Practices of Management
1.1 Basic concepts of Management
1.2 Principles of management
1.1 Characteristics of Management
1.2 Process of Management
1.3 Organizational Behavior
1.4 Different models of Organizational Behavior
1.5 Personality & Attitudes
1.6 Organizational Commitment
1.7 Motivation
1.8 Group Dynamics & Teams

Unit 2: Hospital Planning
2.1. Types of Hospital Organization
2.2 Statutory Requirements for Planning
2.3. Steps in Hospital Planning
2.4 Out Patient Department/Accident/Emergency
2.5 Indoor accommodation,
2.6 Ward design,
2.7 Bed wise planning,
2.8 Special requirements of certain departments such as ICU, OT ,Pediatric, Maternity ward.
2.9 Planning for various categories of Staff, Administrative action for Appointment, Training

PART B

Unit 3: Health Care
3.1. Health Administration in India
3.2. Health Care Delivery System.
3.3. National Health Policy
3.4. National Health Programmes
3.5 Quality Management in Health Care
1. Role of Quality Council of India (QCI)
2. National Accreditation Board of Hospitals (NABH)

Unit 4: Administration of Clinical & Non-clinical Services

4.1 Epidemiological Triad, Levels of Disease Prevention
4.2 Radiology Services & Clinical Laboratory
4.3 Central Sterile Supply Department
3.9 Laundry & Linen Services
4.4 House Keeping Services
4.5 Kitchen Canteen Services
4.6 Medical Records Department
4.7 Marketing
4.8 Billing, Claiming, Insurance Companies/Employers
4.9 Public Relations

Reference Readings:

1. International Standard Classification of Occupations, 2008 revision: Unit Group 3252: Medical records and health information technicians.
2. B.M. Sakharkar, Principles of Hospital Administration and Planning, Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.
3. C.M. Francis and et al., Hospital Administration, Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.
4. S. Srinivasan (ed.), Management Process in Health Care ,Voluntary Health Association of India, New Delhi.
5. G.D. Kunders, Hospitals: Planning, Design and Management. Prism Books Pvt. Ltd., Bangalore
6. Syed Amin Tabish., Hospital and Health Services Administration Principles and Practice (Oxford University Press, New Delhi).

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Course Articulation Matrix

CO Statement (MND-DS-105)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-105.1	3	2	3	2	2	3	3	2	1	1	2	1	2	2
MND-DS-105.2	3	2	3	3	2	3	3	2	1	1	2	2	2	3
MND-DS-105.3	2	3	3	3	2	3	3	3	3	1	3	2	3	1
MND-DS-105.4	1	3	3	2	2	1	3	2	1	1	3	2	2	2

SECOND SEMESTER

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-201-Statistical Methods for Applied Science (Theory)

Periods/week	Credits	Max. Marks : 200
L: 3 T:0 P:0	3	Continuous evaluation : 100
Duration of Examination: 3 Hours		End Semester Exam**:** 100

Course Type: Program Core
Course Outcomes: The students will be able:
MND-DS-201.1. To classify and determine the types, tools and methods of research.
MND-DS-201.2. To understand the ability to construct data gathering methods appropriate to the research design.
MND-DS-201.3. To apply and illustrate the appropriate statistical technique for the measurement/ scale and design.
MND-DS-201.4. To analyze the significance of Statistics and research methodology in nutrition research.

Unit 1: The Research - Basic concept and Process
- 1.1 Meaning and Purpose of Research
- 1.2 Research Process - Identification of research problem
- 1.3 Formulation of objectives
- 1.4 Hypothesis and its types
- 1.5 The design of research
  - 1.5.1 Descriptive research and Analytical research
  - 1.5.2 Experimental and Observational Research
  - 1.5.3 Quantitative and Qualitative research

UNIT 2: Sampling Process
- 2.1 Concept and importance of sampling
- 2.2 Methods of Sampling
- 2.3 Sampling errors :
  - 2.3.1 Systematic and random error
  - 2.3.2 Type 1 error - Level of significance
  - 2.3.3 Type 2 error – power
- 2.4 Sample Size Calculation

Unit 3: Measure of Central tendency
- 3.1 Mean
- 3.2 Median
- 3.3 Mode
- 3.4 Measure of Variability - Range
- 3.5 Variance and Standard Deviation

Unit 4: Measures of relationship
- 4.1 Define correlation and types
- 4.2 Karl's Pearson Correlation
- 4.3 Spearman Correlation

Unit 5: Parametric and Non – Parametric test
- 5.1 Normal Probability Distribution
- 5.2 Application of Independent T-test and Dependent T- test
- 5.3 Application of ANOVA (F - test)
- 5.4 Application of Chi Square (2x2 contingency table)

5.5 Mann Whitney U test

Unit 6: Data analysis - Statistical Software Tool

6.1 Tabulation and coding of quantitative and qualitative data on Excel
6.2 Introduction to SPSS
6.3 Analysis of Data by using SPSS
6.4 Data interpretation and report writing

Reference Readings:

1. R. Ahuja, 2001, Research Methods, Rawat Publications, Jaipur & New Delhi.
2. S. Gupta, 1999, Research Methodology and Statistical Techniques, Deep and Deep Publications.
3. S.P. Gupta, 1987, Statistical Methods, 25th Edition, Sultan Chand and Sons, New Delhi.
4. C.R. Kothari, 1990, Research Methodology-Methods and Techniques, 2nd Edition, Wishwa Prakashan C.A. division of Wiley Eastern Ltd., New Delhi.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-201)	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-201.1	3	2	3	2	1	1	3	2	1	3	2	2	3	3
MND-DS-201.2	2	2	2	2	1	1	3	3	2	3	3	2	3	3
MND-DS-201.3	2	2	2	1	1	1	3	2	3	3	3	2	3	3
MND-DS-201.4	3	2	3	3	1	1	3	3	3	3	3	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-202: Techniques in Food Analysis (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T: 0 P: 0	3	Continuous evaluation: 100
Duration of Examination: 3 Hrs		End Semester Exam: 100

Course Type: Program Core

Course Outcomes The students will be able:

MND-DS-202.1. To explain the principles of various analytical techniques available for nutrition research.
MND-DS-202.2. To describe the working principles of instruments for food analysis.
MND-DS-202.3. To apply the principles in determination of food quality
MND-DS-202.4. To analyze the suitable method for determination of food components.

PART A

UNIT I: Electrolytes

1.1 Acids, bases
1.2 Salts and buffers
1.3 Hendersen-Hasselbach equation.
1.4 Theory of indicators and principles of measurement of Ph.

UNIT II: Basics of Instrumentation

2.1 Physio-chemical principles
2.2 Methodology of Weighing, Colorimetry, photometry, fluorimetry.
2.3 Working principle and applications of spectrophotometer.
2.4 Working principle and applications of atomic absorptiometer.

UNIT III: Chromatography

3.1 Principles and application of paper (circular, ascending and descending) chromatography.
3.2 Principles and Application of ion-exchange chromatography.
3.3 Principles and application of column chromatography.
3.4 Principles and application of thin layer chromatography.
3.5 Principles and application gas liquid and high performance liquid chromatographic techniques.

PART B

UNIT IV: Electrophoresis –

4.1Basic principle of working.

4.2 Types of electrophoresis.
4.3 Principle and applications of paper electrophoresis.
4.4 Principle and applications of gel electrophoresis.

UNIT V: Calorimetry:

5.1 Types of calorimeter
5.2 Bomb calorimeter
5.3 Respirography – BMR/RMR
5.4 Survey Techniques

UNIT VI: Other Techniques

6.1 Immunological Methods – Radio Immune Assay (RIA)
6.2 Enzyme Linked Immuno Sorbent Assay (ELISA)
6.3 Use of Isotopes – Radioactive and stable isotopes.
6.4 Nuclear Magnetic Resonance (NMR) and its Applications

Reference Readings:

1. R. Boyer, 2000, Modern Experimental Biochemistry, 3rd Ed Person Education, Asia.
2. E.A. Dawes, 1980, Quantitative Problems in Biochemistry, 6th Ed, Longman Group Ltd.
3. A.K. Srivastawa and P.C. Jain, 1986, Chemical Analysis: An Instrumental Approach, 2 Ed, S. Chand and Company Ltd.
4. S. Sharma 1993, Practical Biochemistry, Classic Publishing House, Jaipur.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-202)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**

MND-DS-202.1	2	2	1	-	2	3	3	3	3	3	3	2	3	1
MND-DS-202.2	2	2	2	1	2	2	3	2	2	2	3	3	2	3
MND-DS-202.3	1	1	1	1	3	1	3	2	2	3	3	3	3	1
MND-DS-202.4	3	2	2	1	3	3	3	3	3	1	3	3	3	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-252: Techniques in Food Analysis (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T:0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hrs		End Semester Exam: 50

Course Type: Program Core

Course Outcomes: The students will be able:

MND-DS-252.1. To understand the techniques and principles of instruments in food analysis.
MND-DS-252.2. To apply their knowledge to work in food lab independently.
MND-DS-252.3. To analyze data obtained in specific techniques for food analysis.
MND-DS-252.4. To evaluate food data obtained from specific technique.

Practicals

1. **Colorimetric and Fluorimetric Estimation of:**
   - Phosphorus (organic and inorganic)
   - Glucose
   - Iron
   - Total and free cholesterol
   - Haemoglobin
   - Vitamin A & vitamin C
   - Riboflavin.
2. **Chromatography:**
   - Paper separation of Amino Acids

Reference Readings:

1. R. Boyer, 2000, Modern Experimental Biochemistry, 3rd Ed Person Education, Asia.
2. E.A. Dawes, 1980, Quantitative Problems in Biochemistry, 6th Ed, Longman Group Ltd.
3. A.K. Srivastawa and P.C. Jain, 1986, Chemical Analysis: An Instrumental Approach, 2 Ed, S. Chand and Company Ltd.
4. S. Sharma 1993, Practical Biochemistry, Classic Publishing House, Jaipur.

Distribution of Continuous Evaluation Table:

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance

Term end examination

Course Articulation Matrix

CO Statement (MND-DS-252)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-252.1	1	1	1	-	2	2	3	-	2	1	3	3	2	2
MND-DS-252.2	1	2	2	2	1	2	2	2	1	2	2	3	3	2
MND-DS-252.3	1	2	3	2	-	2	3	3	-	1	3	2	1	2
MND-DS-252.4	3	2	2	1	3	3	3	3	3	1	3	3	3	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-203: Institutional Food Service Management (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T: 0 P:0	3	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Core

Course Outcomes: The students will be able:

MND-DS-203.1. To learn the process of management of human, material and financial resources.
MND-DS-203.2. To apply the principles of management in the preparation and services of quality food.
MND-DS-203.3. To prepare menu plans for institutions to enhance quality and quantity of food preparation.
MND-DS-203.4. To calculate the costing and budgeting of any food service institution.

PART A

Unit 1: Institutional Food Management and Principles and Functions of Management:
1.1 Development of Food Service Institutions
1.2 Approaches to Management
1.3 Management: Theories, Principles and Functions
1.4 Tools of Management
1.5 Management of Resources.
1.6 Principle of management
1.7 Functions of management

Unit 2: Organizations of Spaces and Equipment
2.1 Kitchen and storage spaces,
2.2 Service Areas
2.3 Catering Equipment
2.4 Selection of Equipment
2.5 Equipment Design, Installation and Operation
2.6 Purchasing and maintenance of Equipment

PART B

Unit 3: Food Management
3.1 Characteristics of Food, Food Purchasing, and Inventory Management.
3.2 Menu Planning,
3.3 Food Production,
3.4 Food Service,
3.5 Clearing, Cleaning and Waste Management
3.6 Marketing the products of Catering

Unit 4: Hygiene, Sanitation and safety
4.1 Hygiene and Sanitation,
4.2 Safety and Security

Unit 5: Financial
5.1 Definition and scope
5.2 Costing and budgeting
5.3 Pricing and Accounting
5.4 Personnel Management Concepts

Unit 6: Personnel Management
6.1 Staff Employment
6.2 Employee Benefits
6.3 Staff Training and Development
6.4 Legal Aspects of Personnel Management

Reference Readings:

1. Desseler, Garry., 1987, Personnel Management: Modern Concepts and Techniques, Prentice Hall, New Jersey.
2. J. Keiser and E. Kaillo, 1974, Controlling and Analysis of Cost in Food Service Operations, Wiley & Sons, New York.
3. Mohini Sethi, 1993, Catering Management: An Integrated Approach, 2nd Edition, Wiley Publication.
4. Mohini Sethi, 2004, Institutional Food Management, 1st Edition, New Age international (P) Ltd, Publishers.
5. West, B. Bessie and Wood, Levelle, 1988, Food Service in Institutions, 6th Edition, Palacio June Macmillan Publication Company, New York.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-203)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-203.1	3	2	3	2	2	2	3	3	2	1	3	2	2	2
MND-DS-203.2	3	2	2	2	3	3	3	2	2	2	2	2	3	1
MND-DS-203.3	3	2	3	2	2	2	3	2	1	1	3	2	2	2
MND-DS-203.4	3	2	2	1	3	3	3	3	3	1	3	2	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-253: Institutional Food Service Management (Practical)

Periods/week	Credits	Max. Marks: 100
L:0 T:0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Core

Course Outcomes: The students will be able:

MND-DS-253.1. To apply and demonstrate the principles underlying the preparation and service of quality food.
MND-DS-253.2. To analyse the prevailing prices of foodstuffs to apply effectively in organizing meals for different events
MND-DS-253.3. To develop the skills of menu planning for quality and quantity preparation.
MND-DS-203.4. To create menu plans for institutions to enhance quality and quantity of food preparation

Practical:

1. Survey to find out prevailing prices of the various foodstuffs
2. Analysis of the relationship between purchased amount, edible portion and cooked weight of food stuffs
3. Recipe conversion
4. Planning and organizing meals for College canteen
5. Planning and organizing meals for working women Hostel
6. Planning and organizing meals for Birthday Party
7. Planning and organizing meals for Industrial canteen
8. Visit to different types of food service institutions and studying the following: Organization, Physical Plan and Layout, Food Service equipment, Sanitation and Hygiene.

Reference Readings:

1. M. Sethi, 1993, Catering Management: An Integrated Approach, 2nd Edition, Wiley Publication.
2. M. Sethi, 2004, Institutional Food Management, 1st Edition, New Age international (P) Ltd.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-253)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-253.1	2	2	2	1	2	2	2	2	2	2	3	2	2	2
MND-DS-253.2	3	3	2	1	1	1	3	3	3	3	3	2	2	2
MND-DS-253.3	2	2	2	1	2	2	3	2	2	2	3	2	2	2
MND-DS-253.4	2	2	2	1	2	2	3	2	2	2	3	2	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-204: Nutrition in Health and Disease (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T:0 P:0	3	Continuous evaluation : 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Core

Course Outcomes: The students will be able:
MND-DS-204.1. To understand the patho-physiology of various acute and chronic diseases and the patients need.
MND-DS-204.2. To illustrate the dietary and nutritional modifications according to the diseased condition.
MND-DS-204.3. To analyze care needed to prevent or treat the disease condition.
MND-DS-204.4. To create a suitable nutritional management/diet plan for patients of various diseases.

PART A

Unit 1: Introduction to Medical Nutrition Therapy
1.1 Definitions and Role of Dietitians in Health Care
1.2 The Nutritional Care Process (NCP)
1.3 Importance of coordinated Nutritional and Rehabilitation services.
1.4 Patient Care and counseling

Unit 2: Therapeutic adaptations and types of diets
2.1 Therapeutic adaptations of a normal diet and modes of feeding
2.2 Different types of diets and methods of feeding patients
- Enteral Feeding-Indications for use and complications of enteral feeding.
- Parenteral Feeding- Indications for use, advantages and complications.

Unit 3: Disease of Digestive Tract, Liver and Gall bladder
3.1 Diarrhea, Constipation, GERD, Peptic ulcer
3.2 Malabsorption Syndrome, Ulcerative Colitis
3.3 Hepatitis, Cirrhosis of liver, Hepatic Encephalopathy
3.5 Disease of gall bladder
3.6 Acute and Chronic pancreatitis

PART B

Unit 4: Disease of Cardio-vascular system
4.1 Atherosclerosis
4.2 Hyperlipidemia
4.3 Hypertension

Unit 5: Diet in Weight Management
5.1 Prevalence, etiology and Diet management during under weight
5.2 Prevalence and theories of obesity
5.3 Etiology of obesity with special emphasis on genetics and role of leptin
5.4 Metabolic pathway and diagnosis of obesity

5.5 Diet management during Obesity

Unit 6: Diet in Metabolic Disorders
6.1 Incidence and predisposing factors of Diabetes
6.2 Symptoms-types and tests for detection.
6.3 Metabolism in diabetes
6.4 Dietary treatment & meal management
6.5 Hypoglycemic agent, insulin and its types.
6.6 Complication of diabetes.

Reference Readings:

1. F.P. Antia, and P. Abraham, Clinical Dietetics and Nutrition, Oxford University Press, New Delhi.
2. J.S. Garrow, W.P.T James and A. Ralpti, Human Nutrition and Dietetics, Churchill,Livingstone.
3. K. Khanna, S. Gupta. R. Seth, S. J. Passi, R. Mahna and S. Puri, 1997, Textbook of Nutrition and Dietetics, Phoenix Publishing House Pvt Ltd.
4. L.K. Mahan and S. Escott Stump, 2000, Krause's Food Nutrition and Diet Therapy, 11th edition, W.B. Saunders Ltd.
5. M.E. Shils, J. Olson and M. Shike, Modern Nutrition in Health and Diseases. KM Varghese Company, Bombay.
6. S.R. Williams, 2001, Basic Nutrition and Diet Therapy, 11th ed., Times Mirror Mosby College Publishing.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-204)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-204.1	1	2	3	3	2	2	3	3	3	2	2	1	2	3
MND-DS-204.2	2	2	2	3	1	2	3	3	3	2	2	2	2	2
MND-DS-204.3	2	2	3	3	2	2	3	3	3	2	2	2	2	2
MND-DS-204.4	3	3	3	3	2	3	3	3	3	2	2	2	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-254: Nutrition in Health and Disease (Practical)

Periods/week	Credits	Max. Marks: 100
L:0 T:0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Core

Course Outcomes The students will be able:

MND-DS-254.1. To understand the different nutritional supplement and their uses in clinical practice.
MND-DS-254.2. To plan and create suitable therapeutic diets based on patient needs for various diseases/disorders
MND-DS-254.3. To apply the concept of dietary counseling for prevention / treatment of various diseases / disorders
MND-DS-254.4. To develop skills to prepare special therapeutic / health food

Practicals:

1. Market Survey of Commercial nutritional supplements: -Collection of information on commercial food formulae available in the market and their evaluation.
2. Preparation of Aids for Diet Counseling
3. Dietary counseling of 2-5 patients attending the OPD.
4. Planning, Calculation of Diet plan using exchange list and Dietary Counseling for the therapeutic diets mentioned in the theory
5. Visit to a hospital to observe - Enteral Feeding and formula diet for tube feeding.

Reference Readings:

1. K. Khanna, S. Gupta, R. Seth, S.J. Passi, R. Mahna and S. Puri, 1997, Textbook of Nutrition and Dietetics, Phoenix Publishing House Pvt Ltd.
2. L.K. Mahan and S. Escott Stump, 2000, Krause's Food Nutrition and Diet Therapy, 11th edition, W.B Saunders Ltd.
3. S.R. Williams, 2001, Basic Nutrition and Diet Therapy, 11th ed., Times Mirror Mosby College Publishing.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance

Term end examination

Course Articulation Matrix

CO Statement (MND-DS-254)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-254.1	2	2	2	2	2	3	3	2	3	3	2	1	2	3
MND-DS-254.2	3	2	3	3	2	3	3	3	3	3	2	1	2	3
MND-DS-254.3	3	3	3	3	1	3	3	3	3	3	2	2	2	3
MND-DS-254.4	3	3	1	1	2	2	3	3	3	3	2	2	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-205: Nutraceuticals and Functional Foods (Theory)

Periods/week	Credits	Max. Marks: 200
L: 2 T: 0 P: 0	2	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Discipline Specific

Course Outcomes: The student will be able:

MND-DS-205.1. To describe the nutraceutical importance of food components.
MND-DS-205.2. To determine the mechanism of action of phytochemicals in treatment and prevention of diseases.
MND-DS-205.3. To acquainted about Indian foods and some of their claimed neutraceutical properties.
MND-DS-205.4. To relate the neutraceutical properties of food with various degenerative diseases.

PART – A

UNIT 1: Nutraceuticals and their classification
1.1 Nutraceuticals : Use of nutraceuticals in traditional health sciences.
1.2 Role of nutraceuticals in preventing /controlling diseases.
1.3 Definition, Classification, food and non food sources, mechanism of action.
1.4 Role of omega - 3,fatty acids, carotenoids, dietary fiber, phytoestrogens; glucosinates; organosulphur compounds as nutraceuticals.

UNIT 2: Effect of Nutraceuticals
2.1 Prebiotics and probiotics: Usefulness of in gastro intestinal health and other benefits.
2.2 Beneficiary microbes; prebiotic ingredients in foods.
2.3 Types of prebiotics and their effects on gut microbes.

PART - B

UNIT 3:Functional Foods
3.1 Functional foods- Definition
3.2 Development of functional foods.
3.3 Benefits and sources of functional foods in Indian diet.
3.4 Effects of processing conditions and storage
3.5 Research frontiers in functional foods.

UNIT4: Development process
4.1Development of nutraceutical and functional foods–Standards for health claims.
4.2 Process of developing -preclinical & clinical studies.
4.3 Marketing and Regulatory issues, Regulatory bodies in India.

Reference Readings:

1. D. Bagchi, C. Lau Francis, D.K. Ghosh, 2010, Biotechnology in Functional Foods and Nutraceuticals, 4th Ed., CRC press.
2. C. Colleen, G. Kerry, R. Keith, D. Salter Venzon, I. Samantha, 2012, Phytochemicals: Health Promotion and Therapeutic Potential, 1st Ed., CRC Press.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-205)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-205.1	2	2	2	1	1	2	3	1	2	2	3	2	2	2
MND-DS-205.2	2	2	1	1	1	3	3	3	2	2	2	2	2	-
MND-DS-205.3	2	2	2	3	1	2	3	3	3	2	2	2	2	-
MND-DS-205.4	3	2	1	2	2	2	3	2	2	2	2	2	2	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-255: Nutraceuticals and Functional Foods (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Discipline Specific
Course Coordinator/Co-Coordinator:

Course Outcomes: The student will be able:

MND-DS-255.1. To describe the principles of techniques of food analyses
MND-DS-255.2. To apply the techniques in different functional foods.
MND-DS-255.3. To develop various health and neutraceuticals foods.
MND-DS-255.4 .To analyze nutrient in developed foods.

Practicals:

1. To determine vitamin C and presence of secondary metabolites of the following: Bee honey, Amla, Pineapple, Papaya, Lentil and Soya.
2. Extraction and estimation of oil or crude fat content in oil seeds.
3. Estimation of total phenols and chlorogenic acid (Phenolic compound) in plant material.
4. To estimate cholesterol content in given sample by Lievermann-Burchard method.

Reference Readings:

1. D. Bagchi, C. Lau Francis, D.K. Ghosh, 2010, Biotechnology in Functional Foods and Nutraceuticals, 4th Ed., CRC press.
2. C. Colleen, G.Kerry, R., Keith, D.Salter Venzon, I. Samantha, 2012, Phytochemicals: Health Promotion and Therapeutic Potential, 1st Ed., CRC Press.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-205)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-205.1	2	2	2	1	1	2	3	1	2	2	3	2	2	2
MND-DS-205.2	3	2	1	1	1	3	3	3	2	2	2	2	2	-
MND-DS-205.3	3	2	2	3	1	2	3	3	3	2	2	2	2	-
MND-DS-205.4	3	2	1	2	2	2	3	2	2	2	2	2	2	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-206: Nutrition for elderly (Theory)

Periods/week	Credits	Max. Marks: 200
L: 2 T: 0 P: 0	2	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Program Discipline Specific
Course Coordinator/Co-Coordinator:

Course Outcomes: students will be able:
MND-DS-206.1. To understand and combat the problems of the elderly.
MND-DS-206.2. To determine the multifaceted aspects of aging.
MND-DS-206.3. To apply nutritional and health care to the elderly.
MND-DS-206.4. To analyze the nutrient requirement for elderly.

PART – A

Unit 1
1.1 Introduction to Geriatrics Care
1.2 Geriatrics Care, Philosophy and Scope
1.3 Geriatrics Medicine
1.4 Historical review of health care for the elderly
1.5 Development of Geriatrics in India

Unit 2
2.1 Biology of Ageing -What is Ageing
2.2 Theories of Ageing, Microscopic Theories, Changes in Ageing scenario
2.3 Interactions between Biological, psychological, physiological and social processes in Ageing
2.4 Old age across cultures and time – images of ageing across culturally – social psychology of ageing)

PART – B

Unit 3
3.1 Nutritional and health status of elderly
3.2 Factors influencing food and nutrient intake
3.3 Health status including lifestyle pattern, medication, psychosocial aspects etc

Unit 4
4.1 Nutrient requirement and Recommended Dietary Allowances for elderly
4.2 Chronic degenerative diseases and nutritional problems of the elderly, their management, prevention and control
4.3 National, International Agencies for the welfare of the Elderly
4.4Shaping the future of health care for Older Adults

Reference Readings:
1. L.K. Mahan and S. Escott-Stump, 2000, Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. M.E. Shils, J.A. Olson, M. Shike and A.C. Ross, 1999, Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-206)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-206.1	2	3	3	3	3	3	3	3	3	2	2	2	3	2
MND-DS-206.2	2	2	3	3	3	3	3	3	2	2	2	2	3	2
MND-DS-206.3	2	3	3	3	3	2	3	3	2	3	2	2	3	2
MND-DS-206.4	3	2	2	2	2	2	3	3	3	1	2	2	3	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-256: Nutrition for elderly (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T:0 P:2	1	Continuous evaluation : 50
Duration of Examination: 2 Hours		End Semester Exam: 50

Course Type: Program Discipline Specific
Course Coordinator/Co-Coordinator:

Course Outcomes: The students will be able:

MND-DS-256.1. To remember and combat the problems of the elderly
MND-DS-256.2. To understand and develop protocols for the multifaceted aspects of aging
MND-DS-256.3. To apply the knowledge for better health status of elderly
MND-DS-256.4. To analyze national and international welfare programme for elderly

Practical:

1. Case studies of elderly with different ailments and planning of diets
2. Visit to old age homes.
3. Assessment of physical fitness, food intake and nutritional status
4. Developing protocol for promoting fitness and health

Reference Readings:

1. L.K. Mahan and S. Escott-Stump, 2000, Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. M.E. Shils, J.A. Olson, M. Shike and A.C. Ross, 1999, Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-206)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-206.1	2	3	3	3	3	3	3	3	3	2	2	2	3	2
MND-DS-206.2	2	2	3	3	3	3	3	3	2	2	2	2	3	2
MND-DS-206.3	2	3	3	3	3	2	3	3	2	3	2	2	3	2
MND-DS-206.4	3	2	2	2	2	2	3	3	3	1	2	2	3	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-207 SCIENTIFIC WRITING (Theory)

Periods/week	Credits	Max. Marks: 200
L: 2	2	Continuous evaluation: 100
Duration of Examination: 3 Hrs		End Semester Exam: 100

Course Type: Program Discipline Specific (Elective)
Course Coordinator/Co-Coordinator:

Course Outcomes: The student will be able:
MND-DS-207.1. To differentiate types of scientific writing
MND-DS-207.2. To develop competence in writing and abstracting skills.
MND-DS-207.3. To apply the aspect of writing scientifically.
MND-DS-207.4. To analyze critically various forms of writing.

PART A

Unit 1: The Research Process
1.1 Identification of research problem
1.2 Formulation of objectives
1.3 Hypothesis and its types
1.4 The design of research

Unit 2: Research paper outlines
2.1. Kinds of outline: Topic outlines, Conceptual outlines, Sentence outlines.
2.2. Drafting titles, sub titles, tables, illustrations.

PART B

Unit 3 Framing of Research Thesis
3.1 Introduction and Objectives
3.2 Review of literature
3.3 Methods
3.4 Results and discussion
3.5 Summary and abstract
3.6 References and Annexure.

Unit 4 Steps and methods of scientific writing for the following
4.1 Review articles, Monographs.
4.2 Dissertations, Bibliographies
4.3 Book chapters and articles.

Reference Readings:

1. E. Harman and I. Montagnes, Ed., 1997,The thesis and the book, New Delhi: Vistaar.
2. L.F. Locke, 1987, Proposals that work: A guide for planning dissertations.
3. R.J. Stemberg, 1991, The psychologist's companion: A guide to scientific writing for Sciences, New York : John Wiley & Sons students & researchers, Cambridge: CUP.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-207)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-207.1	3	3	3	3	3	2	3	2	2	2	3	-	2	3
MND-DS-207.2	3	3	2	2	3	-	3	2	3	2	1	2	1	2
MND-DS-207.3	3	3	1	1	3	1	3	2	2	1	1	2	2	2
MND-DS-207.4	3	2	2	-	3	1	3	2	2	3	2	2	2	2

THIRD SEMESTER

MNDC-DS-301: Advanced Clinical Nutrition (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Program Core

Course Outcomes: The students will be able:

MNDC-DS-301.1: To understand the etiology, physiological and metabolic anomalies of acute and chronic disorders / diseases

MNDC-DS-301.2: To classify the effect of various disorders / diseases on nutritional status, nutritional and dietary requirement

MNDC-DS-301.3: To develop appropriate nutrition care and assessment tool for prevention of various disorders / diseases

MNDC-DS-301.4: To create appropriate nutrition diet for treatment of various disorders / diseases

PART A

Unit 1 Sign- symptoms, patho-physiology, etiology and dietary management of Endocrine Disorders

1.1 Thyroid Disorders- Assessment in Thyroid Disorders, Hypothyroidism, Hyperthyroidism

1.2 Polycystic Ovary Syndrome

Unit 2 Sign- symptoms, pathophysiology, etiology and dietary management of Cardiovascular disorders

2.1 Myocardial Infarction

2.2 Congestive Heart failure

Unit 3 Sign- symptoms, pathophysiology, etiology and dietary management of Renal Disorders

3.1 Nephrotic Syndrome

3.2 Glomerulonephritis

3.3 Acute kidney Disease

3.4 Chronic Kidney Disease

3.5 Renal Stones.

PART B

Unit 4 Sign- symptoms, pathophysiology, etiology and dietary management of Lung disorders

4.1 Bronchopulmonary dysplasia,

4.2 COPD

4.3 Asthma

4.4 Cystic Fibrosis

Unit 5 Sign- symptoms, pathophysiology, etiology and dietary management of neurological conditions

5.1 Neurological diseases arising from nutritional excesses and deficiencies:

5.1.1 Pernicious anaemia

5.1.2 Wernicke Korsakoff Syndrome

5.1.3 Stroke

5.1.4 Parkinson's disease

5.1.5 Alzhemer's disease

5.1.6 Multiple Sclerosis

5.2 Diet, Nutrient and Drug interactions

Unit 6 Sign- symptoms, pathophysiology, etiology and dietary management of Musculoskeletal and Rheumatic Disorders

6.1 Osteoporosis
6.2 Osteoarthritis and Rheumatoid arthritis
6.3 Gout
6.4 Systemic lupus erythematosus

Reference Readings:

1. L.K. Mahan and E. S. Stump, 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders- Elsevier.

2. M.E. Shils, M. Shike, A.C. Ross, B. Caballero and R. J. Cousins., 2005, Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
3. M.J. Gibney, M. Elia, Ljungqvist and J. Dowsett, 2005, Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company.
4. J.S.Garrow, W.P.T. James and A. Ralph, 2000, Human Nutrition and Dietetics. 10th ed. Churchill Livingstone.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDC-DS-301)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PS O 1	PS O 2	PS O 3	PS O 4
MNDC-DS-301.1	3	1	1	2	1	1	2	3	1	2	2	2	3	3
MNDC-DS-301.2	1	2	2	2	3	3	1	1	3	2	1	2	3	3
MNDC-DS-301.3	2	1	1	3	3	1	1	2	2	1	2	2	3	3
MNDC-DS-301.4	3	3	1	1	2	1	2	3	1	2	2	3	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MNDC-DS-351: Advanced Clinical Nutrition (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Program Core
Course Outcomes: The students will be able:
MNDC-DS-351.1: To understand the etiology, physiological and metabolic anomalies of acute and chronic disorders / diseases
MNDC-DS-351.2: To develop appropriate assessment tool for prevention of various disorders / diseases
MNDC-DS-351.3: To develop diet plans for treatment of various disorders.
MNDC-DS-351.4: To create appropriate nutrition diet plan for diseases.

Planning and calculation of following diets:

1. Diet for patients suffering from Ulcerative Colitis
2. Diet for patients suffering from Myocardial Infarction
3. Diet for patient suffering from Congestive Heart Failure
4. Diet for patient suffering from Nephrotic Syndrome/ARF/CRF
5. Diet for patients suffering from COPD
6. Diet for patient suffering from Pernicious Anaemia
7. Diet for patient suffering from Osteoporosis

Reference Readings

1. L.K. Mahan and E. S. Stump, 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders- Elsevier.
2 M.E. Shils, M. Shike, A.C. Ross, B. Caballero and R. J. Cousins., 2005, Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
3 T. Longvah, R. Ananthan, K.Bhaskarachary and K.Venkaiah, 2017, Indian Food Composition Tables, Telangana, India: National Institute of Nutrition.

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance

Term end examination

Course Articulation Matrix

CO Statement (MNDC-DS-351)	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MNDC-DS-351.1	1	3	3	2	2	1	1	2	3	1	2	1	3	1
MNDC-DS-351.2	3	2	1	1	2	2	3	3	1	2	1	2	3	2
MNDC-DS-351.3	3	1	2	1	2	1	2	1	1	3	3	3	3	1
MNDC-DS-351.4	3	1	2	2	1	3	3	3	3	1	2	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDC-DS-302: Nutrition in Intensive Care (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Program Core
Course Outcomes: The students will be able:
MNDC-DS-302.1. To understand physiology and metabolism in critical conditions.
MNDC-DS-302.2. To develop critical thinking skills and apply evidence based nutrition principles
MNDC-DS-302.3. To understand the theoretical basis for nutrition intervention strategies with the anatomical, physiological and/or biochemical changes that occur in diseases conditions.
MNDC-DS-302.4. To integrate the theories and principles of nutrition therapy into clinical practice.

PART- A

Unit 1: Introduction to Intensive care
1.1 Concepts of critical care and intensive care, History of critical care units, Unit designs, Goals of Care
1.2 Nutritional Support - Assessing nutritional status, Enteral and Parenteral nutrition, Monitoring nutritional status and, determining if needs are met

Unit 2: Dietary management of critical conditions
2.1 Acid/Base Abnormalities
2.2 Electrolyte/Fluid Abnormalities
2.3 Ventilator Support, ventilator associated pneumonia/ nasocomal pneumonia/ Aspiration pneumonia

Unit 3: Medical Nutrition Therapy for oncology conditions-
3.1 Introduction to Cancer, Dietary components associated with Cancer
3.2 Etiology and diagnosis
3.3 Medical treatments and their side effect
3.4 Medical nutrition therapy
3.5 Cancer prevention and nutrition components
3.6 Types of Oncology - Oral, esophagus, gastric, lungs, blood cancer, breast cancer, uterus/ovarian cancers.

PART B

Unit 4: Medical Nutrition Therapy for-
4.1 Burns
4.2 Sepsis
4.3 Trauma
4.4 Surgery

Unit 5: Cardio-vascular Systems
5.1 Cardiac assessment and diagnosis,
5.2 ECG,
5.3 Management of Heart Failure, Coronary Artery Bypass Surgery, heart transplant

Unit 6: Renal System

6.1 Kidney Failure,
6.2 Kidney Replacement Therapies,
6.3 Hemodialysis, Continuous Renal Replacement Therapies (CRRT), Peritoneal Dialysis

Reference readings:

1. P. Faber and M.Siervo, 2014, Nutrition in Critical Care. Cambridge university press, Newyork..
2. R. Rajendram, R.Victor, Preedy, V. B. Patel, 2015, Diet and Nutrition in Critical Care. Springer New York.
3. P. Singer, 2013, Nutrition in Intensive Care Medicine: Beyond Physiology. Karger Medical and Scientific Publishers.
4. L. K.Mahan and E. Stump. S., 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders-Elsevier

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDC-DS-302)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDC-DS-302.1	3	2	1	3	2	3	2	2	2	1	2	2	3	3
MNDC-DS-302.2	3	3	2	2	1	2	2	2	3	2	3	1	2	3
MNDC-DS-302.3	3	2	1	2	2	2	3	3	3	2	1	2	2	3
MNDC-DS-302.4	3	2	2	1	2	3	3	3	2	2	2	2	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be university under section 3 of the UGC Act 1956)

MNDC-DS- 352 Nutrition in Intensive Care (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Internal/Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Program Core
Course Outcomes: The students will be able-
MNDC-DS-352.1. To plan and prepare nutritionally adequate diet for different critical conditions.
MNDC-DS-352.2. To Acquaint with the different diseases and their requirements
MNDC-DS-352.3. To Understand the critical conditions through case studies.
MNDC-DS-352.4. To utilize the knowledge in practical use.

Practical

1. Plan the enteral and parenteral diets
2. Planning preparation and nutritional calculation of various diets.
   - Diet for oral/oesophagus, gastric, blood cancer, uterus/ovarian cancers.
   - Diet for sepsis/burns/trauma patients
   - Diet for patients with heart transplant/ kidney failure
3. Prepare a report of 5 case studies related to critical conditions mentioned in theory.

Reference readings

1. P. Faber and M.Siervo, 2014, Nutrition in Critical Care. Cambridge university press, Newyork..
2. R. Rajendram, R.Victor, Preedy, V. B. Patel, 2015, Diet and Nutrition in Critical Care. Springer New York.
3.P. Singer, 2013, Nutrition in Intensive Care Medicine: Beyond Physiology. Karger Medical and Scientific Publishers.
4. L. K.Mahan and E. Stump. S., 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders-Elsevier

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDC-DS-352)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
MNDC-DS-352.1	3	2	2	1	2	2	3	3	2	1	2	2	3	3
MNDC-DS-352.2	3	2	2	2	1	1	2	2	3	1	1	1	2	3
MNDC-DS-352.3	3	2	2	3	3	3	2	3	2	1	2	2	3	3
MNDC-DS-352.4	2	2	2	3	2	3	2	1	2	1	2	1	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
MNDC -DS-303: Management of Nutrition Related Disorders (Theory)

Periods/week	Credits	Max. Marks: 200
L: 3 T: 0 P: 0	3	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Program Core

Course Outcomes:
The student will be able
MNDC -DS-303.1: To memorize nutrition related disorders prevailing in the community
MNDC -DS-303.2: To understand the management of these nutrition related disorders
MNDC -DS-303.3: To relate the biochemical and clinical manifestations with treatment of these disorders.
MNDC -DS-303.4: To formulate appropriate diet for these disorders

PART A

UNIT 1: Nutrition in Infection and fever
1.1 Nutrition and Infection
1.2 Metabolic Changes during infection
1.3 Classification and etiology of Infection
1.4 Etiology, pathophysiology, symptoms and nutrition Management of Typhoid
1.5 Etiology, pathophysiology, symptoms and nutrition Management of Tuberculosis

UNIT 2: Nutrition in AIDS
2.1 Signs and Symptoms
2.2 Transmittal Routes
2.3 Medical nutrition therapy

UNIT 3: Inborn Errors of Metabolism:
Metabolic defect, clinical symptoms and management of
3.1 Phenylketonuria
3.2 Galactosemia
3.3 Maple Syrup Urine Disease
3.4 Homocystineuria
3.5 Familial Hypercholesterolemia
3.6 Wilson's disease

PART B

UNIT 4: Etiology, clinical symptoms and dietary management of:
4.1 Eating disorders:
- Anorexia Nervosa
- Bulimia Nervosa
- Binge Eating Disorder
- Medical Nutrition Therapy and Counseling in Eating Disorder

4.2 Chronic Alcoholism:
- Nutritional Effects of Alcohol

- Complications
- Nutritional Therapy

UNIT 5: Nutrition in Food Allergies

5.1 Clinical Features
5.2 Mechanism of diagnosis
5.3 Treatment
5.4 Medical Nutrition Therapy for allergies

UNIT 6: Nutritional Care of the Terminally Ill

6.1 The dying process
6.2 Palliative versus curative care
6.3 Dietary Management for Symptom Control.

Reference Readings:

1 L. K.Mahan and E. Stump. S., 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders-Elsevier
2 M.E.Shils, M. Shike, A.C. Ross, B. Caballero and R.J.Cousins, 2005, Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
3 M.J. Gibney, M. Elia, Ljungqvist and J. Dowsett, 2005, Clinical Nutrition: The Nutrition Society Textbook Series. Blackwell Publishing Company.
4 R.D. Lee and D.C. Neiman, 2009, Nutritional Assessment. 5th edition. Brown & Benchmark.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-303)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-303.1	3	2	2	1	2	2	3	3	1	1	2	2	3	3
MND-DS-303.2	3	2	2	2	2	1	2	1	2	1	1	1	3	2
MND-DS-303.3	2	1	1	2	3	2	1	2	2	1	2	2	2	3
MND-DS-303.4	2	2	2	2	3	3	1	2	1	1	1	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MNDC -DS-353: Management of Nutrition Related Disorders (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Program Core

Course Outcomes:
The student will be able
MNDC -DS-353.1: To know the prevalence of nutrition related disorders in the community
MNDC -DS-353.2: To understand the practical management of these nutrition related disorders
MNDC -DS-353.3: To practically relate the biochemical and clinical reports with dietary treatment of these disorders.
MNDC -DS-353.4: To formulate appropriate diet plans for these disorders.

Practicals:

Planning and calculation of following diets:
1. Diet for AIDS patients
2. Diet for patients suffering from Inborn Error of Metabolism
3. Diet for patient suffering from Malabsorption syndrome
4. Diet for patient suffering from Gout
5. Diet for patient suffering from Food Allergies

Reference Readings:

1. L. K.Mahan and E. Stump. S., 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders-Elsevier
2. S.R.Williams, 2001, Basic Nutrition and Diet Therapy. 11th ed. Times Mirror Mosby College Publishing
3. K. Khanna, S. Gupta, R. Seth, S. J. Passi, R. Mahna, S.Puri, 2013. Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt Ltd

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-353)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-353.1	3	2	2	1	2	3	3	2	1	1	2	1	2	2
MND-DS-353.2	2	1	1	2	2	1	3	3	1	1	1	2	1	3
MND-DS-353.3	3	1	1	1	1	2	2	2	1	1	1	2	2	3
MND-DS-353.4	1	2	2	2	2	3	3	3	2	3	1	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDF-DS-301: Advanced Food Science and Chemistry (Theory)

Periods/week	Credits	Max. Marks: 200
L:4 T: 0 P: 0	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Core

Course Outcomes: The students will be able:
MNDF-DS-301.1. To understand the chemistry of water and its role in foods
MNDF-DS-301.2. To interpret the physical and chemical properties of the food constituents.
MNDF-DS-301.3. To demonstrate the impact of processing on different food components.
MNDF-DS-301.4. To analyze the role of functional aspects of food components and to study their role in food processing

PART-A

UNIT 1. Introduction to Food Chemistry: Water and Ice
1.1 Definition, Composition of food
1.2 Definition of water in food, Structure of water and ice, Sorption phenomenon, Water activity and shelf-life

UNIT 2. Carbohydrates
1.1 Classification (mono, oligo and poly saccharides)
1.2 Structure of important polysaccharides(starch, glycogen, cellulose, pectin, hemicellulose, gums)
1.3 Chemical reactions of carbohydrates –oxidation, reduction , with acid & alkali
1.4 Modified celluloses and starches

UNIT 3. Proteins
3.1 Classification and structure
3.2 Nature of food proteins (plant and animal proteins)
3.3 Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation
3.4 Functional properties of proteins eg. Organoleptic, solubility, viscosity, binding gelation / texturization , emulsification , foaming.

PART-B

UNIT 4. Lipids
4.1 Classification of lipids, Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point.
4.2 Chemical properties
4.3 Changes in fats and oils- rancidity, lipolysis, flavor reversion
4.4 Auto-oxidation and its prevention
4.5 Technology of edible fats and oils- Refining, Hydrogenation
4.6 Interesterification, Fat Mimetic

UNIT 5. Vitamins

5.1 Structure, Importance and Stability
5.2 Water soluble vitamins
5.3 Fat soluble vitamins

UNIT6. Flavour
6.1 Definition and basic tastes
6.2 Chemical structure and taste
6.3 Description of food flavours
6.4 Flavour enhancers

Reference Readings:

1. J.M.DeMan, 1999, Principles of Food Chemistry. AVI, New York.
2. O. R. Fennema, 1996, Food Chemistry. 3rd Ed. Marcell Dekker, New York.
3. Whitehurst and Law, 2002, Enzymes in Food Technology. CRC Press, Canada.
4. N.N. Potter and J.H. Hotchkiss, 1995, Food Science. 5th Ed., Chapman & Hall.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination
Course Articulation Matrix

CO Statement (MNDF-DS-301)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDF-DS-301.1	2	2	1	2	2	2	3	3	1	1	2	1	2	2
MNDF-DS-301.2	2	1	1	2	2	1	1	2	1	1	2	2	3	3
MNDF-DS-301.3	1	1	1	2	1	2	1	2	3	1	2	2	3	3
MNDF-DS-301.4	2	2	1	1	2	2	1	1	2	1	2	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDF-DS-351: Advanced Food Chemistry (Practical)

Periods/week	Credits	Max. Marks :100
L:0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Outcomes: The students will be able:
MNDF-DS-351.1. To understand the chemical reactions and physical changes due to processing, storage and handling of foods and their applications.
MNDF-DS-351.2. To interpret the effects of reactions on the quality and safety of food.
MNDF-DS-351.3. To demonstrate the chemistry of food components and their interactions.
MNDF-DS-351.4. To analyze the concept of new product development.

Practicals:
1. Preparation of primary and secondary solutions
2. Estimation of moisture content
3. Determination of gelatinization temperature range (GTR) of different starches and effect of additives on GTR.
4. Determination of refractive index and specific gravity of fats and oils.
5. Determination of smoke point and percent fat absorption for different fat and oils.
6. Determination of percent free fatty acids
7. Estimation of saponification value
8. Estimation of reducing and non-reducing sugars using potassium ferricyanide meth

Reference Readings:

1. M. W. Connie and R. D. James, 2003, The Food Chemistry Laboratory-A Manual for Experimental Foods, Dietetics, and Food Scientists. 2nd edition. CRC Press.
2. J.F.Diehl, 1995, Safety of Irradiated Foods. Marcel Dekker Inc, New York.
3. D.D.Miller, 1998, Food Chemistry: A laboratory manual. Spl edition. Wiley-Blackwell.

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDF-DS-351)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
MNDF-DS-351.1	2	2	1	2	2	2	3	3	1	1	2	1	2	2
MNDF-DS-351.2	2	1	1	2	2	1	1	2	1	1	2	2	3	3
MNDF-DS-351.3	1	1	1	2	1	2	1	2	3	1	2	2	3	3
MNDF-DS-351.4	2	2	1	1	2	2	1	1	2	1	2	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
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MNDF-DS-302: Biotechnology of Food (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Core

Course Outcomes: The students will be able:
MNDF-DS-302.1. To describe the terms related to food biotechnology.
MNDF-DS-302.2. To associate the importance of biotechnology in food industries.
MNDF-DS-302.3. To discuss the applications of biotechnology in enhancing quality of food.
MNDF-DS-302.4. To interpret the importance of biotechnology in food industry.

PART-A

Unit 1: Introduction to Biotechnology
1.1 Definition & Scope of biotechnology
1.2 Application of Biotechnology in Food Industries
1.3 Gene cloning: Definition, Basic concepts, Characteristics of ideal cloning vector, Plasmid, Bacteriophages and Plasmid

Unit 2: Molecular Biology
2.1 Basic concepts, gene cloning, restriction endonucleases, ligation.
2.2 Amplification of DNA: The importance of DNA cloning, PCR: basic features and application.

Unit 3: Fermentation Technology
3.1 Definition of fermentation
3.2 Types of fermentation
3.3 Design of bio reactors, Medium & Micro organism

PART-B

Unit 4: Enzyme Technology
4.1 Enzymes: Nomenclature & characteristics
4.2 Functional role of enzymes
4.3 Factors affecting enzyme kinetics
4.4 Application of enzymes in food & beverage industry

Unit 5: Plant & Animal tissue culture
5.1 Basic requirement for tissue culture Lab, Media & Techniques
5.2 Biotechnology & Health care: Vaccines - Types, Biogas & Bio ethanol production, Concept of Bio - remediation, Hazards of genetic engineering.

Unit 6: Gene modification in Food Industry
6.1 Genetically modified foods: organic foods, types of organic foods, organic foods & preservatives.
6.2 Genetic modification in food industry: Background, history, risks & future applications.

Reference Readings:

1. B.D. Singh, 1998, Biotechnology. Kalyani Publications, New Delhi.
2. R.C.Dubey , 2013, A text book of Biotechnology. S Chand & Co, New Delhi.
3. M.T. Davson, R. Powel, and F. Gannon, 1996, Gene Technology. Bios scientific publishers Ltd U.K.
4. S.J.Ignasimuthu, 2008, Basic Biotechnology. Tata Mc Graw Hill Publication Co Ltd., New Delhi.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDF-DS-302)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDF-DS-	2	2	1	2	2	2	3	3	1	1	2	1	2	2
MNDF-DS-	2	1	1	2	2	1	1	2	1	1	2	2	3	3
MNDF-DS-	1	1	1	2	1	2	1	2	3	1	2	2	3	3
MNDF-DS-	2	2	1	1	2	2	1	1	2	1	2	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MNDF-DS-352: Biotechnology of Food (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Core
Course Outcomes: The students will be able:
MNDF-DS-352.1 To recall an understanding in food biotechnology.
MNDF-DS-352.2 To associate different processes used in industries and their applications for food analysis.
MNDF-DS-352.3 To interpret the importance of biotechnology in food industry.
MNDF-DS-352.4 To explain various biotechnological applications.

Practical:
1. Determination of microbiological quality of water by MPN method.
2. Presumptive and confirmatory tests for coli form bacteria in water.
3. Microbiological quality of dehydrated foods.
4. Microbiological examination of spoiled food.
5. Production of alcohol by fermentation.
6. Production of curd and examination of its microbiological quality.

Reference Readings:

1. B.D.Singh, 1998, Biotechnology. Kalyani Publications, New Delhi.
2. R.C.Dubey , 2013, A text book of Biotechnology. S Chand & Co, New Delhi.
3. M.T. Davson, R Powel, and F Gannon, 1996, Gene Technology. Bios scientific publishers Ltd U.K.
4. S.J.Ignasimuthu, 2008, Basic Biotechnology. Tata Mc Graw Hill Publication Co Ltd., New Delhi

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-352)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PS O 1	PSO 2	PSO 3	PSO 4
MNDF-DS-352.1	2	2	1	2	2	2	3	3	1	1	2	1	2	2
MNDF-DS-352.2	2	1	1	2	2	1	1	2	1	1	2	2	3	3
MNDF-DS-352.3	1	1	1	2	1	2	1	2	3	1	2	2	3	3
MNDF-DS-352.4	2	2	1	1	2	2	1	1	2	1	2	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
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MNDF-DS-303 Microbiology of Food (Theory)

Periods/week	Credits	Max marks: 200
L:3 T:0 P:0	3	Continuous evaluation: 100
Duration of examination: 3 hours		End Semester Exam: 100

Course outcome: The students will be able:
MNDF-DS-303.1. To understand different microbiological terms related to processed foods.
MNDF-DS-303.2. To summarize basic techniques used in food preservation.
MNDF-DS-303.3. To determine the importance of micro-organisms in food spoilage
MNDF-DS-303.4. To analyze the various sanitation techniques w.r.t food industry.

PART - A

Unit 1 Microorganism in foods
1.1 Introduction
1.2 General characteristics of microorganisms
1.3 Classification and identification of yeasts, molds and groups of bacteria important in food microbiology

Unit 2 Contamination and spoilage of food
2.1 Sources of contamination- air, water, soil, sewage, post processing contamination
2.2 Principle of spoilage
2.3 Factors affecting growth of microbes in food

Unit 3 Food Preservation
3.1 Principles of food preservation
3.2 Techniques of preservation: High temperature & low temperature

PART - B

Unit 4 Environmental Microbiology
4.1 Food borne illness: Food borne poisoning, infections and intoxication
4.2 Growth and survival of pathogens in food.

Unit 5 Waste Management
5.1 Waste treatment and disposal: Biological oxygen demand (BOD), Preliminary treatments, Chemical treatment, Biological treatment and disposal & COD
5.2 Sources and classification of food waste types (Liquid waste, solid rubbish, organic waste, recyclable rubbish, hazardous waste)

Unit 6 Microbial Intoxication & Infection
6.1 Mycotoxins: toxin production & physiological interaction
6.2 Sources of infection in foods by pathogenic organisms & their method of control

Reference readings:

1. W.C. Frazier, 2002, Food Microbiology. Tata McGraw Hill, Delhi.
2. M J. James, 2004, Modern Food Microbiology. CBS Publishers, Delhi
3. Y. Motarjemi and M. Adams , 2006, Emerging Food Borne Pathogens. Wood head Publishing Limited, UK.
4. K.R. Aneja, 2009, Experiments in Microbiology, Plant Pathology and Biotechnology. New Age International Publications, India.
5. D.O. Cliver and H.P, 2002, Food Borne Diseases. Academic Press, UK.

Instructions for external evaluation: Seven questions are to be set in total. First question will be a conceptual question covering entire syllabus and will be compulsory to attempt. Three questions will be set from part A and B (one from each unit). Students need to attempt two questions from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDF-DS-303)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDF-DS-	2	2	2	3	1	1	2	1	1	1	2	2	3	1
MNDF-DS-	1	1	1	2	2	2	3	3	1	1	2	2	3	3
MNDF-DS-	3	2	3	3	3	2	1	2	1	1	2	3	3	3
MNDF-DS-	3	3	2	2		1	1	2	1	2	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
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MNDF-DS-353: Microbiology of Food (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Core
Course Outcomes: The students will be able:
MNDF-DS-353.1 To identify latest procedures adopted in various food microbiological operations.
MNDF-DS-353.2 To tabulate different spoilage microorganisms and their effects on food
MNDF-DS-353.3 To associate different microorganisms with their colony forming structures
MNDF-DS-353.4 To examine microbiologically various food stuffs for quality and safety.

Practical:

1. Concept of asepsis.
2. Sterilization- laboratory broth & media
3. Staining of bacteria: simple staining & gram-staining.
4. Identifications of important molds and yeast in food items.
5. Development of slants, stabs & plates
6. Analyze microbiological quality of commonly consumed foods.
7. Visit (at least one) to food processing units or any other organization dealing with advanced methods in food microbiology.

Reference readings:

1. W.C. Frazier, 2002, Food Microbiology. Tata McGraw Hill, Delhi.
2. M J. James, 2004, Modern Food Microbiology. CBS Publishers, Delhi
3. Y.Motarjemi and M. Adams, 2006, Emerging Food Borne Pathogens. Wood head Publishing Limited, UK.
4. K.R. Aneja, 2009, Experiments in Microbiology, Plant Pathology and Biotechnology. New Age International Publications, India.
5. D.O. Cliver and H.P., 2002, Food Borne Diseases. Academic Press, UK.

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Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II

Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDF-DS-353)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
MNDF-DS-353.1	2	2	2	3	1	1	2	1	1	1	2	2	3	1
MNDF-DS-353.2	1	1	1	2	2	2	3	3	1	1	2	2	3	3
MNDF-DS-353.3	3	2	3	3	3	2	1	2	1	1	2	3	3	3
MNDF-DS-353.4	3	3	2	2		1	1	2	1	2	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
MNDS-DS – 301A Exercise Physiology & Metabolism (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Internal/Continuous Assessment: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Core

Course Outcomes: The student will be able

MNDS-DS-301A.1. To understand the concepts of exercise physiology and the importance of exercise in health disease

MNDS-DS-301A.2. To demonstrate an understanding of physiological and metabolic responses and adaptations to exercise.

MNDS-DS-301A.3. To evaluate the physiological and metabolic responses and adaptations in environmental stress.

MNDS-DS-301A.4. To associate the physiological and metabolic processes with movement and physical performance.

PART A

Unit-1: Introduction to Exercise Physiology

1.1 Introduction: Scope and Importance of Exercise Physiology in Games and Sports; Components of fitness; types of exercise (aerobic and anaerobic); Training Periodisation; Training methods; Physiological and metabolic adaptations to training; Overtraining and detraining; rest/recovery, progression; warm-up and cool down.

1.2 Exercise in Health and Disease: physical activity guidelines for various physiological groups**;** benefits; physical activity and exercise prescription in obesity, diabetes, CVD, hypertension, asthma, chronic obstructive pulmonary disease, arthritis, cancer, osteoporosis and aging

Unit-2: Cardio-Respiratory Responses to exercise

2.1 Respiratory Responses to exercise: Overview of respiratory system, mechanism of pulmonary ventilation and diffusion Transport and exchange of gases, Control and regulation of ventilation, Acute and chronic responses to exercise; Respiratory limitations to performance (oxygen deficit and steady state); Factors influencing maximal oxygen uptake in athletes.

2.2 Cardiovascular responses to exercise: Overview of circulatory system, regulation of cardiovascular system (neural control, anatomical sensors and neuro-hormonal control);

Cardiovascular responses and adaptation to aerobic, static and dynamic exercises; Detraining effects on cardiorespiratory system.

Unit-3: Bio-energetics of Exercise

3.1 Biological energy transformation: Energy systems, Substrate utilisation; Response to anaerobic exercise (Oxygen deficit and excess post-exercise oxygen consumption); Measurement of anaerobic metabolism; Responses to aerobic exercise (oxygen and carbon-di-oxide production, oxygen cost of breathing, RER,

3.2 Estimation of calorie expenditure: MET, Field estimates of energy expenditure, efficiency and economy), Factors affecting energy systems, Hormonal control in substrate utilisation.

PART B

Unit-4: Endocrine and Immune Response

4.1 Overview of endocrine system: Role of the endocrine system in exercise; Hormonal responses to exercise; Hormonal adaptation to training;

4.2 Immune system: Structure and function, Immune response to exercise across various intensities and/or duration of exercise; Cytokine response to exercise; Neuroendocrine control of immune response to exercise.

Unit-5: Exercise in Environmental Stress

5.1 Measurement of environmental conditions: Measurement of body temperature; Thermal balance; Heat exchange; Exercise in the heat; Cardiovascular demands of exercise in the heat; Influence of sex and age on the exercise response to heat; Exertional heat illness syndromes; Exercise in cold; Cold induced injuries; Cold tolerance across age and sex;

5.2 Maintaining fluid balance: physiological and metabolic changes at high altitude

Unit-6: Musculo-Skeletal Responses to Exercise

6.1 Skeletal system: Structure, Functions; Bone development; Factors influencing bone health; Skeletal adaptation to exercise training and detraining

6.2 Neuro-Muscular system: Structure; Muscle fibre types; Muscle function; Role of skeletal muscle in aerobic and anaerobic respiration; Neuromuscular aspects of movement; The nervous system (basic structure and activation of nerve cell, neural control of muscle contraction, reflex control of movement, volitional control of movement, flexibility); Physiological response to exercise and training.

References:

1. Scott, CB. (2010). A Primer for the Exercise and Nutrition Sciences: Thermodynamics, Bioenergetics, Metabolism. Humana Press.
2. Raven, P., Wasserman, D., Squires, W., & Murray, T. (2012). Exercise Physiology: An Integrated approach. Nelson Education.
3. ACSM's Resources for Clinical Exercise Physiology: Musculoskeletal, Neuromuscular, Neoplastic, Immunologic and Hematologic Conditions by American College of Sports Medicine
4. Powers, S. (2014). Exercise physiology: Theory and application to fitness and performance. McGraw-Hill Higher Education.
5. Smith, D. L., & Fernhall, B. (2011). Advanced cardiovascular exercise physiology. Human Kinetics.
6. Farrell, P. A., Joyner, M., & Caiozzo, V. (2011). ACSM's advanced exercise physiology.
7. Cheung, S. (2010). Advanced environmental exercise physiology. Human Kinetics.
8. Hale, T. (2005). Exercise physiology: a thematic approach (Vol. 5). John Wiley & Sons.
9. Ehrman, J. K., Kerrigan, D., & Keteyian, S. (2017). Advanced Exercise Physiology: Essential Concepts and Applications. Human Kinetics.
10. McArdle, W. D., Katch, F. I., & Katch, V. L. (2015). Exercise physiology: nutrition, energy, and human performance. 8th Edition, Lippincott Williams & Wilkins.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Course Articulation Matrix

CO Statement (MNDS-DS-301A)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
MNDS-DS-301A.1	2	1	1	1	1	1	2	3	2	2	2	1	1	3
MNDS-DS-301A.2	2	1	1	1	1	1	2	2	2	2	2	1	1	3
MNDS-DS-301A.3	3	1	1	1	1	1	3	3	1	1	1	3	3	3
MNDS-DS-301A.4	3	1	1	1	1	1	3	3	1	1	1	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
MNDS-DS-351A: Exercise Physiology & Metabolism (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Internal/Continuous Assessment: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Core

Course Outcomes: The student will be able

MNDS-DS-351A.1. To attain the skills of handling equipment used in exercise physiology

MNDS-DS-351A.2. To learn the techniques for testing of basic physiological functions

MNDS-DS-351A.3. To equip with an assessment of physiological performance testing

MNDS-DS-351A.4. To demonstrate the skills of measurement of physical fitness

Practicals:

1. Introduction to exercise physiology equipment
2. Assessment of physical fitness and training load using heart rate and blood pressure during and after exercise
3. Measurement of lung capacity using spirometry
4. Anaerobic power assessment through Wingate test
5. Assessment of aerobic capacity using maximal graded treadmill exercise test
6. Assessment of aerobic capacity using Harvard step test
7. Assessment of aerobic capacity using 20 meter beep test
8. Muscular strength and endurance assessment
9. Assessment of physical fitness: agility, strength, power, flexibility
10. Measurement of HRV to understand the recovery status in athletes

References:

1. Eston, R. and Reilly, T. (2009). Kinanthropometry and exercise pysiology laboratory manual Vol 2, Routledge.
2. Beam, W.C and Adams, G.M. (2013). Exercise Physiology Laboratory Manual. 7 edition McGraw-Hill Higher Education.

Distribution of Continuous Evaluation Table:

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Course Articulation Matrix

CO Statement (MND-DS-351A)	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
MNDS-DS-	2	1	2	2	2	1	3	3	1	2	3	2	-	3
MNDS-DS-	3	2	1	2	2	1	3	2	2	1	3	3	-	3
MNDS-DS-	3	2	1	2	2	1	3	2	2	1	3	3	-	3
MNDS-DS-	3	2	1	2	2	1	3	2	2	1	3	3	-	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

MNDS-DS-302A: Sports Specific Nutrition (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Internal/Continuous Assessment: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Core

Course Outcomes: The student will be able

MNDS-DS-302A.1. To describe physique and physiological variations in athletes belonging to different sports

MNDS-DS-302A.2. To relate the physiological aspects with nutritional requirements of athletes belonging to different sports

MNDS-DS-302A.3. To illustrate the sports specific use of dietary supplements and ergogenic aids

MNDS-DS-302A.4. To create the nutrition strategies required in different sports

PART A

Unit 1: Nutrition for popular team sports (Hockey, Football, Volleyball, Kabaddi and Cricket)

1.1 Playing position and rules of the game; Applied physiology and physique

1.2 Determining position-wise fuel need for training and competition; Quantity and timing of nutrient intake; Current research on position-specific nutrition needs and fuel utilisation.

1.3 Supplement usage and Dietary periodisation among the athletes; Case studies on team sports.

Unit 2: Nutrition for Athletics and Cyclic sports

2.1 Athletics (Sprinters, middle and long distance, field events): Types of events, rules and best timings of sport, Physiological variations; Fuel utilisation; Body composition; Dietary guidelines and nutrient requirements; Nutrient timing; Hydration, Travel nutrition; dietary Supplements or ergogenic aids; Current research evidence and Case studies

2.2 Nutrition for Endurance Sports (Long distance Swimming, Cycling and Marathon): Characteristics; Physiology; Energy systems; Body Composition; Duration and intensity of event; Nutritional Requirements in Training and Competition; Dietary and Hydration Strategies; dietary Supplements or ergogenic aids; Recovery strategies; Current research evidence and Case studies

Unit 3: Nutrition for Racket Sports

3.1 Racket sports (Badminton, Tennis, Squash): Game dynamics and fuel utilisation (energy and macronutrients & micronutrients); Body composition; Energy demands of the game; Nutrient timing and dietary periodisation; Hydration guidelines, Travel nutrition; Use of dietary Supplements or ergogenic aids; Recovery strategies.

PART B

Unit 4: Nutrition for Weight-dependent and Balance Sports

4.1 Strength and Combat sport (Wrestling, Weightlifting, Judo, Boxing): Game dynamics; Fuel utilisation (energy and macronutrients); Energy demands of the game; Nutrient timing and dietary periodisation; Current research on strength & combat sport; Current research evidence and Case studies

4.2 Weight management issues: Overemphasis on protein requirements; Nutrition and hydration guidelines before, during and post-training/competitions; Supplement or other ergogenic aids; Recovery strategies (dietary and non-dietary components); Current research evidence and Case studies

Unit - 5: Nutrition for Balance Sports

5.1 Balance sports (Gymnastics, Golf): Playing formats and Fuel utilisation (energy and macronutrients); Different energy demands of balance sport; Physique maintenance and weight management issues; nutrient timing and dietary periodisation; Nutrition and hydration guidelines before, during and post-training/competitions; Supplement or other ergogenic aids commonly used; Recovery strategies; Current research evidence and Case studies

Unit - 6: Nutrition for water sport and coordination sport

6.1 Water sports (Rowing, Kayaking): Sporting format, Physique, Fuel utilisation, Physiological and Biochemical changes in water sports; Common nutritional problems associated to water sports; nutrient requirements; timing; Dietary periodisation; Supplement usage; Recovery strategies; Current research evidence and Case studies

6.2 Coordination sport (Archery, Shooting): Playing formats and specific demands of the game; Nutritional requirements; Dietary Concerns; Dietary guidelines for pre, during and post training/competition, Supplement usage; Current research evidence and Case studies

References

1. Maughan, R. J (2000). Nutrition in sport (Volume VII- Encyclopedia of Sports Medicine), 1st Edition Blackwell Science Ltd.
2. Joaquín, D. (2008). Eating disorders in athletes. 1st Edition John Wiley & Sons Inc.
3. Cotton, R.T. (1996). Lifestyle & Weight Management Consultant Manual. 2nd Edition American Council on Exercise, USA.
4. Dunford, M. and Doyle J.A. (2008). Nutrition for Sport and Exercise. 4th Edition Thomson Wadsworth.

5. Maughan, R. J. (Ed.). (2008). Nutrition in sport (Vol. 7). John Wiley & Sons.
6. Fink, H. H., & Mikesky, A. E. (2017). Practical applications in sports nutrition. Jones & Bartlett Learning.
7. Eberle, S. G. (2013). Endurance Sports Nutrition, 3E. Human Kinetics.
8. Ryan, M. (2012). Sports nutrition for endurance athletes. Velo Press.
9. Campbell, B. (Ed.). (2013). Sports nutrition: enhancing athletic performance. CRC Press.
10. Slater, G., & Phillips, S. M. (2011). Nutrition guidelines for strength sports: sprinting, weightlifting, throwing events, and bodybuilding. *Journal of sports sciences*, *29*(sup1), S67-S77.
11. Zinner, C. and Sperlich B. (2016). Marathon Running: Physiology, Psychology, Nutrition and Training Aspects.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Course Articulation Matrix

CO Statement (MND-DS-302A)	**PO 1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**

MNDS-DS-302A.1	3	2	2	2	2	1	2	3	3	1	3	3	1	3
MNDS-DS-302A.2	3	2	1	1	2	1	3	2	-	1	3	3	3	3
MNDS-DS-302A.3	3	2	1	1	2	2	3	2	1	1	3	3	-	1
MNDS-DS-302A.4	3	1	1	1	1	1	3	3	2	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

MNDS-DS-352A: Sports Specific Nutrition (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Internal/Continuous Assessment: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Core

Course Outcomes: The student will be able

MNDS-DS-352A.1. To identify the nutritional requirement of various sports.

MNDS-DS-352A.2. To plan and calculate diets as per the game requirement.

MNDS-DS-352A.3. To illustrate the use of popular dietary supplements and ergogenic aids in different sports.

MNDS-DS-352A.4. To examine the doping practices in different sports.

Practical

1. Planning and preparation of diet for mid-fielder, defender and goalkeeper
2. Planning and preparation of diet for a cyclist (long distance)
3. Planning and preparation of diet for a boxer (55kg female)
4. Planning and preparation of diet for a shooter
5. Planning and preparation of diet for a gymnast
6. Planning and preparation of diet for a sprinter (100m, 200m, 400m)
7. List of popular dietary supplements and ergogenic aids used in different sports – Case studies/ research evidence
8. Doping practices followed used in different sports – Case studies/ research evidence

References:

1. Dunford M. and Sperlich J. A. (2008). Nutrition for Sport and Exercise. 4th Edition Thomson Wadsworth.
2. Maughan, R. J. (Ed.). (2008). Nutrition in sport (Vol. 7). John Wiley & Sons.
3. Fink, H. H., & Mikesky, A. E. (2017). Practical applications in sports nutrition. Jones & Bartlett Learning.
4. Eberle, S. G. (2013). Endurance Sports Nutrition, 3E. Human Kinetics.
5. Ryan, M. (2012). Sports nutrition for endurance athletes. Velo Press.
6. Campbell, B. (Ed.). (2013). Sports nutrition: enhancing athletic performance. CRC Press.

7. Slater, G., & Phillips, S. M. (2011). Nutrition guidelines for strength sports: sprinting, weightlifting, throwing events, and bodybuilding. Journal of sports sciences, 29(sup1), S67-S77.

Distribution of Continuous Evaluation Table:

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Course Articulation matrix

CO Statement (MNDS-DS-352A)	**PO 1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDS-DS-352A.11	2	1	1	1	1	1	2	3	2	1	3	2	3	2
MNDS-DS-352A.21	2	1	1	1	1	1	2	3	2	1	3	3	3	2
MNDS-DS-352A.3	3	1	1	1	2	1	3	3	2	1	3	3	3	3
MNDS-DS-352A.4	3	1	1	1	2	1	3	3	2	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MNDS-DS-303A: **Exercise and Sports Nutrition (Theory)**

Periods/week	Credits	Max. Marks: 200
L: 3 T: 0 P: 0	3	Internal/Continuous Assessment: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Core

Course Outcomes: The student will able:

MNDS-DS-303A.1. To understand the role of macronutrients in exercise and sports.

MNDS-DS-303A.2. To explain the physiological basis of fuel mobilization during exercise.

MNDS-DS-303A.3. To determine the nutritional requirements of a sportsperson during competition

MNDS-DS-303A.4. To devise a strategy on usage of dietary supplements and ergogenic aids.

PART A

Unit-1: Macronutrient intake and Its Impact on Exercise and Sports Performance -1

1.1 Introduction To Sports Nutrition: Definition; History; Role of international agencies in sports nutrition;

1.2 Carbohydrate Intake and Exercise and Sports performance: Type, timing, quantity and utilisation of carbohydrate intake in various intensities and types of exercise; Role of GI and GL in exercise and sports; Recommendations of carbohydrate for varying intensities, level of training and for fitness & recreational sports

Unit-2: Macronutrient intake and Its Impact on Exercise and Sports Performance -2

2.1 Fat Intake and Exercise and Sports performance: Type, timing, quantity and utilisation of of fat intake in various intensities and types of exercise; Recommendations of fats for varying level of training, fitness or recreational sports.

2.2 Protein Intake and Exercise and Sports performance: Type and Quality of protein and its utilisation in the body; Quantitative measures of protein quality; Protein turnover during different types of exercise; Specific role of amino acids for performance; Dietary protein strategies for performance enhancement; Requirements set for protein intake for athletes and fitness enthusiasts.

Unit-3: Energy balance

3.1 Energy balance concept for Physical training: Contribution of Resting metabolic Rate, Thermic effect of food and Exercise and Non-exercise activity thermogenesis (NEAT) towards energy expenditure; Consequences of Energy imbalance on performance

3.2 Determining energy requirements of athletes: Principles and methods for determining energy expenditure commonly used among athletes; Differences in energy expenditure across events and level of training expertise; Energy availability in assessing energy requirement for athletes; Energy and nutritional requirements for athletes

3.3 Energy intake pattern of athletes: Nutritional intake concerns for athletes in sport and exercise; Food fads and beliefs among athletes regarding nutrition intake

PART B

Unit-4: Vitamins and Minerals in Exercise and Sports performance

4.1 Vitamins: Types; Mode of action; Primary functions; Excess Vs. Deficiency; Role of increased intake of vitamins in exercise performance; Requirements for athletes.

4.2 Minerals: Types; Mode of action; Primary functions; Excess Vs. Deficiency; Role of increased intake of minerals in exercise performance; Requirements for athletes

Unit-5: Nutrient Periodisation

5.1 Nutrient Periodisation: Definition, Importance of periodisation, meal timings according to type of training and exercise intensity.

5.2 Periodisation strategies in different phase/season of training.

Unit-6: Hydration Among Athletes

6.1 Hydration Status: Definition of hydration, dehydration, hypo and over hydration, Causes; Symptoms and effects of dehydration; Tolerable levels of dehydration; Synergistic effect of dehydration and hyperthermia; Methods for determining degree of dehydration among athletes; Strategies for lowering hyperthermia; Recent advances in hydration science

6.2 Hydration Strategies: Beverage composition and formulation (isotonic, hypotonic and hypertonic); Strategies to maintain euhydration - Beverage type, timing, volume, composition (Pre-exercise hydration, during exercise, Post-exercise); Factors that influence intake; Gastric emptying and absorption of fluids; Beverage palatability and fluid intake; Intravenous rehydration; Food versus fluid consumption during exercise.

References:

1. Maughan, R. J., & Shirreffs, S. M. (Eds.). (2013). Food, Nutrition and Sports Performance III. Routledge.
2. Campbell, B. (Ed.). (2013). Sports nutrition: enhancing athletic performance. CRC Press.
3. Dunford M. (2017) Nutrition for Sport and Exercise.
4. Jeukendrup, A. (2010). Sports Nutrition-From lab to Kitchen. Meyer & Meyer Sport.
5. Spano, M., Kruskall, L., & Thomas, D. T. (2017). Nutrition for Sport, Exercise, and Health. Human Kinetics.
6. Lanham-New, S. A., Stear, S., Shirreffs, S., & Collins, A. (Eds.). (2011). Sport and exercise nutrition (Vol. 8). John Wiley & Sons.
7. Lamprecht, M. (Ed.). (2014). Antioxidants in sport nutrition. CRC Press.
8. **F**ink, H. H., & Mikesky, A. E. (2017). Practical applications in sports nutrition. Jones & Bartlett Learning.
9. Wolinsky, I., & Driskell, J. A. (Eds.). (2005). Sports nutrition: vitamins and trace elements. CRC Press.
10. Clark, N. (2013). Sports Nutrition Guidebook, Leisure Press.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDS-DS-303A)	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MNDS-DS-303A.1	2	2	1	1	1	1	2	3	2	1	3	2	2	3
MNDS-DS-303A.2	2	2	1	1	1	1	2	3	2	1	3	2	2	3
MNDS-DS-303A.3	2	2	1	1	1	1	3	3	2	1	3	2	2	3
MNDS-DS-303A.4	3	3	2	2	2	3	3	3	3	3	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MNDS-DS-353A: **Exercise and Sports Nutrition (Practical)**

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	1	Internal/Continuous Assessment: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Core

Course Outcomes: The student will able

MNDS-DS-353A.1. To learn the techniques used in the estimation of energy requirements

MNDS-DS-353A.2. To acquire the skills of estimating the fluid requirements of an athlete

MNDS-DS-353A.3. To design the menu plans in training periodization

MNDS-DS-353A.4. To compose various sports drinks and snacks for athletes

Practicals:

1. Assessment of body composition using 2C and 5C model
2. 24-hour Energy Expenditure pattern of an athlete using the factorial method.
3. Energy balance: Calculation of total energy expenditure (TEE) and energy intake
4. Planning and preparation of diets for an athlete of the preparation phase – speed/endurance
5. Planning and preparation of diets for an athlete of the preparation phase – power/strength
6. Planning and preparation of diets for an athlete of the pre-competition phase
7. Planning and preparation of diets for an athlete of the competition phase
8. Planning and preparation of diets for an athlete of the recovery phase
9. Assessment of hydration status
10. Planning and preparation of pre-event, during the event and post-event snacks based on ACSM guidelines
11. Planning and preparation of hypotonic, isotonic, and hypertonic sports drinks

References:

1. Jeukendrup, A. (2010). Sports Nutrition-From lab to Kitchen. Meyer & Meyer Sport.
2. **F**ink, H. H., & Mikesky, A. E. (2017). Practical applications in sports nutrition. Jones & Bartlett Learning.
3. Clark, N. (2013). Sports Nutrition Guidebook, Leisure Press.

Distribution of Continuous Evaluation Table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDS-DS-353A)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDS-DS-353A.1	3	1	1	1	1	1	3	2	2	1	3	3	3	3
MNDS-DS-353A.2	3	1	1	1	1	1	3	2	2	1	3	3	3	3
MNDS-DS-353A.3	3	1	1	1	2	2	3	2	2	1	3	3	3	3
MNDS-DS-353A.4	3	1	1	1	2	2	2	2	2	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MNDP-DS-301: Food and Nutrition Security (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T:0 P:0	4	Continuous evaluation: 100
		End Semester Examination: 100

Duration of Examination: 3 Hours

Course Outcomes: The students will be able
MNDP-DS-301.1 To understand the concept of food and nutrition security.
MNDP-DS-301.2 To analyze the national / public sector policies and programmes for improving food and nutrition security.
MNDP-DS-301.3 To evaluate the current situation of development programmes in attaining nutrition security.
MNDP-DS-301.4 To apply the knowledge in planning nutrition program for different vulnerable group

PART – A

Unit1: Food and Nutrition Security
1.1 Concepts and definitions of food and nutrition security at national, regional, household and individual levels.
1.2 Impact of food production, losses, distribution, access, availability, and consumption on food and nutrition security – critical appraisal of the current scenario.

Unit 2: National / Public Sector Policies for Improving Food and Nutrition Security
2.1 Role of national public policies in improving food and nutrition security (agriculture, food, nutrition, water and sanitation and health sectors)
2.2 National Plan of Action on Nutrition

Unit 3: Public Sector Programmes for Improving of Food and Nutrition Security
3.1 Rationale, implementation status, monitoring / evaluation and critical appraisal of ongoing programmes.

PART - B

Unit 4: Impact of Development Programmes on Nutrition Security
4.1 Impact of micronutrient deficiency programmes (Vit A, Iron and Iodine deficiency) on nutritional status of target group
4.2 Enrichment, fortification techniques and using biotechnology to ensure nutritional security

Unit 5: Technologies for food and nutrition security
5.1 Irradiation and supplementation to offer food security and suitable vehicles for it
5.2 Bio-fortification and organic foods

Unit 6: Challenges in attaining food and nutritional security

6.1 Reasons for poor coverage of national nutritional security programmes

6.2 Possible improvements in policy making and implementation of the programmes

Reference Readings:

1. K.T. (Ed) Achaya, 1984, Interface Between Agriculture, Nutrition and Food Science. United Nations University Press.

2. M.J.Gibney, B.M. Margetts, J. M. Kearney, I. Arab, 2004, Public Health Nutrition. NS Blackwell Publishing.

3. C. Gopalan, and S. Kaur, 1993, Towards Better Nutrition, Problems and Policies. Nutrition Foundation of India.

4. K. Park, 2009, Park's Textbook of Preventive and Social Medicine. 20th ed. Jabalpur M/s. Banarsidas Bhanot.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Practical records

Sessional tests

Surprise questions during lectures/Class Performance

Term end examinationCourse Articulation Matrix

CO Statement (MNDP-DS-301)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
MNDP-DS-301.1	3	2	2	1	1	2	2	1	1	1	2	2	2	2
MNDP-DS-301.2	2	2	1	1	2	2	1	2	2	1	2	2	3	3
MNDP-DS-301.3	2	2	2	2	1	1	1	2	1	1	2	2	3	3
MNDP-DS-301.4	3	3	2	2	1	2	2	2	2	2	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDP-DS-351: Food and Nutrition Security (Practical)

Periods/week	Credits	Max. Marks: 100
L:0 T:0 P:2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Outcomes: The students will be able to
MNDP-DS-351.1. To understand the planning and functioning of national nutrition programs in India
MNDP-DS-351.2. To develop nutrition education program for vulnerable groups
MNDP-DS-351.3. To evaluate and plan nutrition education program
MNDP-DS-351.4. To analyze the ongoing nutrition programs in India

Practical
1. Critical review of following programs with advantages and challenges

    a) Integrated Child Development Service
    b) Pradhan Mantri Fasal Bima Yojana
    c) Annapurna scheme

2. Overview of WHO guidelines of nutritional security in Asia
3. Survey of at least three schools with ongoing mid day meal programme with major focus to the quality of food provided
4. Development of a plan for conducting nutrition education programmes in the community. Preparation of communication aids for different groups

Reference Readings:

1. A. Aggrawal and S. A. Udupi,2014, Textbook of Human nutrition. Jaypee brothers medical publisher. Delhi.
2. M. Devirati and P. Govindi, 2014, Challenges in food security in India. Indian journal of medical sciences, Vol 6; 233-239
3. National Nutrition Policy, GoI, 1993.
4. National Plan of Action on Nutrition, GoI, 1995

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDP-DS-351)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
(MNDP-DS-351).1	1	3	3	1	2	1	2	1	3	1	1	3	3	1
(MNDP-DS-351).2	2	1	2	3	1	1	1	2	2	2	2	1	2	3
(MNDP-DS-351).3	2	1	1	1	1	1	2	3	1	2	2	1	1	1
(MNDP-DS-351).4	3	2	3	2	3	2	1	3	2	1	3	2	3	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDP-DS-302 Health Promotion and Nutrition Communication (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course outcomes: The students should be able :
MNDP-DS-302.1. To describe and discuss the wide range of individual and environmental factors which determine food choice.
MNDP-DS-302.2. To apply theoretical models of food choice behavior
MNDP-DS-302.3. To analyze aims and methods of nutrition promotion
MNDP-DS-302.4. To plan, implement and evaluate behavior change communication for promotion of nutrition and health among the vulnerable groups

PART A

Unit 1: Dietary guidelines for nutrition and health related concerns
1.1 National / international guidelines and their role in nutrition promotion.

1.2 Critical appraisal of the current guidelines.

Unit 2: Nutrition and Behavior Inter-relationship
2.1 Food and health behavior
2.2 Models/theories of health behavior
2.3 Food choice
2.4 Strategies for intervention at the ecological and individual level

Unit 3: Behavior Change Communication for nutrition and health promotion
3.1 Concept and objectives of communication for behavior change
3.2 Planning of communication strategies for behavior change programme
3.3 Communication needs analysis
3.4 Stakeholders in nutrition promotion
3.5 Developing nutrition education plan

PART B

Unit 4: Identifying communication strategies and approaches for nutrition and health promotion
4.1 Designing nutrition and health messages
4.2 Selecting communication channels
4.3 Developing and field testing of communication materials
4.4 Designing training strategy for trainers and building capacity.
4.5 Implementing behavior change communication intervention: overview

4.6 Evaluation of communication for behavior change programmes
4.7 Ethics in nutrition and health communication

Unit 5: Nutrition Advocacy
5.1 Role in policy formulation and execution
5.2 Theory of advocacy
5.3 Advocacy vs Behavior Change Communication
5.4 Analysis of the policy environment
5.5 Preparation of policy briefs
5.6 Monitoring and evaluation of policy related activities and outcomes

Unit 6 Social marketing and Health Literacy
6.1 Basic principles of social marketing and its applications.
6.2 Overview of social media in health communications
6.3 Health literacy

Reference Readings

1 M.J. Gibney, B.M. Margetts, J.M.Kearney, L. Arab, (Eds), 2004, Public Health Nutrition. NS Blackwell Publishing.
2 C. H. Robert, 2002, Public Health Communication: Evidence for Behavior Change, Lawrence Erlbaum Associates, Inc.
3 E. B. Ray and L. Donohew, 1990, Communication and Health: Systems and Applications. Lawrence Erlbaum Associates, Inc.
4 A. B. Marie and H. H.David, 2006, Community Nutrition in Action: An Entrepreneurial Approach. 4 Editions. Thomson Wadsworth.

Instructions for External Evaluation: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt .Three questions will be set from each part A and part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical records
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDP-DS-302)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MNDP-DS-302.1	3	-	3	1	-	-	1	-	3	3	3	2	-	-
MNDP-DS-302.2	1	-	-	2	1	-	2	1	-	-	3	3	-	2
MNDP-DS-302.3	2	-	1	2	-	-	3	3	2	-	3	2	-	2
MNDP-DS-302.4	3	-	1	2	1	-	2	2	-	-	-	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDP-DS-352 Health Promotion and Nutrition Communication (Practical)

Periods/week	Credits	Max. Marks: 100
P: 2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Outcomes: The students will be able:
MNDP-DS-352.1. To develop skills in preparation of communication strategies and communication aids for nutrition / health promotion of the community.
MNDP-DS-352.2. To plan, implement and evaluate nutrition education programme for the community
MNDP-DS-352.3. To prepare an evaluation plan for a public health nutrition programme
MNDP-DS-352.4. To implement and evaluate an action plan for a public health nutrition programme in the community.

Practicals

1. Planning, implementation and evaluation of a nutrition education programme for the identified community.
2. Planning an evaluation for a public health/ nutrition programme
3. Planning of a communication strategy for a nutrition education programme in the community; field testing of messages, materials and methods
4. Implementation and evaluation of the action plan for a public nutrition programme for the identified community

Reference Readings

1. M.J. Gibney, B.M. Margetts, J.M.Kearney, L. Arab, (Eds), 2004, Public Health Nutrition. NS Blackwell Publishing.
2. C. H. Robert, 2002, Public Health Communication: Evidence for Behavior Change. Lawrence Erlbaum Associates, Inc.

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDP-DS-302)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MNDP-DS-302.1	3	-	3	1	-	-	1	-	3	3	3	2	-	-
MNDP-DS-302.2	1	-	-	2	1	-	2	1	-	-	3	3	-	2
MNDP-DS-302.3	2	-	1	2	-	-	3	3	2	-	3	2	-	2
MNDP-DS-302.4	3	-	1	2	1	-	2	2	-	-	-	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDP-DS-303 Aspects of Public Health Nutrition

Periods/week	Credits	Max. Marks: 200
L: 3 T: 0	3	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Program Core

Course Outcome: The Students will be able
MNDP-DS-303.1. To understand the basic elements of program planning in public health.
MNDP-DS-303.2. To identify barriers to successful planning of program.
MNDP-DS-303 3. To apply the strategic planning to overcome the program planning barriers.
MNDP-DS-303.4. To prepare a successful program in the field of public health.

PART A

Unit 1: An introduction to program planning for public health
1.1 Concept, principles, theories and models of program planning
1.2 Health Planning & planning Cycle, and its management

Unit 2: Overview of Program planning steps
1.3 Survey of area, Assessing community needs, defining the problem (Goals and Objectives for program planning),
1.4 Find resources- , budgeting and funding and sustainability,
1.5 Planning of interventions, program implementation and evaluation (impacts and outcomes)

Unit 3 Program Evaluation Techniques and their applications
3.1 Program Evaluation and Review Technique (PERT)
3.2 Critical Path Method (CPM)

PART B

Unit 4: Health Economics
4.1 Concept of health economics
4.2 Concepts related to cost
- Cost Benefit Analysis (CBA)
- Cost Effective Analysis (CEA)

Unit 5 Health Planning, administration and Management
5.1 Health Planning
5.2 Health Administration and Management
5.3 Government Health Organization in India

Unit 6 National Health Policies and Programs
6.1 National Health policy
6.2 National Rural Health Mission (NRHM)
6.3 Role of Niti Aayog in health sectors

Reference readings:
1. L. M. Issel. Health Program Planning and Evaluation: A Practical, Systematic Approach for community health. Edition-2nd, Jones and Bartlett publisher, Sudbury, Massachusetts.
2. C. T. Thomas. Planning, Program Development, and Evaluation: A Handbook for Health promotion, aging and health services. Edition-2nd. Jones and Bartlett publisher, Sudbury, Massachusetts.
3. C. H. Boni. Assessment and Planning in Health Programs. Edition-2nd. Jones and Bartlett publisher, Sudbury, Massachusetts.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDP-DS-303)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
(MNDP-DS-303).1	1	3	3	1	2	1	2	1	3	1	1	3	3	1
(MNDP-DS-303).2	2	1	2	3	1	1	1	2	2	2	2	1	2	3
(MNDP-DS-303).3	2	1	1	1	1	1	2	3	1	2	2	1	1	1
(MNDP-DS-303).4	3	2	3	2	3	2	1	3	2	1	3	2	3	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDP-DS-353 Aspects of Public Health Nutrition (Practical)

Periods/week	Credits	Max. Marks: 100
L: 0 T:0 P:2	1	Continuous evaluation: 50
Duration of Examination: 2 Hours		End Semester Examination: 50

Course Type: Program Core

Course Outcome: The Students will be able
MNDP-DS-353.1 To understand the importance of program planning
MNDP-DS-353.2 To develop an ability to design a program.
MNDP-DS-353.3 To develop an ability to implement a program.
MNDP-DS-353.4 To develop a skill to constructively evaluate public health program.

Practical
Prepare an effective program for community on current issues by using all the described seven steps and submit the report

Step I- Survey of area and resource mapping - Presentation
Step II- Identify major Health Problems
Step III-Analyze problems
Step IV- Find resources
Step V- Plan specific, short term, small & effective intervention
Step VI- Implementation
Step VII- Analyze the result & write the report

Reference readings:
1. L. M. Issel. Health Program Planning and Evaluation: A Practical, Systematic Approach for community health. Edition-2nd, Jones and Bartlett publisher, Sudbury, Massachusetts.

2. C. H. Boni. Assessment and Planning in Health Programs. Edition-2nd. Jones and Bartlett publisher, Sudbury, Massachusetts.

Instructions for paper setting: Practical assessment will be carried out using the following parameters: practical performance, written, practical record, and viva voce.

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDP-DS-353)	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
(**MNDP-DS-353**).1	1	3	3	1	2	1	2	1	3	1	1	3	3	1
(**MNDP-DS-353**).2	2	1	2	3	1	1	1	2	2	2	2	1	2	3
(**MNDP-DS-353**).3	2	1	1	1	1	1	2	3	1	2	2	1	1	1
(**MNDP-DS-353**).4	3	2	3	2	3	2	1	3	2	1	3	2	3	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-354: Technical Seminar

Periods/week	Credits	Max. Marks : 50
L: 0 T: 0 P: 2	1	Continuous evaluation : 50

Duration of Examination: 2 Hours

Course Outcomes: The students will be able:

MND-DS-354.1 To understand recent research findings on problems in the field of Nutrition and Dietetics
MND-DS-354.2 To acquainted with sources of literature in the field of Nutrition and Dietetics.
MND-DS-354.3 To analyze and present the findings in scientific manner.
MND-DS-354.4 To develop professional skills in the area of public speaking and an ability to present oneself before his/her peers.

Instructions
Each student is responsible for the presentation of a topic in the area of Nutrition and Dietetics. Any topic of interest may be chosen by the student based on current issues, pertinent problems and changing trends in the area of Nutrition and Dietetics. Evaluation of the seminar will be done by the panel of faculty members on the basis of the following parameters.
1. Importance of the topic undertaken
2. Understanding and in-depth knowledge of the topic
3. Presentation
4. Viva
5. Report

Continuous Evaluation table

Viva- I	**30%**
Viva- II	**30%**
Practical Record	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Practical Record
Viva I & II
Surprise questions during lectures/Class Performance
Term end examination

CO Statement (MND-DS-354)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-354.1	3	1	1	1	2	3	3	3	-	-	3	2	-	1
MND-DS-354.2	3	2	1	1	2	3	3	3	-	-	3	3	-	3

MND-DS-354..3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
MND-DS-354.4	3	1	2	1	2	3	3	3	2	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-355: Research Proposal Development (Practical)

Periods/week	Credits	Max. Marks: 100
L:0 T: 0 P: 4	2	Continuous evaluation: 100

Duration of Examination: 3 Hours

Course Outcomes: The students will be able:

MND-DS-355.1 To describe current issues, problems and challenging concepts in the field of Nutrition and Dietetics.
MND-DS-355.2 To study, analyze and condense the current literature.
MND-DS-355.3 To compare the various research methodologies and choosing the appropriate one
MND-DS-355.4 To apply the contextual knowledge in designing the experiments

Course Guidelines:

1. Every student should be allotted a Research supervisor.
2. The Research Supervisor will be from the department and if required, the minor guide, from the same department or any other department to which the topic may be related.
3. The allotment of the Research Supervisor should be done in starting of the third semester.
4. The topic of the research is decided by the research supervisor in consultation with the Head of the Department during the third semester.
5. It will be the responsibility of Research Supervisor that the student is making the required progress in work.
6. The student will have to give research proposal seminar in the mid of the third semester and a seminar on the findings of the research before submitting the Dissertation.
7. The suggestions and constructive criticism of the faculty should be made use of by the student for further improving the draft of the Dissertation.
8. Internal Marks will be awarded for research seminars/ practical exercises/Research plan and viva-voce examination.

Distribution of Continuous Evaluation Table:

Research proposal development	20%
Internal seminar/PPT	30%
Evaluation by supervisor	30%
Attendance	20%

Course Articulation Matrix

CO Statement (MND-DS-355)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-355.1	3	1	1	1	2	3	3	3	-	-	3	2	-	1
MND-DS-355.2	3	2	1	1	2	3	3	3	-	-	3	3	-	3
MND-DS-355.3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
MND-DS-355.4	3	1	2	1	2	3	3	3	2	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS- 306 Advanced Nutritional Sciences (Theory)

Period/Week	Credit	Max. Marks: 200
L: 2 T: 0 P: 0	2	Continuous evaluation: 100
Duration of Examination: 2 Hour		End Semester Examination : 100

Course outcomes: The students will be able:
MND -DS-306.1: To Understand the nutritional benefits of non-nutritive food compounds
MND -DS-306.2 To Relate nutrition with gene expression
MND -DS-306.3 To Illustrate the reason behind bioavailability of nutrients.
MND -DS-306.4 To Analyze the role of nutrient in immunity.

PART – A

Unit 1: Potential Health Benefits of Food Components other than nutrients
1.1 Functional foods, bioactive substances from protein foods
1.2 Probiotics, prebiotics, polyphenols and phytoestrogens
1.3 Determine the bio-availability of nutrients.
1.4 Analyze the role of nutrition in immunity.

Unit 2: Nutrition Regulation and Gene Expression
2.1 Fundamentals and principles of gene structure
2.2 Transcription and Translation
2.3 Role of specific nutrients in controlling gene expression: Protein lipids, Fuel molecules , vitamins and minerals

PART – B

Unit 3: Bioavailability of Nutrients
3.1 Animal and human metabolic studies-use in assessment of nutrient bioavailability
3.2 Methods of evaluating protein quality – need, Amino acid score NPU, BV, Digestibility coefficient
3.3 Methods of determining bioavailability of vitamins and minerals: Radio-isotopes, Balance studies, Growth and specific tissue response, Repletion-depletion techniques, Plasma appearance, Microbial assays, In vitro studies,

Unit 4: Nutrition associated with immunity
4.1 Active immunity – Humeral, cellular and combination of both
4.2 Passive immunity – Normal human Ig, Specific human Ig, animal antitoxins or antisera Immunoglobulins – IgG, IgM, IgA, IgD, IgE
4.3 Role of nutrients on immune function, Malnutrition and immune function

Reference Reading

1. J. G. Michael, E. Marinos, L. Olle, D. Julie, 2005, Nutrition and Metabolism-Nutrition Society Textbook series. Blackwell Publishers.
2. L.K. Mahan and E. S. Stump, 2008, Krause's Food & Nutrition Therapy. 12th ed. Saunders- Elsevier.
3. M.E.Shils, M Shike, A.C. Ross, B. Caballero and R.J. Cousins., 2005, Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.

4. M.J.Gibney, M. Elia, Ljungqvist and J. Dowsett, 2005, Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
5. J.S.Garrow, W.P.T. James and A. Ralph, 2000. Human Nutrition and Dietetics. 10th ed. Churchill Livingstone.
6. R.Murray, V. Rodwell, D. Bender, K. Botham, P. Anthony, Weil and P. Kennelly, 2009, Harper's Illustrated Biochemistry. 28th Edition. McGraw Hill Company.
7. IGNOU, 2006, Manual on Advance Nutrition. MFN-004.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-306)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-306.1	3	1	1	1	2	3	3	3	-	-	3	2	-	1
MND-DS-306.2	3	2	1	1	2	3	3	3	-	-	3	3	-	3
MND-DS-306.3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
MND-DS-306.4	3	1	2	1	2	3	3	3	2	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-307 Fortification of Food (Theory)

Period/Week	Credit	Max. Marks: 200
L: 2 T: 0 P: 0	2	Continuous evaluation: 100
Duration of Examination: 3 Hour		End Semester Examination : 100

Course Outcomes: The student will be able:
MND-DS-307.1 To Understand the need of fortification in the present scenario.
MND -DS-307.2 To Explain the basis of fortification.
MND -DS-307.3 To Analyze the relation between food and its fortificants.
MND -DS-307.4 To Apply the knowledge of fortification in combating malnutrition.

PART A

UNIT 1 Food fortification
1.1 Food fortification: basic principles and Terminology
1.2 Types of fortification
1.3 Legal considerations: mandatory versus voluntary fortification

UNIT 2 Public health significance of micronutrient malnutrition
2.1 Iron, vitamin A and iodine
2.2 Zinc, folate, vitamin B12 and other B vitamins, vitamin C, vitamin D, calcium, selenium and fluoride

PART B

UNIT 3 Fortificants
3.1 Physical characteristics, selection and use with specific food vehicles
3.2 Implementing effective and sustainable food fortification programmes
3.3 National food law

UNIT 4 Fortification programmes
4.7 Estimating the cost-effectiveness and cost–benefit of fortification
4.8 Safety issues
4.9 FSSAI and fortification

Reference/Readings:

1. Preedy, R. Victor, S. rajaskanthan, Rajaventhan, Patel, B. Vinood, 2013, Handbook of Food Fortification and Health From Concepts to Public Health Applications. Volume 2. Springer.
2. P. B. Ottaway, 2008, Food Fortification and Supplementation : Technological, Safety and Regulatory Aspects. Taylor & Francis Inc.
3. A. Lindsay, C.A. Davis, D. B. Bruno and D. Omar, 2006, Guidelines on food fortification with micronutrients. WHO and FAO. https://ffrc.fssai.gov.in/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-307)	**PO 1**	**PO 2**	**P O3**	**PO 4**	**PO 5**	**PO6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PS O 1**	**PS O 2**	**PS O 3**	**PS O 4**
MND-DS-307.1	3	1	1	1	2	3	3	3	1	-	3	2	-	1
MND-DS-307.2	3	2	1	1	2	3	3	3	1	-	3	3	-	3
MND-DS-307.3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
MND-DS-307.4	3	1	2	1	2	3	3	3	2	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-308: Epidemiology and Public Health

Period/Week	Credit	Max. Marks: 200
L: 2 T: 0 P: 0	2	Continuous evaluation: 100
Duration of Examination: 3 Hour		End Semester Examination : 100

Course Outcomes: Students will be able:
MND-DS-308.1To Evaluate methodologies used in nutritional epidemiology
MND-DS-308.2. To Understand dietary assessment methodologies
MND-DS-308.3. To Analyze the current epidemiological evidence for relationships of diet and non communicable diseases
MND-DS-308.4. To Apply and evaluate epidemiological data in relation to nutrition and health.

PART – A

UNIT 1: Overview of Epidemiology
1.1 Definition/ objective of epidemiology research
1.2 Historical developments in epidemiology
1.3 Study designs used in epidemiological research
1.4 Study tools used in nutritional epidemiological research
1.5 Key issues in nutritional epidemiology

Unit 2: Epidemiology of Major public Health and Nutrition Problems in India
2.1 Status of maternal & child nutrition/health as per latest surveys
2.2 Studying the progress of key indicators of vulnerable age groups based on disaggregated data rural vs urban, male vs female, SC, ST, OBC and Wealth quintiles. (NNMB, SRS, DLHS,CES, MICS,NFHS I, II and III data) and calculating per annum progress/deterioration.
2.3 Vital statistics and Causes of IMR, NMR, MMR, Under 5 Mortality rates & its relationship with nutrition.
2.4 Emergence of evidence based interventions for improving Maternal and Child Health and Nutrition from global and National epidemiological data base.

PART-B

UNIT 3: Epidemiology of Major Micronutrient deficiencies
3.1 Status of micronutrient deficiencies in mothers and children as per latest surveys
3.2 Utilization rates of key interventions to improve micronutrient deficiencies for women, children, and adolescence: globally and in India;
3.3 Vital statistics and Causes of IMR, NMR, MMR, Under 5 Mortality rates & its relationship with nutrition.

UNIT 4: Biomarkers in Nutritional Epidemiology
4.1 Definition and types of Biomarkers used in nutrition epidemiology
4.2 Advantages of using biomarkers in nutritional epidemiology
4.3 Difference between a direct and surrogate biomarker
4.4 Important considerations relating to the use of nutritional biomarkers

4.5 Common surrogate biomarkers used in epidemiological studies

Reference Readings:

1. W. Willett, Nutritional Epidemiology. Volume 30 (2nd edition). Oxford University Press, USA.
2. R Bonita, R. Beaglehole, T. Kjellström, WHO, 2006, Basic Epidemilogy. 2nd Edition , http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf.
3. G. Moon, M. Gould, 2000, Epidemiology: An Introduction. Philadelphia. Open University Press.
4. L. Langseth,1996, Nutritional Epidemiology: Possibilities and Limitations. Washington DC, ILSI Press.
5. G.H. Pelto, R.J. Pelto and E. Masser, 1989, Research Methods in Nutritional Anthropology, Tokyo, Japan: The United Nations University.
6. M .Koblinsky, 1993, The Health of Women : A Global Perspective. NCIH, Washington, DC, USA.
7. A.E.Black. Critical evaluation of energy intake using the Goldberg cut-off for energy intake:basal metabolic rate. A practical guide to its calculation, use and limitations. Int J Obes Relat Metab Disord. 2000 Sep;24(9):1119–1130.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (**MND-DS-308**)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
(MND-DS-308).1	3	1	1	1	2	3	3	3	1	-	3	2	-	1
(MND-DS-308).2	3	2	1	1	2	3	3	3	1	-	3	3	-	3
(MND-DS-308).3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
(MND-DS-308).4	3	1	2	1	2	3	3	3	2	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
MND-DS-309A: Sports Supplements and Doping (Theory)

Periods/week	Credits	Max. Marks: 200
L: 2 T: 0 P: 0	2	Internal/Continuous Assessment: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Discipline Specific
Course Outcomes: The student will be able
MND-DS-309A.1. To understand the prohibited drugs, doping laws and regulations and doping agencies.
MND-DS-309A.2. To determine the benefits and harmful effects of macro and micronutrient supplements
MND-DS-309A.3. To assess the benefits and harmful effects of metabolite and botanical supplements
MND-DS-309A.4. To review the motivational factors for supplements use

PART A

UNIT -1: Regulation of Dietary Supplements and Ergogenic Aids

1**.1** Definition and classifications of dietary supplements and ergogenic aids, Dietary Supplement Health and Education Act of 1994; FDA Regulatory Action and Legislation, Regulations on Dietary supplements: FSSAI.

1.2 Doping Control and Supplement Testing: World anti-doping agency and National Anti-doping agency (NADA), Formation and History; List of prohibited substances and drugs; Therapeutic use exemption (TUE), Standards for testing and investigations (ISTI); Protection and privacy of athletes personal information (ISPPPI), International Standard for code compliance by signatories (ISCCS)

1.3 Anti-doping: Athletes Biological Passport & Its guidelines, antidoping administration and management system (ADAMS), Antidoping rule violations (ARDVS), Antidoping education.

Unit-2: Macronutrient Supplements

2.1 Protein Supplements: Whey, Casein, Egg Albumin, Soy Protein, Pea Protein, Other Vegan Proteins/Protein Blends, Protein Bars, Protein shakes, Amino Acid Supplements- Beta alanine, BCAA, Glutamine, Arginine, Taurine.

2.2 CHO Supplements: Carbo loading, Sports Drinks, Sports Bars and Gels, Dextrose, Maltodextrin, Fructose, Glucose, Sucrose, Waxy Maize

2.3 Fat Supplements: Conjugated linoleic acid (CLA), Omega Fatty acids/fish oils, Medium Chain TCG, L-Carnitine, Gamma Oryzanol

PART B

Unit-3: Micronutrient Supplements

3.1 Vitamin Supplements: B-Complex Vitamins, Vitamin C, Vitamin D, Vitamin E, Multi-Vitamin Supplements.

3.2 Mineral Supplements: Calcium, Magnesium, Iron, Chromium, Selenium, Zinc.

Antioxidants Supplements: Antioxidant Vitamins & Mineral Supplements.

Unit -4: Metabolite and Botanical Ergogenic Supplements

4.1 Botanical Ergogenic Supplements: Wheat Germ oil, Beetroot, Green Tea Extract, Tart Cherries, Caffeine, Green coffee extract, Curcumin, Ginger, Pepper, Phytosterols, Capsaicin, Bio Flavonoids, Ashwagandha, Rhodiola, Shilajit, Ginseng, Grape Seed Extract, chyawanprash, Herbal Testosterone-Boosters (Eg. Tribulus Terristris, Nettle Root, Long Jack Root Etc), Bitter Orange (Citrus aurantium), Capsaicin, White Kidney Bean (Phaseolus vulgaris), Garcinia Cambogia (Hydroxycitric Acid), Guar Gum, and Psyllium, Glucomannan.

4.2 Metabolite Ergogenic Supplements: Co Enzyme Q 10, Creatinine, DHEA, NADH, Glycerol, Inosine, Melatonin, FRAC, Glucosania, Alcohol, Sodium bicarbonate, sodium citrate, Androstenedione, B-HMB.

4.3 Use of Nutritional Supplements in Sport and Exercise: Motivational Antecedents and behavioural Outcomes: Motivational Theories Applied to Supplement Use; Behavioural Effects of Selected Supplements Commonly Employed for Performance, Fitness, and Health.

References:

1. Burke, L., Stear, S., Castell, L.M. (2015). Nutritional supplements in sport, exercise and health: An A to Z guide, Routledge publishers
2. Antonio, J., & Stout, J. R. (2002). Supplements for endurance athletes. Human Kinetics.
3. Greenwood, M., Cooke, M. B., Ziegenfuss, T., Kalman, D. S., & Antonio, J. (Eds.). (2015). Nutritional supplements in sports and exercise. Humana Press.

4. Cooper, C. E. (2008). Drugs and ergogenic aids to improve sport performance. Essays in biochemistry, 44, 1-10.
5. www.wada-ama.org.
6. www.ndaindia.org.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination.

Course Articulation Matrix

CO Statement (**MND-DS-309A**)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-309A.1	3	1	1	2	2	2	3	3	2	1	3	1	2	3
MND-DS-309A.2	3	1	1	1	1	1	2	3	2	1	3	2	3	3
MND-DS-309A.3	3	1	1	1	1	1	2	3	2	1	3	2	3	3
MND-DS-309A.4	2	2	3	3	3	1	2	3	2	2	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-310 Nutrition for Parathletes

Period/Week	Credit	Max. Marks: 200
L: 2 T: 0 P: 0	2	Continuous evaluation: 100
Duration of Examination: 3 Hour		End Semester Examination : 100

Course Objectives: The student will be able:
MND-DS-310.1. To describe the roles and responsibilities of International Paralympics Committee.
MND-DS-310.2. To explain the basic nutritional requirements of a disabled sportsperson.
MND-DS-310.3. To apply the knowledge of physiology of parathletes in understanding of the sports injuries and medical issues pertaining to disability sports.
MND-DS-310.4. To analyse the role of various sports organizations working for paratheltes.

PART A

Unit 1 Introduction to the International Paralympic Committee (IPC)
1.1 What is IPC
1.2 The roles and responsibilities of IPC
1.3 History of the Paralympics movement: National and international
1.4 IPC as an international federation

Unit 2 Duties and responsibilities of all IPC members and standing committees
2.1 Anti doping committee.
2.2 AHSN committee.
2.3 Legal and ethics committee.
2.4 Paralympic games committee.
2.5 Sports Science committee.
2.6 Medical and women in sports committee.

PART B

Unit 3 Nutrition for disability sports:
3.1 Introduction to disability sports.
3.2 Energy requirements
3.3 Carbohydrates, protein Fat ,fluids and electrolytes
3.4 Micronutrients and other nutrients
3.5 Body composition assessment
3.6 Practical aspects and daily life.

Unit 4 Disability Sports –Injuries and Medical Issues
4.1 Implications of disability in sports
4.2 Pre performance exam, Medical staff coverage, Medical concerns in sport participation, Medical emergency awareness
4.3 Classification of athletes by disability
4.4 Other medical issues –sclerosis, diabetes , obesity, Seizures, Autonomic Dys reflexia/Boosting, Pressure Ulcers, Spasticity, Hydrocephalus, Sport Injuries Osteoporosis, Pregnancy
4.5 Prosthetics and Orthotics
4.6 Benefits of a fitness program
4.7 Disabled sports organizations

References Readings:

1. A. L. Susan, S.J. Stear, M.S. Susan and L.C. Adams, 2011, Sport and Exercise Nutrition. 1st Edition. Wiley Blackwell.

2. https://www.paralympic.org/the-ipc/international-organisation-for-the-disabled

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-310)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MND-DS-310.1	3	1	1	1	1	3	3	2	-	-	3	2	-	1
MND-DS-310.2	3	2	1	1	2	3	3	2	-	-	3	3	-	3
MND-DS-310.3	3	2	1	1	2	2	3	2	1	-	3	3	-	1
MND-DS-310.4	3	1	2	1	2	3	3	1	1	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
MND-DS-311 Nutrigenomics and Nutrigenetics

Period/Week	Credit	Max. Marks: 200
L: 2 T: 0P: 0	2	Internal/Continuous Assessment: 100
Duration of Examination: 3 Hour		End Semester Examination: 100

Course Type: Discipline-Specific Elective

Course Objectives: The student will be able:
MND-DS-311.1. To learn the basic concepts of nutrigenomics and nutrigenetics
MND-DS-311.2. To explain the impact of genes and nutrition and vice versa
MND-DS-311.3. To interpret the gene and nutrient interaction in diseases
MND-DS-311.4. To build skills on the usage of the latest technologies in nutrigenomics

PART A

Unit 1: Understanding of Nutrigenomics

1.1 Concept of Functional Genomics;

1.2 Systems Biology;

1.3 Nutrigenomics; Personalized Nutrition and its Importance.

Unit 2: I**ntroduction to nutrigenetics and nutrigenomics**

2.1 Structure, functions, and composition of DNA

2.2 DNA replication and repair

2.3 Structure, functions, transport, and types of RNA, transcription activators and repressors, RNA processing, editing, and splicing.

.

PART B

Unit 3: Nutrients and Genes

3.1 Role of genetics in human nutrient metabolism; Nutrients as regulators of activity and transcription factors; Nutrients as epigenetic exchange agents

3.2 Nutrigenomics and nutrigenetics in early life, ageing, calorie restriction, obesity, cardiovascular disease, cancer and sports performance

UNIT 4: **Technologies in Nutrigenomics**

4.1 Genomic techniques: Different sequencing approaches, Microarray, SNP genotyping, PCR and RT-PCR techniques

4.2 Proteomics Techniques:1-D, 2-D gel electrophoresis, Differential gel electrophoresis (DIGE), novel peptide identification, peptide sequencing methods

4.3 Metabolic techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders

4.4 Computational approaches: Introduction to different types of public domain databases, data mining strategies, primer designing.

References:

1. Kok F., Bouwman L., Desiere F.(2008) Personalized Nutrition: Principles and Applications. CRC press
2. Ferguson, L. R. (2013). Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition. CRC press

Instructions for paper setting: Seven questions are to be set in total. The first question will be conceptual covering the entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Course Articulation Matrix

CO Statement (MND-DS-311)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**

MND-DS-311.1	3	1	1	1	1	3	3	2	-	-	3	2	-	1
MND-DS-311.2	3	2	1	1	2	3	3	2	-	-	3	3	-	3
MND-DS-311.3	3	2	1	1	2	2	3	2	1	-	3	3	-	1
MND-DS-311.4	3	1	2	1	2	3	3	1	1	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDC-DS-401: NUTRITION IN EMERGENCY (Theory)

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Type: Program Core
Course Outcomes: The student will be able
MNDC-DS-401.1. To Familiarize students with various natural and man-made emergencies and disaster situation.
MNDC-DS-401.2. To Understand the special nutritional concerns arising out of these conditions.
MNDC-DS-401.3. To apply strategies for nutritional rehabilitation management of the health and emergency /disaster affected populations.
MNDC-DS-401.4. To evaluate emergency preparedness and response programme

PART A

Unit 1: Natural/manmade disasters resulting in emergency situations:
1.1 Famine, drought, flood, earthquake, cyclone, war civil and political emergencies.
1.2 Factors giving rise to emergency situation in the disasters.
1.3 Illustration using case studies from Indian subcontinent.
1.4 Meeting nutritional requirements

Unit 2: Major nutritional deficiency diseases during emergencies
2.1 Causes of malnutrition in emergency situations
2.2 Protein – Emergency Malnutrition
2.3 Micronutrient deficiencies and nutritional relief

Unit 3: Assessment and surveillance of nutritional status in emergency affected populations:
3.1 Scope of assessment of malnutrition in emergencies.
3.2 Indictors of malnutrition. Clinical signs for screening acute malnutrition.
3.3 Anthropometric assessment of nutritional status. Indictors and cut-offs indicating
3.4 seriously abnormal nutrition situations: Weight-for-height based indicators, MUAC, social indicators.
3.5 Organization of nutritional surveillance and individual screening.

PART B

Unit 4: Nutritional Relief and Rehabilitation
4.1 Assessment of food needs in emergency situations.
4.2 Food distribution strategy – identifying and reaching the vulnerable group Targeting Food Aid.
4.3 Mass and Supplementary Feeding
4.4 Special foods / rations for nutritional relief.
4.5 Local production of special food
4.6 Local food rehabilitation
4.7 Organization of mass feeding / general food distribution,

4.8 Feeding centers
4.9 Transportation and food storage

Unit 5: Communicable diseases: Surveillance and treatment:
5.1 General disease prevention measures
5.2 Health information system
5.3 Roll of immunization and sanitation
5.4 Prevention and treatment of specific communicable diseases
5.5 Environmental health

Unit 6: Emergency preparedness and response programme
6.1 community preparedness and national preparedness
6.2 Fostering ownership, participation and capacities
6.3 Optimizing food aid
6.4 Psychosocial and mental health concern
6.5 Nutrition education intervention programmes

Reference readings:

1. V. Goyet, Fish, J. Seaman, and U. Geijaer, 1978. The management of Nutritional Emergencies in Large Populations, World Health Organization, Geneva.
2. Refugee Nutrition Information System (RNIS2015): Newsletters UN ACC/SCN Sub-committee on Nutrition
3. On Field Exchanges, 2016. Newsletters by Emergency Nutrition Network, Dept. of Community Health General Practice Ireland
4. SCN News, 2018. Newsletters by UN ACC/SCN Sub – committee Nutrition
5. WHO Geneva, 2018. The management of Nutrition in major emergencies, AITBS publishers and distributors.
6. Indian Council of Medical Research, 2015. Nutrient Requirements and Recommended-Dietary Allowance for Indians. New Delhi.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-401)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-401.1	3	-	2	3	2	3	-	3	3	1	3	2	-	1
MND-DS-401.2	3	-	2	2	3	2	-	3	2	-	3	3	-	3
MND-DS-401.3	3	-	1	2	3	1	-	3	2	1	3	3	-	1
MND-DS-401.4	3	-	3	3	3	3	-	3	2	1	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be university under section 3 of the UGC act 1956)

MNDF-DS-401 Food Processing & Microbiology (Theory)

Periods/week	Credits	Max marks: 200
L:4	4	Continuous evaluation: 100
Duration of examination: 3 hours		End Semester Examination: 100

Course outcome: The students will be able
MNDF-DS-401.1 To describe the microbiology of processed foods.
MNDF-DS-401.2 To associate basic techniques used in food preservation.
MNDF-DS-401.3 To explain the importance of micro-organisms in food spoilage
MNDF-DS-401.4 To discuss the importance of nano-interactions in food processing

PART - A

Unit 1 Microorganism in foods
1.1 Introduction
1.2 General characteristics of microorganisms
1.3 Classification and identification of different microorganisms important in food industry

Unit 2 Contamination and spoilage of food
2.1 Sources of contamination: air, water, soil, sewage, post processing contamination
2.2 Principles of spoilage
2.3 Factors affecting growth of microbes in food
2.4 Spoilage of fresh fruit and vegetables, spoilage of meat, fish, eggs and poultry products.

Unit 3 Food Preservation
3.1 Principles and Classifications
3.2 Effects on Microbes: chemical preservation, high temperature, low temperature, irradiation, etc.
3.3 Fermented milk, Cereal foods, Vinegar, Oriental foods, Alcoholic beverages.

PART - B

Unit 4 Food in relation to disease
4.1 Food borne illness
4.2 Food borne poisoning, infections and intoxication
4.3 Food borne diseases: Investigations and control.

Unit 5 Industrial Microbiology
5.1 Microorganism in industry
5.2 Industrial uses of bacteria, yeasts and molds
5.3 Future prospects

Unit 6 Food sanitation, control and inspection
6.1 Microbiology in food sanitation

6.1.1 Microbiology in food products
6.1.2 Good manufacturing practices
6.1.3 Hazards analysis and critical control points (HACCP)
6.1.4 Personal Hygiene and health of food Handlers
6.2 Food control
6.3 Enforcement and control agencies
6.4 Microbiological criteria for foods

References reading-

1. W.C. Frazier., 2002. Food Microbiology. Tata McGraw Hill, Delhi.
2. M J. James., 2004. Modern Food Microbiology; CBS Publishers, Delhi
3. Y. Motarjemi and M. Adams., 2006. Emerging Food Borne Pathogens Woodhead Publishing Limited, UK.
4. K.R. Aneja., 2009. Experiments in Microbiology, Plant Pathology and Biotechnology New Age International Publications, India.
5. D.O. Cliver and H.P., 2002. Food Borne Diseases Academic Press, UK.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-401)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDF-DS-401.1	3	2	1	1	2	2	2	3	3	1	2	1	2	2
MNDF-DS-401.2	3	2	2	2	2	1	1	2	1	2	2	2	3	3
MNDF-DS-401.3	2	2	1	2	2	1	2	2	1	1	2	2	3	3
MNDF-DS-401.4	3	2	2	2	1	1	2	2	1	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

MND-DS-411: CLINICAL SPORTS NUTRITION

Periods/week	Credits	Max. Marks: 200
L: 4 T: 0 P: 0	4	Internal/Continuous Assessment: 100
Duration of Examination: 3 Hours		End Semester Exam: 100

Course Type: Core

Course Outcomes: The student will be able:

MND-DS-411.1. To learn about various clinical conditions in sports and required nutrition interventions

MND-DS-411.2. To study the dietary needs and support required for special physiological groups of athletes

MND-DS-411.3. To apply various nutrition strategies in special environmental conditions

MND-DS-411.4. To devise nutrition strategies for sports injuries and rehabilitation

PART A

Unit-1 Nutrition in Clinical Conditions

1.1 Diabetes: Definition and description of diabetes mellitus; Problems of athletes with type 1 diabetes, Exercise in Hyperinsulinemia and Hypoinsulinemia; Medical nutrition therapy (MNT); Dietary guidelines, Carbohydrate type and timing; Pre and post event carbohydrate loading and fluids; Insulin adjustments for athletes with type-1 diabetes; Special problems for athlete with Type-1 diabetes, Complications with poorly controlled diabetes.

1.2 Osteopenia and Osteoporosis: Definition and description; Pathophysiology; Causes and consequences; Medical Nutrition Therapy.

1.3 Sports Anaemia: Definition; Pathophysiology; Clinical symptoms, Causes and consequences; Anaemia status assessment; Medical Nutrition Therapy.

1.4 Gastrointestinal Issues: Common GI problems; Aetiology, Diagnosis, Effect on performance, Food related adverse reactions (FRAR); Irritable Bowel Syndrome (IBS); Low FODMAP diet for IBS; Composition, food sources of FODMAP and pattern of consumption; Coeliac disease (Diagnosis and treatment); Inflammatory bowel disease (IBD), Medical Nutrition Therapy, Gut Training

Unit-2- Nutrition for Paralympic Athletes and Sports Injuries

2.1 Paralympic Athlete: About IPC, Classification, Common medical (sclerosis, diabetes, obesity, Seizures, Autonomic Dys reflexia/Boosting, Pressure Ulcers, Spasticity, Hydrocephalus, Sports Injuries Osteoporosis, Pregnancy, etc), Prosthetics and Orthotics, nutritional problems, injury risk management, dietary concerns related to food and fluid intake, Nutritional requirements, Therapeutic Use Exemption (TUE) under WADA; Use of vitamin, mineral or sports supplements; Travelling issues

2.2 Sport Injury and Rehabilitation: Type of injuries, Physiological and metabolic changes in injury and rehabilitation; dietary concerns and requirements during recovery and rehabilitation

PART B

Unit-3 Nutrition for Athletes with Special Dietary Needs

3.1 Children and Adolescent Athlete: Growth and development; Physiological characteristics; Common nutritional issues, Food and Fluid requirements, Supplement use

3.2 Female Athlete: Nutritional problems, Fuel or nutrient utilisation; Female athletic triad (FAT), Relative energy deficiency in Sports (RED-S), Assessment for FAT, RED-S; Dietary guidelines and suggestions for FAT and RED-S.

3.3 Vegetarian athlete: Classification; Dietary concerns, Nutritional requirements, Suggestions on plant based recipes, meal planning and preparation

3.4 Masters Athlete: Physiological and metabolic changes; Common medical and nutritional problems**,** dietary concerns and requirements; Supplements

Unit-4 Nutrition in Special Environmental Conditions

4.1 High Altitude Training: Physiological and metabolic adaptations; Types of altitude training, Food and Fluid requirements; Common Nutritional problems at high altitude, Supplements use.

4.2 Cold: Physiological and metabolic adaptations; Types of Injuries, Food and Fluid requirements; Common nutritional problems, Supplements use.

4.3 Heat: Heat Balance, Physiological and metabolic adaptations; Classification of Heat Stress Injuries, Effects of exercise in the heat; Food and Fluid requirements; Common Nutritional problems, Supplements use.

4.4 Travelling Athlete: Prerequisites of travelling athletes, Nutritional problems; Jet lag and travel fatigue; Guidelines for preventing food borne diseases and illnesses; Dietary requirements; fluid and electrolytes strategies; Supplements use

References:

1. Burke, L., and Deakin, V. (2015). Clinical sports nutrition. McGraw-Hill.
2. Broad, E. (Ed.). (2014). Sports Nutrition for Paralympic Athletes. CRC Press.
3. Maughan, R. J., & Shirreffs, S. M. (Eds.). (2013). Food, Nutrition and Sports Performance III. Routledge.
4. Campbell, B. (Ed.). (2013). Sports nutrition: enhancing athletic performance. CRC Press.
5. Larson-Meyer, D. E. (2007). Vegetarian sports nutrition. Human Kinetics.
6. Marie Dunford. (2017) Nutrition for Sport and Exercise.
7. LeMura, L. M., & Von Duvillard, S. P. (Eds.). (2004). Clinical exercise physiology: application and physiological principles. Lippincott Williams & Wilkins.
8. Cheung, S. (2010). Advanced environmental exercise physiology. Human Kinetics.
9. https://www.paralympic.org/the-ipc/international-organisation-for-the-disabled

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (**MNDS-DS-411**)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDS-DS-411.1	2	1	1	1	2	1	3	3	2	1	3	3	3	3
MNDS-DS-411.2	3	2	2	2	2	1	2	3	2	1	3	3	3	3
MNDS-DS-411.3	3	2	2	2	1	3	2	3	2	1	3	3	3	3
MNDS-DS-411.4	3	2	2	2	2	2	2	3	2	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MNDP-DS-401: Public Health and Malnutrition

Periods/week	Credits	Max. Marks: 200
L: 4	4	Continuous evaluation: 100
Duration of Examination: 3		End Semester Examination: 100

Course Outcomes: The student will be able
MNDP-DS-401.1. To understand the principles of nutritional epidemiology and its importance in public health
MNDP-DS-401.2. To analyze the prevalence and determinants of community's nutritional/ health problems.
MNDP-DS-401.3. To evaluate public health implications of various nutritional problems and the strategies to overcome the same.
MNDP-DS-401.4. To understand different public health policies run by govt.

PART-A

Unit 1: Epidemiology
1.1 Definition, aims, basic measurements and applications
1.2 Epidemiology Study designs
1.3 Methods of conducting nutrition research in Epidemiology

Unit 2: Introduction: The Incidence of Malnutrition in the World
2.1 Physiology of Malnutrition: Types of malnutrition-What happens to the malnourished body
2.2 Protein-energy malnutrition
2.3 Micronutrient malnutrition
2.4 Nutrition transition and dual nutrition burden of diseases

Unit 3: Public Health Aspects of Under Nutrition
3.1 Etiology and effects of malnutrition at different stages of the life cycle
3.2 Public health implications, prevention and community based management of PEM
3.3 Sever acute malnutrition and prevention and community based management

PART-B

Unit 4: Public Health Aspects of life style related disorders
Public health implications and preventive strategies for obesity, hypertension, coronary heart disease, diabetes, osteoporosis, cancer and dental caries

Unit 5: Socio-Economics of Malnutrition
5.1 Famines
5.2 Present Malnutrition status in India & World
5.3 Food supply and demand
5.4 Population growth, Regional differences, Income distribution

Unit 6: Alleviating Hunger and Malnutrition: Policy Options
6.1 Malnutrition as a motivation for policy intervention
6.2 Population policy and demography
6.3 Pricing policy
6.4 Food distribution

Reference Readings:

1. Leathers, Howard and P. Foster, 2009. The World Food Problem, Fourth Edition, Boulder: Lynn Reinner Publishers.
2. A. Berg, 1973. The Nutrition Factor, The Brookings Institution, Washington.
3. R. Bonita , R. Beaglehole , Kjellstrom., 2006. Basic Epidemiology. Second Edition. WHO.
4. G.C. Frank , 2008, Community Nutrition-Applying epidemiology to contemporary practice. Second Edition. Jones and Bartlett Publishers.
5. M.J. Gibney, B.M. Margetts, J.M. Kearney, I. Arab, (Eds)., 2004, Public Health Nutrition. NS Blackwell Publishing.
6. K. Park, 2009, Park's Textbook of Preventive and Social Medicine. 20th ed. Jabalpur M/s. Banarsidas.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MNDP-DS-401)	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO 6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
MNDP-DS-401.1	3	2	2	2	3	3	1	1	1	1	2	2	2	2
MNDP-DS-401.2	2	2	1	1	2	3	2	1	2	3	1	2	2	3
MNDP-DS-401.3	2	2	3	3	1	1	2	3	2	1	3	2	3	3
MNDP-DS-401.4	3	3	3	1	2	1	2	1	1	1	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-451: Dissertation (Practical)

Periods/week	Credits	Max. Marks: 200
L:0 T: 0 P: 12	6	Continuous evaluation: 100
Duration of Examination: 3 Hours		End Semester Examination: 100

Course Outcomes: The students will be able:
MND-DS-451.1 To apply the appropriate methodology for conducting the experiments.
MND-DS-451.2 To analyze and interpret the research outcomes and adapt a process to yield the quality output
MND-DS-451.3 To analyze the further scope of research
MND-DS-451.4 To learn the structuring of the manuscript.

Course Guidelines:

1. The Approved study (#rd Semester) must be completed and submitted in the form of Dissertation by the end of the fourth semester.
2. M.Sc. Dissertation is expected to cover 60-80 pages of A4 size, excluding bibliography and appendices.
3. Five copies of the same should be submitted to the Head of the Department through the major guide.
4. Each student submitting a Dissertation should also submit five copies of the abstract of his/her dissertation not exceeding 250 words, excluding the title.
5. The student will publish at least one National/International research paper and one oral /Poster presentation on National / International level conference before the viva voce.
6. The thesis shall be accompanied with plagiarism test report/Certificate from the Departmental library duly signed by the scholar, supervisor and the concerned Research Coordinator before the final viva voce.
7. All published papers shall be annexures in the thesis. The overall similarity should not exceed 15% and not more than 10% from a single source excluding self-plagiarism.
8. Marks will be awarded for research seminars/ practical exercises and viva-voce examination.

Distribution of Continuous Evaluation Table:

Research proposal development	20%
Internal seminar/PPT	30%
Evaluation by supervisor	30%
Attendance	20%

Course Articulation Matrix

CO Statement (MND-DS-451)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-451.1	3	1	1	1	2	3	3	3	-	-	3	2	-	1
MND-DS-451.2	3	2	1	1	2	3	3	3	-	-	3	3	-	3
MND-DS-451.3	3	2	1	1	2	3	3	3	3	-	3	3	-	1
MND-DS-451.4	3	1	2	1	2	3	3	3	2	-	3	2	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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MND-DS-402: Nutrition and Health Promotion (Theory)

Periods/week	Credits	Max. Marks: 200
L: 2 T: 0 P:0	2	Continuous evaluation: 100
		End Semester Examination: 100

Duration of Examination: 3 Hours

Course Outcomes: The students will be able
MND-DS-402.1. To understand the concept of health and health promotion
MND-DS-402.2. To relate the social-cultural value for determination of health promotion
MND-DS-402.3. To apply the method of health promotion and education in the work place
MND-DS-402.4. To compare the health promotion strategic planning and evaluation

PART A

Unit 1: Introduction to Health and Health Promotion
1.1. Concept and definition of Health and Wellbeing
1.2. Positive and Negative health
1.3. Linking well-being and ill health
1.4. Ottawa charter
1.5. Bangkok charter
1.6. Goal of health promotion and Concept

Unit 2: Health Promotion determinant of social-cultural value
2.1. Attitudes and health promotion
2.2. Identifying and measuring attitudes
2.3. Attitudes change
2.4 Values in health promotion
2.5. Necessary social and individual values
2.6. Linking social and individual values
2.7. Theories and behavior changing
2.8. Health, health care & health determinants

PART B

Unit 3: Health promotion and education
3.1. Health protection and prevention
3.2. A model of health promotion
3.3. Program planning
3.4. Definition of health education
3.5. Approaches and ingredients
3.6. Health education orientations
3.7. Communication
3.8. Health promotion in setting place (hospital, school, college, working place and community)

Unit 4: Health promotion strategic planning and evaluation

4.1 Prevention and control of Oral health Problem
4.2. Intervention and Promotion of oral Health program
4.3. Evaluation of program intervention (Prevention and promotion) surveillance of oral health

Reference readings:

1. J.F. Mckenzie, B.L. Neiger, & R. Thackeray, 2009. Planning, Implementing, & Evaluating Health Promotion Programs (6th ed.). San Francisco, Pearson Education, Inc.
2. Healthy People 2020: The Road Ahead. Washington D.C.: Author Available at: http://www.healthypeople.gov/hp2020/
3. D.A.Girdano, 1986. Occupational Health Promotion. Macmillan Publishing Co., New York.
4. H. C.Gerald and Melby, L.Christopher, 1987. Priorities for Health Promotion and Disease Prevention. Eddie Bowers Publishing Company, Dubuque, Iowa.

Instructions for External Evaluation: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt .Three questions will be set from each part A and part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Distribution of Continuous Evaluation Table:

Sessional- I	**30%**
Sessional- II	**30%**
Assignment	**20%**
Class Performance	**10%**
Attendance	**10%**

Assessment Tools:
Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Course Articulation Matrix

CO Statement (MND-DS-402)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4
MND-DS-402.1	-	-	3	1	-	-	1				3	2	-	-
MND-DS-402.2	1	-	-	2	1	-	2				3	3	-	2
MND-DS-402.3	2	-	1	2	-	-	3				3	2	-	2
MND-DS-402.4	3		1	1	1	-	2				-	3	3	3

Appendix A

Subjects focusing on Global, National and Regional Development

Course Code	Course Name	Global	National	Regional
MND-DS-101	Nutritional Biochemistry	✔	✔	
MND-DS-151	Nutritional Biochemistry (Practical)	✔	✔	
MND-DS-102	Human Physiology	✔	✔	
MND-DS-152	Human Physiology (Practical)	✔	✔	
MND-DS-103	Human Nutrition Requirement	✔	✔	✔
MND-DS-153	Human Nutrition Requirement (Practical)	✔	✔	✔
MND-DS-104	Food Science & Processing Technology		✔	✔
MND-DS-154	Food Science & Processing Technology(Practical)		✔	✔
MND-DS-105	Healthcare Management			✔
MND-201	Manav Rachna Life Skills –I			✔
MND-DS-201	Statistical Methods for Applied Sciences	✔	✔	✔
MND-DS-202	Techniques in Food Analysis		✔	✔
MND-DS-252	Techniques in Food Analysis (Practical)		✔	✔
MND-DS-203	Institutional Food Service Management		✔	✔
MND-DS-253	Institutional Food Service Management (Practical)		✔	✔
MND-DS-204	Nutrition in Health and Disease	✔	✔	
MND-DS-254	Nutrition in Health and Disease (Practical)	✔	✔	
MND-DS-205	Neutraceutical and Functional Foods		✔	
MND-DS-206	Nutrition for elderly		✔	
MND-DS-255	Neutraceutical and Functional Foods (Practical)		✔	
MND-DS-256	Nutrition for Elderly (Practical)		✔	
MND-DS-207	Scientific Writing and Communication Skills	✔	✔	
MNDC-DS-301	Advanced Clinical Nutrition	✔	✔	✔
MNDC-DS-351	Advanced Clinical Nutrition (Practical)	✔	✔	✔
MNDC-DS-302	Nutrition in Intensive Care	✔	✔	✔
MNDC-DS-352	Nutrition in Intensive Care (Practical)	✔	✔	✔
MNDC-DS-303	Management of Nutrition Related Disorders	✔	✔	
MNDC-DS-353	Management of Nutrition Related Disorders(Practical)	✔	✔	
MND-DS-354	Technical Seminar	✔	✔	✔

MND-DS-355	Research Proposal Development	✔	✔	✔
MND-DS-306	Advanced Nutritional Sciences		✔	
MND-DS-307	Fortification of Food		✔	
MND-DS-308	Epidemiology and Public Health		✔	
MND-DS-309	Sports Supplements and Doping	✔	✔	✔
MND-DS-310	Nutrition for Parathletes		✔	✔
MNDF-DS-301	Advanced Food Science & Chemistry	✔	✔	✔
MNDF-DS-351	Advanced Food Science & Chemistry (Practical)	✔	✔	✔
MNDF-DS-302	Biotechnology of Food		✔	✔
MNDF-DS-352	Biotechnology of Food(Practical)		✔	✔
MNDF-DS-303	Microbiology of Food		✔	✔
MNDF-DS-353	Microbiology of Food (Practical)		✔	✔
MNDS-DS-301	Exercise Physiology & Metabolism	✔	✔	✔
MNDS-DS-351	Exercise Physiology & Metabolism (Practical)	✔	✔	✔
MNDS-DS-302	Sports Specific Nutrition		✔	✔
MNDS-DS-352	Sports Specific Nutrition (Practical)		✔	✔
MNDS-DS-303	Sports Nutrition		✔	✔
MNDS-DS-353	Sports Nutrition (Practical)		✔	✔
MNDP-DS-301	Food and Nutrition Security	✔	✔	✔
MNDP-DS-351	Food and Nutrition Security (Practical)	✔	✔	✔
MNDP-DS-302	Health Promotion and Nutrition communication		✔	✔
MNDP-DS-352	Health Promotion and Nutrition communication (Practical)		✔	✔
MNDP-DS-303	Aspects of Public Health Nutrition		✔	✔
MNDP-DS-353	Aspects of Public Health Nutrition (Practical)		✔	✔
MNDC-DS-401	Nutrition in Emergency		✔	✔
MND-DS-402	Nutrition and Health Promotion		✔	✔
MNDP-DS-401	Public Health and Malnutrition		✔	✔
MND-DS--451	Dissertation	✔	✔	✔
MNDF-DS-401	Food Processing and Microbiology		✔	✔
MNDS-DS-401	Recent Trends in Sports Nutrition		✔	✔

APPENDIX B

Courses focusing on Entrepenureship, Employability and Skill development

Course Code	Courses	Entrepenureship	Employability	Skill Development
MND-DS--151	Nutritional Biochemistry (Practical)			✔
MND-DS--152	Human Physiology (Practical)			✔
MND-DS--153	Human Nutrition Requirement (Practical)			✔
MND-DS--154	Food Science & Processing Technology(Practical)			✔
MND-DS-201	Statistical Methods for Applied Sciences			✔
MND-DS-202	Techniques in Food Analysis			✔
MND-DS-252	Techniques in Food Analysis (Practical)			✔
MND-DS-203	Institutional Food Service Management			✔
MND-DS-253	Institutional Food Service Management (Practical)	✔		✔
MND-DS-204	Nutrition in Health and Disease			✔
MND-DS-254	Nutrition in Health and Disease (Practical)		✔	✔
MND-DS-255	Neutraceutical and Functional Foods (Practical)			✔
MND-DS-256	Nutrition for Elderly (Practical)			✔
MNDC-DS-301	Advanced Clinical Nutrition		✔	✔
MNDC-DS-351	Advanced Clinical Nutrition (Practical)		✔	✔
MNDC-DS-302	Nutrition in Intensive Care			✔
MNDC-DS-352	Nutrition in Intensive Care (Practical)		✔	✔
MNDC-DS-353	Management of Nutrition Related Disorders (Prac.)		✔	✔

MND-DS-354	Technical Seminar		✔	✔
MND-DS-355	Research Proposal Development			✔
MND-DS-307	Fortification of Food			
MND-DS-308	Epidemiology and Public Health			✔
MND-DS-309	Sports Supplements and Doping		✔	✔
MNDF-DS-351	Advanced Food Science & Chemistry (Practical)			✔
MNDF-DS-352	Biotechnology of Food(Practical)			✔
MNDF-DS-303	Microbiology of Food			✔
MNDF-DS-353	Microbiology of Food (Practical)			✔
MNDS-DS-301	Exercise Physiology & Metabolism			✔
MNDS-DS-351	Exercise Physiology & Metabolism (Practical)			✔
MNDS-DS-352	Sports Specific Nutrition (Practical)			✔
MNDS-DS-303	Sports Nutrition		✔	✔
MNDS-DS-353	Sports Nutrition (Practical)		✔	✔
MNDP-DS-301	Food and Nutrition Security			✔
MNDP-DS-351	Food and Nutrition Security (Practical)		✔	✔
MNDP-DS-302	Health Promotion and Nutrition communication		✔	✔
MNDP-DS-352	Health Promotion and Nutrition communication (Practical)		✔	✔
MNDP-DS-353	Aspects of Public Health Nutrition (Practical)			✔
MNDC-DS-401	Nutrition in Emergency			✔
MNDF-DS-401	Food Processing and Microbiology			✔

MNDS-DS-401	Recent Trends in Sports Nutrition			✔
MNDP-DS-401	Public Health and Malnutrition			✔
MND-DS-451	Dissertation			✔

APPENDIX C

Courses focusing on Professional ethics, Environment and sustainability, Gender Equality and Human values

Course Code	Courses	Professional Ethics	Environment and Sustainability	Gender Equality	Human Values
MND-DS-103	Human Nutrition Requirement			✔	
MND-DS-105	Health Care Management		✔		
MND-DS-204	Nutrition in Health and Disease	✔			
MND-DS-309	Sports Supplement and Doping	✔			
MNDC- DS-352	Nutrition in Intensive Care	✔			